TM 1-1520-248-MTF

TECHNICAL MANUAL

MAINTENANCE
TEST FLIGHT

ARMY
OH-58D
HELICOPTER

This manual supersedes TM 1-1520-248-MTF, dated 30 April 1999, including all changes, and TM 1-1520-248-MTF CDS4 Supplement, dated 01 November 2000.

HEADQUARTERS
DEPARTMENT OF THE ARMY
15 NOVEMBER 2001

URGENT

TM 1-1520-248-MTF
C 2

CHANGE NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *15 March 2002*

Maintenance Test Flight

Army OH-58D Helicopter

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Remove pages	Insert pages
5-3 and 5-4	5-3 and 5-4
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TM 1-1520-248-MTF
C 2
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
0206602

DISTRIBUTION:

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CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *31 December 2001*

Maintenance Test Flight

Army OH-58D Helicopter

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TM 1-1520-248-MTF, 15 November 2001, 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
2-3 and 2-4	2-3 and 2-4
2-5 through 2-10	2-5 through 2-10
2-23 through 2-26	2-23 through 2-26
---	2-26.1/(2-26.2 blank)
2-27 and 2-28	2-27 and 2-28
---	2-28.1/(2-28.2 blank)
2-41 through 2-46	2-41 through 2-46
2-59 and 2-60	2-59 and 2-60
2-65 and 2-66	2-65 and 2-66
---	3-8.1/(3-8.2 blank)

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TM 1-1520-248-MTF
C1

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0134703

DISTRIBUTION:
To be distributed in accordance with Initial Distribution No. (IDN) 310929 requirements for TM 1-1520-248-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 1-1520-248-10 Operator's Manual and must be completed prior to each maintenance test flight. Emergency procedures are found in the applicable -10 or checklist (-CL) and are not duplicated in this publication. Prior to each maintenance test flight, the pilot will contact maintenance/quality control personnel to determine the maintenance that has been performed. This manual shall be used only by qualified maintenance test flight pilots as required in AR 95-1.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of the applicable Aircraft Operator's Manual (when using the 2028-2 or an electronic 2028 from the Operator's manual, ensure the publication number and title reflect this MTF) direct to: Commander, U.S. Army Aviation and Missile Command, ATTN:AMSAM-MMC-MA-NP, Redstone Arsenal, Alabama 35898-5230. A reply will be furnished to you.

TABLE OF CONTENTS

SECTION I. INTRODUCTION

1. Purpose. The purpose of this manual is to provide complete instructions for performing maintenance test flights of OH-58D helicopters. For the specific conditions which require a general or limited maintenance test flight, refer to the following manuals:

AR 95-1
TM 1-1500-204-23 Series
TM 1-1500-328-23
TM 1-1520-248-23 Series
TM 1-1520-248-T Series
TM 1-2840-263-23
TM 1-6625-724-13&P
TM 9-1240-778-23
TM 11-1520-248-23 Series
TM 55-2840-256-23

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 the following conditions:

WARNING

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

CAUTION

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

NOTE

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

3. General Information.

a. This manual covers only maintenance test flights of OH-58D helicopters and in no way supersedes any information contained in the TM 1-1520-248-10 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 for **"**Before Starting Engine Checks**"** through **"**Engine Shutdown Checks**"**.

b. Crew requirements will be as specified in TM 1-1520-248-10.

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

d. Checks completed with this manual shall not be conducted with live ordnance installed on the aircraft.

4. Special Instructions.

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

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

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

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

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

f. Asterisked Checks. An asterisk (*) prior to a check requires that the Test Flight Sheet be annotated with a specific reading. Also a check (√) for satisfactory performance or an (X) for problem detected will be recorded and a short statement entered in the remarks block of the Check Sheet.

g. Maintenance Test Flight Check Sheet. A Check Sheet similar to the one contained in Section V will be used for all test flights. When a test flight is performed for the purpose of determining 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 helicopter test flight Check Sheet may be locally reproduced. Continuation sheets may be used when necessary. Items that prove to be unsatisfactory during the test flight, and require corrective action, shall be listed in the remarks block during flight and transferred to DA Form 2408-13-1/-1E immediately after termination of the flight. The sheet will be attached to DA Form 2408-13-1/-1E upon completion.

h. Series and Effectivity Codes. Designator symbol R is used in conjunction with text contents, text headings, and illustration titles to show OH-58D(R) effectivity of the material. If the material applies to all series and configurations, no designator symbols will be used. Where practical, descriptive information is condensed and combined to avoid duplication.

The R effectivity symbol designates that the material applies to armed OH-58Ds equipped with dedicated left and right MCPUs and an Allison 250-C30R/3 engine. The following equipment is also normally installed in R equipped aircraft: IDM in place of ATHS, DRU in place of DTR, and RMS. OH-58Ds without FADEC are identified as **(OH-58D)** or **(CDS2)** as applicable.

OH-58D Control Display System II is identified as CDS2, OH-58D Control Display System III is identified as CDS3, and OH-58D Control Display System IV is identified as CDS4. The R effectivity symbol is applicable to both CDS3- and CDS4-configured aircraft, unless identified as CDS3- or CDS4-peculiar.

i. Symbol(s) Preceding Numbered Steps. **"**O**"** Indicates if installed.

SECTION II. MAINTENANCE TEST FLIGHT CHECKLIST

General. This section contains the maintenance test flight requirements peculiar to Army model OH-58D helicopters. Conditions requiring accomplishment of test flights shall be in accordance with TM 1-1500-328-23. The requirements contained herein are established to ensure a thorough inspection of the helicopter before flight, during flight and upon completion of the maintenance test flight. The right side of the checklist (Troubleshooting Reference) is cross-indexed to the troubleshooting guides contained in Section III. A dash between references means "thru"; a comma means "and". The references list the possible abnormal conditions, indications or malfunctions which could be encountered while performing the procedure.

PROCEDURE	TROUBLESHOOTING REFERENCE

PRIOR TO MAINTENANCE TEST FLIGHT

1. Forms and Records — Check.
2. A thorough flight readiness inspection in accordance with the requirements contained in TM 1-1520-248-10 — Performed.
3. Special Pre-Flight Checks — Accomplished.

INTERIOR BEFORE STARTING ENGINE

1. Antitorque pedal adjustment knobs — Check full travel and set as desired.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

CAUTION

To prevent possible inadvertent contact of pilot cyclic grip with instrument panel, adjustment of the cyclic will not exceed two complete turns from the full aft position.

2. Cyclic — Check full travel of adjustment knob. Set as desired.

WARNING

If CPG cyclic is to be used as a flight control, the cyclic shall be engaged.

NOTE

If conducting rotor smoothing procedures, it is recommended the CPG cyclic be locked out.

3. CPG cyclic — Check for positive engagement. Lock out cyclic and verify lockout capability. Reengage cyclic as required.

4. Seat belts and shoulder harnesses — Fasten and adjust.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

5. Shoulder harness inertia reels and locks — Check operation and leave unlocked.

6. Utility light — Check condition of light, blue-green lens, and power cord.

7. HEAT rheostat — Check for smooth operation and contact of both stops. Turn off (counterclockwise).

CAUTION

R To prevent accidental automatic start, ensure IGN circuit breaker switch is OFF prior to applying power to the aircraft.

8. Circuit breakers and switches — Set as follows:

   a. Circuit breakers — As required.

      (1) R IDM circuit breaker — Out.

      (2) RADAR WARN circuit breaker switch — **(CDS2)** RADAR (up), **(CDS3/ CDS4)** as desired.

      (3) EGI circuit breaker — Out.

PROCEDURE	TROUBLESHOOTING REFERENCE
INTERIOR BEFORE STARTING ENGINE (CONT)	
(4) R FADEC circuit breaker switch — FADEC (forward/on).	
(5) R IGN circuit breaker switch — OFF.	
(6) IR JAMMER XMTR circuit breaker switch — IR JAMMER (rear/off).	
(7) CARGO HOOK circuit breaker switch — OFF.	
(8) IR JAMMER BASE circuit breaker switch — IR JAMMER (fwd/on)	
b. NVG, CONSOLE LT, and INST LT rheostats — Check smoothness of operation, set as desired.	C17
c. FLOOD LT rheostat and switch — Check smoothness of operation, set as desired. Check blue-green lens right side, clear lens left side.	C17
d. POS light — As required.	C15, 16
e. ANTI COLL light switch — ANTI COLL.	C14
f. PITOT HTR switch — OFF.	
g. HTR switch — OFF.	
h. L DEFOG BLWR switch — OFF.	

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

i. R DEFOG BLWR switch — OFF.

j. COMPT BLWR switch — AUTO.

k. Deleted.

l. Deleted.

m. FUEL BOOST switch — OFF.

n. ENG ANTI ICE switch — OFF.

o. ENG OIL BYPASS switch — OFF.

p. ESNTL BUS switch — START.

q. AC GEN switch — OFF.

r. DC GEN switch — OFF.

s. BATT 2 switch — OFF.

t. BATT 1 switch — OFF.

9. FUEL valve handle — Check for threads in witness hole, cotter pins present, cracks, and excessive grooves on lever arm, and condition of Teflon slider (if installed). Check for smoothness of operation, flex in cable when closing, and leave in forward (ON) position and locked into detent.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

* 10. Free air temperature (FAT) gage — Check condition and note FAT.

O 11. PDU — Check condition and security. Adjust or stow as required.

12. PDU Mount — Check condition and security.

13. RFD — Check condition.

14. RPM, TGT, and TRQ vertical scale indicators — Check condition.

15. Pilot and CPG MFDs — Check condition.

16. MFD auxiliary panels — Check condition, switches set as desired, pilot inclinometer full of fluid, no bubbles or cracks.

17. Clock — Check condition; if analog, check condition and set.

18. Radar warning indicator — Check condition.

O 18.1 FILTER/BYPASS switch — Check condition and security.

* 19. Magnetic compass compensated within last 12 months, and record magnetic compass heading.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

NOTE

Do not adjust standby altimeter until DC power has been applied.

20. Standby altimeter — Check condition.

21. Standby attitude indicator — Check condition and caged with OFF flag visible.

22. Standby airspeed indicator — Check condition, static indication, range markings:

Red line	—	125 kts
Green arc	—	20 to 125 kts
Yellow arc	—	0 to 20 kts.

23. R FADEC AUTO/MAN switch — Check condition and security. Place in AUTO.

24. MPD — Check condition.

25. MFK — Check condition, ZERO and EMER switch covers down.

26. ACP — Check condition and security. Set switch as follows:

    a. GUN switch — SAFE (gun not installed).

    b. GUN switch — ARMED (if gun installed).

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

c. ARMED/STBY indicator — Check condition.

d. MASTER switch — OFF.

e. JETTISON switches — Check condition, covers down and safetied.

27. Pilot and CPG CSC — Check and set as desired.

28. R External RMT/ICS switch — As desired.

29. Ignition switch — Check that outer race does not rotate and key cannot be removed in ON position. Leave switch in ON position.

30. **(OH-58D)** Fuel control panel — Check condition and cover down.

31. SCAS control panel — Check condition and set switches as follows:

a. SCAS PWR switch — OFF.

b. SCAS TEST switch — Check condition.

c. SCAS PITCH/ROLL ENGAGE, and YAW ENGAGE switches — Spring-loaded OFF.

PROCEDURE	TROUBLESHOOTING REFERENCE
INTERIOR BEFORE STARTING ENGINE (CONT)	
d. FORCE TRIM switch — FORCE TRIM.	
e. HYD SYS switch — HYD SYS.	
32. Collective control switches — Check condition, set as follows:	
a. **(CDS2)** RMT ICS — ICS.	
b. START switch — OFF.	
c. SRCH LT — OFF.	
d. Remaining switches — Check.	
33. Flight controls — Check as follows:	
a. Cyclic friction — OFF. Check condition and security of CPG and pilot cyclic switches.	
b. Collective — Down and unobstructed, friction off.	H5
c. Antitorque pedals — Check freedom of travel and no spring-back from the full stop position. Center pedals.	H3, 4
34. Throttle — Check for full travel, spring-back, idle detent and return to closed position. Check CPG throttle grip screw is visible.	E1, 7

PROCEDURE		TROUBLESHOOTING REFERENCE
INTERIOR BEFORE STARTING ENGINE (CONT)		
O 35.	BATT 2 switch — BATT 2.	C2
36.	BATT 1 switch — BATT 1.	C2, 3, 11, 12
37.	MFD — Check LOW RPM audio can be heard in both headsets, initial page displays CAUTION annunciator, ENG OUT, LOW RPM ROTOR, and **(CDS4)** LOW FUEL PRES warning messages.	C7, 8
38.	Caution, warning and advisory messages — Review and acknowledge.	
39.	GPU — Connect as required (DC only).	B1
40.	R FADEC — Check as follows:	
	a. Collective — Full down.	
	b. FADEC MONITOR page — Review, record.	

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

CAUTION

Maintenance codes on ENGINE HISTORY PAGE 3 are not subject to software anomalies but may indicate intermittent problems. Troubleshooting must be performed on all maintenance codes displayed.

c. ENGINE HISTORY pages — Review, record, and clear when appropriate.

d. FADEC circuit breaker switch — OFF. Note FADEC FAIL, FADEC MANUAL, and FADEC MAINT messages display and FADEC audio is heard.

e. FADEC circuit breaker switch — FADEC. Note FADEC FAIL, FADEC MANUAL, and FADEC MAINT messages delete and FADEC MAINT message momentarily displays.

f. AUTO/MAN switch — MAN. Note MAN legend illuminates and FADEC MANUAL message displays with audio.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

g. AUTO/MAN switch — AUTO. Note FADEC MANUAL message and audio delete, FADEC MAINT message momentarily displays and AUTO legend illuminates.

h. IGN circuit breaker switch — IGN. If performing HMU piston parking procedure — OFF.

NOTE

ESW 6, CODE 0040, may be an indication that the HMU pistons may not be properly parked.

41. R HMU piston parking procedure. If aircraft has had engine, FADEC, or HMU maintenance accomplished it is possible that the HMU manual mode pistons were left in the wrong position. When not certain of the piston positions, park the HMU pistons as follows:

a. IGN circuit breaker switch — OFF.

b. AUTO/MAN switch — MAN.

c. Throttle — Check closed.

d. START switch — Motor for 10 seconds.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

e. AUTO/MAN switch — AUTO.

f. START switch — Motor for 10 seconds.

g. Warnings, cautions, and advisories — Verify no FADEC messages displayed.

(1) If FADEC MAINTENANCE/NO AUTO START messages display with the throttle closed, advance the throttle to idle.

(2) If the messages delete, the fault should clear after the next start cycle.

(3) If the messages do not delete, verify fault codes on ENGINE HISTORY Page 3 and complete appropriate maintenance prior to starting the engine.

h. ESW Maintenance codes — Verify none appear.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

NOTE

FDL menu page will not display if weight on gear switch does not sense helicopter on ground.

42. TAMS BIT — Accomplish.

    a. FDL MENU key — Press.

NOTE

With GPU connected for starting, ESNTL BUS switch does not need to be placed to RUN position.

    b. BIT key — Press.

    c. ESNTL BUS switch — RUN.

NOTE

TAMS BIT results are valid only when performed with the rotor stopped.

    d. TAMS — Press. Wait for TAMS BIT cycle to complete test. Check MFD to display GO for TAMS BIT.

    e. ESNTL BUS switch — START.

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

f. Caution, warning, and advisory messages — Review and acknowledge.

43. CW HISTORY page — Review; clear when appropriate.

44. ENGINE HISTORY page(s) — Review. Record; clear when appropriate.

45. MPD — Check.

a. Vertical scale instruments — Check static indications and range markings.

b. TEST switch — TEST position, vertical scales will illuminate full-scale and digital readouts will indicate 888 except NG which indicates 188.8. Also WRN and selectable display lights will be illuminated.

NOTE

In some cases, vertical scale resolution does not allow color change to occur exactly at a limit mark.

(1) TRQ:

Blue light	—	Power — ON
Green light	—	0 to 100%

PROCEDURE		TROUBLESHOOTING REFERENCE
INTERIOR BEFORE STARTING ENGINE (CONT)		
Red light	—	100 to 135%
Limit Mark (◄)	—	100%
Digital readout	—	888
(2) TGT:		
Blue light	—	Power — ON
Green light	—	200 to 710 °C
Yellow light	—	710 to 800 °C
Red light	—	800 to 1050 °C
S	—	927 °C
T	—	871 °C
Limit Mark (◄)	—	802 °C
Yellow/white Marking	—	715 to 800 °C
Digital readout	—	888
(3) NP:		
Blue light	—	Power — ON
Green light	—	0 to 107%
Red light	—	107 to 120%
Limit Mark (◄)	—	107%
Digital readout	—	888
(4) NR:		
Blue light	—	Power — ON
Green light	—	97 to 100%
Yellow light	—	90 to 97% and 100 to 107%
Red light	—	0 to 90% and 107 to 120%
Limit Mark (◄)	—	90 to 107%
Green Marking	—	97 to 100%

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

Digital readout	—	888

(5) XMSN Oil Pressure:

Blue light	—	Power — ON
Green light	—	30 to 70 psi
Red light	—	0 to 30 psi and 70 to 75 psi
Limit Mark (◄)	—	30 and 70 psi

(6) XMSN Oil Temperature:

Blue light	—	Power — ON
Green light	—	15 to 110 °C
Red light	—	0 to 15 °C and 110 to 140 °C
Limit Mark (◄)	—	15 to 110 °C

(7) ENG Oil Pressure:

Blue light	—	Power — ON
Red light	—	0 to 50 psi
Yellow light	—	50 to 90 psi
Green light	—	90 to 130 psi
Red light	—	130 to 150 psi
Yellow/white Marking	—	50 to 90 psi
Limit Mark (►)	—	50 and 130 psi

(8) ENG OIL Temperature:

Blue light	—	Power — ON
Green light	—	0 to 100 °C
Red light	—	-10 to 0 °C and 100 to 140 °C

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

Limit Mark (◄)	—	0 and 107 °C

(9) Fuel QTY:

Blue light	—	Power — ON
Yellow light	—	0 to 100 lbs
Green light	—	100 to 750 lbs
Digital readout	—	888

(10) NG:

Blue light	—	Power — ON
Green light	—	0 to 105%
Red light	—	105 to 115%
Limit Mark (►)	—	105%
Digital readout	—	188.8

c. Selectable digital display — Check for following indications and leave in BATT V and START V. Each pair of system indicators is selected by repeated pressing of SEL switch. As each pair is called up, the appropriate indicator light will illuminate and digital readouts display as follows:

NR	At or near 0
NP	At or near 0
FUEL QTY	Note indication
ENG TRQ%	At or near 0
AC V	Note indication
RECT V	At or near 0
RECT LD%	At or near 0
S. GEN LD%	At or near 0

PROCEDURE	TROUBLESHOOTING REFERENCE

INTERIOR BEFORE STARTING ENGINE (CONT)

BATT V	Note indication
START V	At or near 0

d. BRT — Check rheostat through full range. Set as desired.

e. MFD BKUP — Check and select.

46. MMS control panel switches — Check condition, set as follows:

a. MMS mode selector switch — OFF.

b. VIDEO toggle switches — As desired.

c. LASER FIRST/LAST switch — As desired.

d. LASER OFF/STANDBY/ARM switch — OFF.

e. LASER CODE button — Check condition and security.

47. **(OH-58D)** RPM switch — Decrease (–) for 10 seconds. C13

(OH-58D) ENGINE START

1. Fireguard — Posted.
2. Rotor blades — Clear and untied.

PROCEDURE	TROUBLESHOOTING REFERENCE

(OH-58D) ENGINE START (CONT)

CAUTION

- If fuel control caution/advisory message displays during engine start, abort start and verify failure codes. Engine starting under these conditions should only be accomplished when helicopter evacuation or troubleshooting is necessary; monitor TGT and NG to avoid exceeding limits.
- DO NOT attempt start if BATT V is less than 21 volts.
- BATT V may go below 14 volts during initial start cycle; however, BATT V must be at least 14 volts prior to advancing throttle. If after advancing throttle the BATT V is less than 14 volts, abort the start.
- If TGT does not begin to rise by 18% NG, abort the start.
- If auto acceleration occurs when throttle is opened, abort start. On subsequent restart, engine shall be warmed up at idle (63 to 65% NG) for 10 minutes prior to flight.

PROCEDURE	TROUBLESHOOTING REFERENCE

(OH-58D) ENGINE START (CONT)

CAUTION

Refer to TM 1-1520-248-10 for engine starting limits. Abort start if abnormal conditions are noted.

NOTE

- A FUEL BOOST FAIL caution message, before or during start, will not be cause for aborting the start or grounding the helicopter.
- For cold temperature starts, if ENG OIL and/or XMSN OIL pressures are above limits, or ENG OIL and/or XMSN OIL temperatures are below limits, do not accelerate engine above idle.
- Low battery voltage may cause erroneous readings on engine and transmission instruments.

3. Engine start — Accomplish as follows:
   a. START switch — Press and hold. Start time.
   b. BATT V and START V — Check at or above 14 volts prior to advancing throttle.

PROCEDURE	TROUBLESHOOTING REFERENCE
(OH-58D) ENGINE START (CONT)	
c. TGT — 150 °C or less.	
d. Throttle — Advance slowly at 12% NG and modulate throttle to maintain TGT within limits. Slowly advance to idle after TGT has decreased from initial peak.	
* e. TGT — Monitor for over-temperature condition and record peak indication.	A2,3,5
f. ENG OIL pressure — Check rising by 20% NG or abort start.	
g. Rotor blades — Check turning by 25% NG or abort start.	A4, 6
h. Flight controls — Collective down, cyclic and pedals centered.	
* i. START switch — Release at 50% NG. Record start time.	A7
j. NG — Check stabilized at idle, 63 to 65%.	E5
k. NR/NP — Check indication.	
l. Engine and Transmission Instruments — Within limits.	

PROCEDURE	TROUBLESHOOTING REFERENCE

R ENGINE START (AUTOMATIC MODE)

1. Fireguard — Posted (if available).
2. Rotor blades — Clear and untied.
3. Engine start — Accomplish as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

R ENGINE START (AUTOMATIC MODE) (CONT)

CAUTION

- To prevent a hot start, if the "NO AUTO START" advisory is displayed on the MFD, do not attempt an automatic start, unless message is deleted when throttle is advanced to the idle detent.
- If the starter is still engaged at idle (indicated by START V not near 0) the throttle must be closed, and after TGT is below 200 °C the battery switch(es) must be turned off.
- DO NOT attempt start if BATT V is less than 21 volts.
- BATT V may go below 14 volts during the initial starting cycle; however, BATT V must be at least 14 volts by the time NG reaches 10%. If this requirement is not met, or BATT V decreases below 14 volts after 10% NG, abort the start to prevent the possibility of a hot start.
- If TGT does not begin to rise by 18% NG, abort the start.
- Refer to TM 1-1520-248-10 for engine starting limits. Abort start if abnormal conditions are noted.

PROCEDURE	TROUBLESHOOTING REFERENCE

R ENGINE START (AUTOMATIC MODE) (CONT)

a. AUTO/MAN switch — Check AUTO.

NOTE

- The START switch must be activated within 60 seconds of advancing the throttle or the engine will not start. This is a safety feature to prevent inadvertent automatic starting of the engine. Clearing of this safety feature requires the pilot to place the throttle in the cutoff position, cycle the FADEC circuit breaker switch OFF then ON, then reinitiate the start sequence.
- A FUEL BOOST FAIL caution message, before or during start, will not be cause for aborting the start or grounding the helicopter.
- Low battery voltage may cause erroneous readings on engine and transmission instruments.

b. Throttle — Open to idle detent.

PROCEDURE	TROUBLESHOOTING REFERENCE

R ENGINE START (AUTOMATIC MODE) (CONT)

CAUTION

To prevent damage to engine, if it becomes apparent that temperature limits will be exceeded before 50% NG is attained, abort the start.

c. Start switch — Press for 2 seconds then release.

d. BATT V — Check 14 volts or greater.

* e. TGT — Increasing and within limits. Record peak TGT. A2,3,5

f. Engine oil pressure — Check rising by 20% or abort start.

g. Rotor blades — Turning by 25% NG or abort start. A4, 6

* h. START V — Decreased to near 0 at 50% NG. Record start time. A7

i. NG — Check stabilized at idle (63 to 65%). E5

PROCEDURE	TROUBLESHOOTING REFERENCE

R ENGINE START (AUTOMATIC MODE) (CONT)

NOTE

For cold temperature starts, if ENG OIL and/or XMSN OIL pressures are above limits, or ENG OIL and/or XMSN OIL temperatures are below limits, do not accelerate engine above idle.

4. XMSN OIL pressure and ENG OIL pressure — Within limits.

ENGINE RUNUP — PILOT

CAUTION

To prevent damage to the DC charging system when second battery is installed, do not initially charge both batteries simultaneously.

O 1. BATT 2 — OFF.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP — PILOT (CONT)

NOTE

- If a GPU is used for engine start, the ESNTL BUS switch will be placed in RUN position prior to placing the DC GEN switch in DC GEN position. This will eliminate momentary power loss to power assured and DC essential buses.
- When the DC GEN switch is placed in DC GEN position, with the ESNTL BUS switch already in RUN position, it is essential to ensure that the generator comes on line.

2. DC GEN switch — DC GEN. Verify START generator load.
3. AC GEN switch — AC GEN.
4. CPG MFD — Check INITIAL PAGE 1 displays. Review warning, caution, and advisory messages and compare to pilot MFD.
5. ESNTL BUS switch — RUN.

O 6. GPU — Disconnect. Verify EXT PWR advisory deletes.

7. **(CDS2)** DTS/R MDU — Mission load as required.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP — PILOT (CONT)

O 7.1 EBF system — Check as follows:

a. FILTER/BYPASS switch — Press. Check BYPASS segment illuminated. Ensure bypass door opens fully.

b. FILTER/BYPASS switch — Press. Check BYPASS segment extinguished. Ensure bypass door is closed.

NOTE

STBY altimeter must indicate greater than sea level for the EGI to align properly.

8. EGI — Check as follows: C6

a. Pilot MFD NAV ALIGN key — Press.

b. CPG MFD VSD key — Press.

c. EGI circuit breaker — In.

d. Pilot MFD — Allow auto alignment to activate or perform manual alignment as required. Start time when GC align displays. Verify PITCH/ROLL ladder displays 45-60 seconds after time is started.

e. CPG INIT switch — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP — PILOT (CONT)

f. MISSION key — Press. Verify ZULU time and Julian date are displayed.

g. CPG HSD key — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP — PILOT (CONT)

h. Pilot MFD — Verify GC align message deletes and AUTO/MANUAL legend is unboxed at 4 minutes since time was started. **(CDS4)** Verify GPS SAT DATA display is proper for conditions.

i. MISSION key — Press.

(1) ZULU and JULIAN date — Verify correct.

(2) **(CDS4)** TIME FOM — Verify display.

9. Standby attitude indicator — Uncaged, OFF-FLAG goes away.

SYSTEM CHECK

1. MPD BIT/RST switch — Place to BIT position, note correct MPD software for helicopter configuration, and note and record any fault codes. Press to RST and release upon completion of built-in test.

2. RFD — Press TEST key and verify test pattern displays.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

CAUTION

Limit cyclic and pedal movement to 2 inches maximum displacement from center for all ground operations.

NOTE

Excessive loose play is not normal and requires maintenance action.

3. Force trim check.

FORCE TRIM switch — FORCE TRIM. Check cyclic and antitorque pedals for positive feeling of force gradient springs; check for loose play. Check for approximately equal forces needed to offset cyclic into lateral and fore-and-aft positions. Check operation of pilot and CPG force trim interrupter switches. Note correlation of both cyclic sticks.	G2, 4 H3, 4, 8, 9, 13

4. Cyclic check.

   a. CPG cyclic — Disengaged.

PROCEDURE			TROUBLESHOOTING REFERENCE
SYSTEM CHECK (CONT)			
	b.	FORCE TRIM switch — OFF. Check for creep, motoring, and freedom of movement. No binding or restrictions allowed. Check tip path plane for correlation with cyclic movement.	H1, 2, 11, 12
*	c.	Use spring scale to check all quadrants for equal force of 1 ± 0.5 pound.	H1, 2, 11
	d.	FORCE TRIM switch — ON. Check cyclic friction is on. Turn FORCE TRIM switch — OFF. An acceptable increased force should be required to move cyclic in all quadrants. FORCE TRIM — ON.	H11
	e.	Cyclic friction — OFF.	
	f.	CPG cyclic — Engaged as required.	
5.	Collective check.		
*	a.	Raise collective approximately 0.5 inch from lower stop. Use spring scale to check built-in friction of 2 to 6 pounds. Collective down.	G2, 4, H6

PROCEDURE	TROUBLESHOOTING REFERENCE
SYSTEM CHECK (CONT)	
b. Raise collective mid travel and return to full down while checking for binding and hard spots in upper portion of travel. Observe control reaction and LOW HYD PRESS caution message does not display.	G2, 4 H6, 7
c. Collective friction — ON. An acceptable increased force should be required to move the collective. Collective — down. Friction — OFF.	H5, 6, 7
CAUTION	
CPG shall guard flight controls while the following step is performed.	
* 6. Antitorque pedal check. FORCE TRIM — OFF. Check built-in friction for 3 to 4 pounds.	H3,4
7. Hydraulic system check.	

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

CAUTION

- Before any movement of controls with the hydraulic system off, both hands must be on the controls.
- Brief CPG not to remove his hand from hydraulic system switch unless instructed to do so. Be prepared for possible up forces on collective. If up forces are excessive, return switch to HYD SYS. This condition must be corrected before continuing.

a. HYD SYS switch — OFF. Acknowledge caution audio message only.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

Feedback forces will be encountered when moving the cyclic stick. If hydraulic servos are functioning properly, negligible forces will be required to maintain a given stick position once the stick is stopped.

b.	Cyclic — Check for unusual forces or feedback while moving cyclic 45 degrees right forward then back to neutral, 45 degrees left forward and return cyclic to neutral.	G3
c.	Collective — Check that collective can be moved up about midtravel and moved full down.	G3
d.	Antitorque pedals — Check right and left pedals for binding.	G3,H17
e.	HYD SYS circuit breaker — Out. LOW HYD caution message deleted and pressure restored.	
f.	HYD SYS switch — HYD SYS.	
g.	HYD SYS circuit breaker — In.	
h.	FORCE TRIM switch — FORCE TRIM.	

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

8. Engine idle speed check.

   a. DC GEN switch — OFF. Check idle stabilized at 63 to 65% NG.

NOTE

For cold temperature starts, if ENG and/or XMSN oil pressures are above limits or ENG and XMSN oil temperatures are below limits, do not accelerate engine above idle.

   b. Pilot throttle — Increase approximately 5% NG then return to idle. NG should stabilize at 63 to 65%. Note NG% and repeat step verifying NG returns to same stabilized NG%.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

- Dual control installation requires an idle speed check from the CPG throttle.
- CPG throttle is double the rate of the pilot throttle. Idle speed may be up to 0.5% NG higher on CPG throttle twist grip, but no lower.

c. CPG throttle — Increase approximately 5% NG, then return to idle.

9. Idle release — Check:

a. Note NG speed and reduce pilot throttle to 1/8 inch below idle stop for 15 seconds, then return to flight idle. NG shall remain stabilized throughout check.

b. DC GEN switch — DC GEN.

10. **(OH-58D)** Fuel control overspeed check. E9

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

The test circuit for the electronic NP overspeed control is equipped with a lockout switch that is activated at 70% NP and below. At 80% NP and above the lockout switch is activated to prevent excessive torque fluctuations in the event the check circuit malfunctioned or was inadvertently energized.

a. FDL BIT PAGE — Select.

b. MPD SEL switch — Select NR/NP.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

Do not hold test buttons longer than necessary to complete next check.

c. Throttle — Slowly advance to increase NP to 66%. Digital test button - press and hold - increase NP to 70%. Note NP does not exceed 70%. Retard throttle to idle position once NP drops from 70%. Simultaneously release digital test button. Check FUEL CONTROL for GO/NO GO. Note any failure codes and refer to appendices for action(s) required.

d. Throttle — Slowly advance to increase NP to 66%. Analog test button - press and hold - increase NP to 70%. Note NP does not exceed 70%. Retard throttle to idle position once NP drops from 70%. Simultaneously release analog test button.

e. Throttle — Advance to stabilize NP at 85 ± 2%. Note low RPM audio and warning message come on at approximately 80% NR.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

f. DIGITAL test button — Press and release. Note no decrease in NP. FUEL CONTROL advisory message should momentarily appear. Note GO/NOGO with any error code.

g. ANALOG test button — Press and release. Note no decrease in NP and BIT not initiated.

NOTE

28 Vdc power is removed from the FADEC when switch is turned OFF. This will trip a BIT fault code 0001 on engine status word 2. A NO AUTO START and FADEC MAINT message will display on next aircraft power up when the throttle is below idle detent. A normal engine start, runup, and shutdown will clear the NO AUTO START and FADEC MAINT message.

11. R FADEC — Check as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

CAUTION

To prevent uncontrollable rotor overspeed and damage to drive train components, do not switch to manual mode unless the collective is full down and the throttle is at idle.

a. AUTO/MAN switch — MAN. Note FADEC MANUAL message displayed, audio is heard in both headsets, and MAN legend illuminates.

b. Throttle — Open slowly to 100% NP.

(1) Note the LOW RPM ROTOR warning message appears at approximately 80% NR with audio tone for both pilot and CPG stations. (Note warning message and audio delete at approximately 93% NR.)

(2) At 100% NP, check for high frequency vibrations and verify correlation between engine oil pressure and NG.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

(3) If HIGH RPM rotor warning check is required, advance throttle to 107% NR as displayed on the MFD. HIGH RPM rotor warning messages should display at 107% ± 1% NR with audio. Reduce throttle and set to 100% NP.

c. AUTO/MAN switch — AUTO. Reduction in NP may occur due to manufacturing tolerances and atmospheric conditions. Note FADEC MANUAL message deletes and AUTO legend illuminates.

d. Throttle — Full open, then reduce to 91 ± 1% NP.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

- FADEC FAIL and FADEC MANUAL messages will only occur if the PMA fails to provide power to the ECU.

- After placing the FADEC circuit breaker switch to OFF position, AUTO/MAN switch will not be illuminated and NO AUTO START message will display in approximately 30 seconds.

e. FADEC circuit breaker switch — OFF. Note no change in NP and FADEC FAIL and FADEC MANUAL messages do not activate.

f. Throttle — Reduce to 81 ±1% NP. Note FADEC FAIL and FADEC MANUAL messages and audio do not activate at or above 85% NP.

g. FADEC circuit breaker switch — FADEC. Note AUTO legend illuminates.

h. Throttle — Reduce to idle. Note FADEC MAINT message displays. Check FADEC maintenance codes.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

i. AUTO/MAN switch — MAN then AUTO. Note FADEC MANUAL message, with audio, deletes and AUTO legend illuminates. Note FADEC MAINT and NO AUTO START message deletes.

12. Throttle — Full open and check as follows:

a. Recall caution and advisories and verify AC GEN and RECT FAIL messages delete at 95 ± 2% NP.

b. LOW RPM ROTOR warning message comes on at approximately 80% NR and goes off at approximately 95 ± 2% NR.

c. **(OH-58D)** NR stabilizes at 96 ± 2%. J3

d. R NR stabilizes at 100 ± 1%. J3

e. Check for high frequency vibrations.

f. Verify correlation between engine oil pressure and NG.

O g. FILTER/BYPASS switch — Check.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

Use digital readout on MPD when adjusting/setting NR/NP. NR vertical scale indicator and MFD NR BACKUP display may indicate 1% higher than actual NR, which is shown on digital MPD readout.

13. **(OH-58D)** NP trim check — Position RPM trim switch on pilot collective to increase (+). NP should increase to 102 ± 2%. Adjust NP to 100%. — C13, E2

14. R NP trim check — Position RPM trim switch on pilot collective to decrease (-). NP should decrease to 95 ± 1%. Position RPM trim switch to increase (+). NP should increase to 105 ± 1%. Adjust NP to 100%. — C13, E2

* 15. Mast torque — Check. At flat pitch and 100% NR, torque should be below 25%.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

CAUTION

Overspeed protection will not be provided while fuel control circuit breakers are pulled. All throttle movements should be smooth and continuous.

16. **(OH-58D)** HIGH RPM rotor warning — Check as follows:

    a. Throttle — Reduce to idle.

    b. FUEL CONTR DIGT circuit breaker — Out. Note caution and advisory.

    c. FUEL CONTR ANLG circuit breaker — Out.

    d. Throttle — Open slowly to 107 ± 1% NR. Note the HIGH RPM warning message activates on both MFDs and the audio is heard in each headset. Reduce throttle to idle.

    e. FUEL CONTR DIGT and ANLG circuit breakers — In. Note caution and advisory deleted. Complete ESC BIT.

    f. Throttle — Full open 100% NR.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

If not completed in step 11, perform the following.

17. R HIGH RPM rotor warning — Check as follows:

    a. Throttle — Reduce to idle.

    b. AUTO/MAN switch — MAN. Note FADEC MANUAL message and audio.

    c. Throttle — Open slowly; note the HIGH RPM warning message displays on both MFDs and the audio is heard in both headsets at 107% ± 1% NR. Throttle reduce to idle.

    d. AUTO/MAN switch — AUTO. Note FADEC MANUAL message deletes and AUTO legend illuminates. FADEC MAINT will momentarily display on MFD.

    e. Throttle — Full open 100% NR.

18. SCAS REL switch — Check as follows:

    a. Verify EGI FAIL caution message is not displayed.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

b. SCAS PWR switch — PWR.

c. SCAS PITCH/ROLL ENGAGE switch — PITCH/ROLL.

d. SCAS YAW ENGAGE switch — YAW.

e. Pilot SCAS REL switch — Press. Observe SCAS DISENG displayed on MFD.

f. SCAS YAW ENGAGE switch — YAW.

g. SCAS PITCH/ROLL ENGAGE switch — PITCH/ROLL.

h. CPG SCAS REL switch — Press. Observe SCAS DISENG displayed on MFD. Engage SCAS.

19. SCAS CHECK — Check as follows:

a. FORCE TRIM switch — OFF.

b. INIT switch — Press.

c. SCAS CHECK key — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

d. SCAS TEST switch — Press. Observe SCAS CHECK IN PROGRESS displays on MFD. After 5 to 6 seconds, PITCH/ROLL and YAW SCAS switches will automatically cycle to OFF.

NOTE

- Do not move flight controls until SCAS PITCH/ROLL ENGAGE and YAW ENGAGE switches are off.
- To ensure a valid test, maintain the following cyclic and pedal position inputs steady until completion of test.

e. Cyclic — Displace right 1.0 inch and aft 1.0 inch.

f. Pedals — Displace right 1.0 inch.

g. MFD — PREFLT COMPLT, SCAS DISENG caution message displayed. Center cyclic and pedals.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

Due to tolerances inherent to the SCAS system, random failures of the SCAS test may be indicated. If a SCAS test failure is encountered, verify system failure by attempting two additional checks.

h. PITCH/ROLL ENGAGE switch — PITCH/ROLL.

i. YAW ENGAGE switch — YAW.

WARNING

Do not activate L or R portion of SCAS heading, hold ENGA DISENG trim switch. Unguarded pedals could position to left or right mechanical stops.

20. Heading hold — Check as follows:

a. EGI aligned. Heading hold ENGA/DISENG SWITCH — ENGA. Observe HDG HOLD advisory displayed on both MFDs.

b. Antitorque pedals — Move. Observe HDG HOLD deleted from MFDs. Note audio is heard in both headsets.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

c. SCAS heading hold ENGA DISENG trim switch — ENGA. Observe HDG HOLD displayed on MFDs.

d. SCAS heading hold ENGA DISENG trim switch — DISENG. Note antitorque pedals move freely and HDG HOLD deleted from MFDs. Note audio is heard in both headsets.

e. FORCE TRIM switch — FORCE TRIM.

21. MPD SEL switch — Select RECT LD%/S GEN LD%. Check S GEN LD% load.

22. AC GEN switch — OFF. Acknowledge AC GEN and RECT FAIL caution message.

23. COMPT BLWR — Check as follows:

a. COMPT BLWR switch — OFF, then ON. Note increase in S GEN LD%. Note blower motor operates properly and check for excessive noise in headset caused by blower motor or noise suppressor failure.

b. COMPT BLWR switch — AUTO. Note blower operation above 37 °C FAT only.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

24.	DEFOG & VENT — Check as follows:	C4
	a. R DEFOG BLWR switch — R DEFOG BLWR. Note increase in S GEN LD%. Note blower motor operates properly and check for excessive noise in headset caused by blower motor or noise suppressor failure. Check proper operation of VENT PULL levers.	
	b. Repeat step a. for L DEFOG BLWR switch.	
25.	HTR switch — HTR. Check no TGT increase or warming air from outlets. Rotate HEAT rheostat switch to INCREASE. Check for TGT increase and warming air from outlets near base of pilot and CPG cyclic sticks. Close outlets and check for warming air from defog vents. R and L DEFOG BLWR switch — OFF; check for decrease in S GEN LD%. VENT levers push in, HTR switch — OFF; check for decrease in TGT. Set HTR switch as required.	

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

26. PITOT HTR switch — PITOT HTR. Check for increase in S GEN LD% and PITOT HEAT ON advisory message displays on MFD. Switch OFF. Note decrease in S GEN LD% and message deleted. Set switch as required. — C9

NOTE

Fuel boost is required for all normal conditions when engine is operating except during starting.

27. FUEL BOOST switch — FUEL BOOST. Ensure S GEN LD% does not increase more than 3%. Ensure NG remains stabilized. FUEL BOOST PUMP FAIL caution message and audio may activate, and then delete. — D2

28. AC GEN switch — AC GEN. Verify AC GEN and RECT FAIL caution messages delete.

29. ENG ANTI ICE — Check as follows:

    a. ENG ANTI ICE switch — ENG ANTI ICE. Check for increase in TGT and ENG ANTI-ICE ON advisory displayed on MFD. — E4

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

b. ENGINE ANTI ICE switch — OFF. Note decrease to normal TGT and advisory deleted.

30. BATT PRHT indicator lights — Press to test. C1

31. MPD SEL switch — Select FUEL QTY/ENG TRQ%. E6

32. BIT checks — Accomplish as follows and note failure codes:

a. INIT switch — Press.

b. FDL MENU key — Press.

c. BIT key — Press.

d. CDS key — Press. R Verify GO.

e. R OS test — Confirm legend is displayed.

f. **(CDS2)** ATHS key — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

NOTE

Note RALT reading less than 5 feet on CPG MFD.

g. Set high altitude warning and low altitude warning for a safe altitude for local operating areas. RALT key — Press. Check GO displays and note reading increases to 1000 ± 100 ft on CPG MFD. As altimeter decreases below 180 feet, verify analog bar decreases to zero.

h. EGI — Verify GO.

i. MAST TQ key — Press. Mast torque indication should increase to 90 ± 2%.

NOTE

- **(CDS2)** Ensure CSC B knob is IN to verify ISP audio tones.

- **(CDS2)** If ISP is not installed, ISP legend will not be displayed and key will have no function.

O j. **(CDS2)** ISP key — Press.

k. DTS key — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

SYSTEM CHECK (CONT)

l. PAGE 2 key — Press.

m. R FM-1 key — Press.

n. UHF key — Press.

o. VHF key — Press. R Verify status.

O p. HF key — Press.

q. R FM-2 key — Press.

r. ADU key — Press. Observe RFD display and monitor for proper audio tones.

s. IFM key — Press. R Verify status.

t. VTR key — Press. R Verify status.

u. PAGE 3 key — Press.

NOTE

If TACAN is installed, PAGE 3 will display TACAN BIT PAGE. PAGE 4 will display MUX BUS status.

O v. TACAN key — Press.

w. MUX BUS status — Check.

33. Avionics — Check as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE
SYSTEM CHECK (CONT)	
a. Pilot MFD — Access FREQ pages. Verify that at least two preset frequencies are entered for each radio.	
b. Pilot CSC — Select each radio. Note that an arrow appears next to the corresponding number on RFD. Channel UP/DOWN on each radio and note that frequencies change.	
c. **(CDS2)** CSC Transmit selector switch — Select a numbered position. Pilot RMT/ICS switch — RMT. Use radio select switch to select radios. Channel to manual frequency, select KYBD, and enter desired frequency.	
d. R Pilot RMT/ICS switch — RMT. Use radio select switch to select radios. Channel to manual frequency, select KYBD, and enter desired frequency.	K1,2
e. Secure radio equipment — Configure for operation and check if installed.	K4
f. CIPH key on RFD — Select, then deselect CIPH mode for each radio. Verify CIPH appears, deletes on the RFD.	K3,4

PROCEDURE	TROUBLESHOOTING REFERENCE
SYSTEM CHECK (CONT)	
g. CPG CSC — Select each radio and note that an arrow appears next to the corresponding number on the RFD. Channel UP/DOWN on each radio and note that frequencies change. Channel to manual frequency, select KYBD and enter desired frequency.	K1,2
O h. ICS VOX function — Check and set as required.	
i. IFF — Set and test. Refer to TM 1-1520-248-10 for operational check.	K6,11
j. **(CDS2/CDS3)** IFM power — Set to HI.	
k. **(CDS4)** IFM power — Verify HI is available.	
34. Navigation waypoints — Check and load.	
35. R RMS — Configure.	
36. Flight plan — Check/construct.	
37. Battlefield graphics — Check/ construct.	

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE HOVER CHECKS

1. R AUTO/MAN switch — Verify AUTO.
2. Throttle — Full open, 100% NR.
3. CPG cyclic — Engaged as required.
4. SCAS — Engaged.
5. Warnings, Cautions, and Advisories — Review and acknowledge.

* 6. Systems — Check and record following: E6

   a. XMSN OIL P

   b. XMSN OIL T

   c. ENG OIL P

   d. ENG OIL T

   e. NG

   f. ENG TRQ

   g. TGT

   h. MAST TRQ.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE HOVER CHECKS (CONT)

7. Standby altimeter — Set barometric pressure and compare with field elevation. Altimeter indication should be within 70 feet of field elevation below 5000 feet pressure altitude.

8. MFD — Select VSD and set PITCH and ROLL switches. BRT and CONT as desired. Check altimeter. Indication should be within 70 feet of field elevation below 5000 feet pressure altitude.

9. Cyclic and collective friction — As desired. Recommended off.

10. Force trim — As desired. Recommended off.

O 11. Dual battery charging — Complete.

O 12. Ejector rack pins and grounding cables — Remove.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS

1. Take off to hover — Carefully bring helicopter to a 3-foot hover. Monitor control response and CG hang as helicopter leaves ground. Controls should be in proper position for conditions. Check hover power appropriate for conditions. — H14-16, J1, 2

NOTE

Power assurance check and hover power check may be deferred until reaching hover test flight area.

2. Power assurance check — Perform. — E8

   a. Turn HTR and ENG ANTI ICE switches — Off.

   b. Aircraft — Stabilized 3-foot hover into the wind.

   * c. Record FAT, TGT, pressure altitude, ENG TRQ%.

   d. Enter power assurance chart (Figure 5-1) at FAT, move up to TGT, over to current pressure altitude, and down to ENG TRQ%.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

NOTE

If indicated ENG TRQ% is less than value shown on the power assurance chart, this would indicate NO GO criteria. Repeat check twice to verify data. Discontinue test flight and refer to **(OH-58D)** TM 55-2840-256-23/R TM 1-2840-263-23 for procedures.

* 3. Hover power check — While at a stabilized 3-foot hover into the wind, record mast torque, TGT, and NG. Readings should be normal for conditions. Check torque with PPC.

NOTE

Check parking area for indication of leaks.

4. Control rigging check.

   a. With helicopter heading into the wind, check controllability of the tail rotor by making 90 degree pedal turns left and right.

   b. With helicopter into the wind, perform sideward flight in both directions to check cyclic response and rigging. Limit ground speed to 5 knots.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

c. While maintaining 5 feet AGL, fly forward into the wind until effective translational lift is reached. Check cyclic response and rigging, abnormal vibrations, and/or flight control displacement.

5. SCAS check — With helicopter at a stabilized 10-foot hover into the wind, check as follows:

   a. Check pitch and roll SCAS by making fore, aft, and lateral cyclic inputs of approximately 1 inch. Note pitch and roll rates.

   b. Check yaw SCAS by making left and right pedal inputs of approximately 1 inch. Note yaw rates.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

c. Repeat steps a. and b. with SCAS off. Verify that the rates are lower and heading is held better with SCAS on and that SCAS improves overall flight characteristics and handling qualities.

d. SCAS PITCH/ROLL and YAW switches — Engage.

6. Heading hold check — With helicopter at a stabilized 3-foot hover into the wind, engage heading hold. Check HDG HOLD displays on MFD. Helicopter should maintain heading within ± 2 degrees. Increase collective moderately. Stabilize at a 10-foot hover and note that heading remains constant. Descend to a 3-foot hover. Move SCAS heading hold ENGA DISENG trim switch to R and L to check for normal operation. Apply slight pressure to antitorque pedals. Heading hold should disengage automatically. Check HDG HOLD deletes from MFD and audio is heard in both headsets.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

CAUTION

Brief CPG to hold HYD SYS switch throughout following check. should cyclic jam or become hard to move, instruct CPG to place HYD SYS switch Off, then HYD SYS. If cycling the switch does not release controls, turn HYD SYS switch Off and accomplish a hydraulics-off landing.

7. Power cylinder check.

Climb and maintain a 10-foot hover. Smoothly move cyclic along a straight line from left rear to right forward. The length of the stroke should be approximately 3 inches either side of center. No restrictions to movement should be felt and the LOW HYD PRESS caution message should not illuminate. This check is primarily a flow capacity check of the hydraulic pump. Repeat the procedure moving from right rear to left forward, then return to normal hover altitude. G1,2,4

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

CAUTION

- Do not exceed helicopter operating limits during power applications.
- Manually reduce throttle to idle prior to switching fuel control modes to prevent overspeed.

NOTE

NR/NP may droop slightly during application of collective and increase during reduction of collective, but should start to recover within 5 seconds.

8. **(OH-58D)** Engine response and fuel control check.

   a. Digital fuel control — From a stabilized 3-foot hover, while maintaining instruments within normal ranges, make a positive increase in collective. NG should increase then stabilize. Increase should occur in less than 1 second. Stop climb before excessive altitude is gained and land helicopter.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

b. Analog fuel control check — Reduce the throttle to idle and allow NG to stabilize, raise the fuel control panel switch cover and move the switch to ANLG BACK UP position. Note fuel control caution and advisory messages. Increase throttle to full open position. NR/NP should stabilize at 101 to 103%. Move RPM switch to + and - position. NR/NP should remain constant. Bring helicopter to a hover and make a positive increase in collective. Verify NG increases, then stabilizes. Increase should occur in less than 1 second. Reduce collective to avoid excessive altitude gain, then descend and land helicopter.

c. Fuel control switch — Reduce throttle to idle. Move fuel control switch to NORM position. Fuel control caution and advisory messages should delete. Perform ESC BIT. Rotate throttle to full open. Reset NR to 100%.

9. R Engine response check.

a. FADEC MONITOR page — Select. Note ENGINE SURGE events.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

b. From a stabilized 3-foot hover, while maintaining instruments within normal ranges, make a positive increase in collective. NG should increase then stabilize. Increase should occur in less than 1 second. Stop climb before excessive altitude is gained and land helicopter.

NOTE

If ENG SURGE numbers increment, the surge may not be duplicated because the FADEC will automatically adjust fuel scheduling to avoid the surge/stall area.

c. FADEC MONITOR page — Verify ENGINE SURGE events did not increment.

10. R FADEC manual mode check.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

CAUTION

- Failure to coordinate throttle/ collective inputs may result in engine overspeed, overtemp, overtorque or inadvertent activation of the NP overspeed protection system.
- To prevent uncontrollable rotor overspeed and damage to drive train components, do not switch to manual mode unless the collective is full down and the throttle is at idle.

a. Throttle — Reduce to idle.

b. AUTO/MAN switch — MAN. Note FADEC MANUAL message displays, audio is heard in both headsets and MAN legend illuminates. ACK audio only.

c. Throttle — Open slowly to 100% NR. **(CDS4)** Reduce throttle. Note that LOW RPM ROTOR warning message appears, with audio, at 93 ±1%. Set throttle to 100% NR.

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

d. Take off to hover — Carefully bring helicopter to a 3-foot hover. Coordinate throttle/ collective inputs to maintain 100 ± 2% NR at a hover. Land helicopter.

e. Throttle — Reduce to idle.

f. AUTO/MAN switch — AUTO. Note FADEC MANUAL message deletes and AUTO legend illuminates.

g. ENGINE HISTORY page 3 — Check maintenance codes.

h. Throttle — Full open 100% NR.

11. HOVER/HOVER BOB-UP — Perform as follows from stabilized 3-foot hover:

PROCEDURE	TROUBLESHOOTING REFERENCE

HOVER CHECKS (CONT)

NOTE

R If the FOM is > 1 or the NAV system is not in the blended mode, the advisory HVR DEGRADED will appear when the BOB-UP box is activated.

a. MFD — Select hover/hover bob-up page. Note velocity vector and hover box positioning. Move helicopter and observe hover box indicates original helicopter position.

12. Flight instruments — Verify proper function.

BEFORE TAKEOFF CHECKS

1. Avionics — As required.
2. NR — 100%
3. R FADEC AUTO/MAN switch — AUTO.
4. Systems check — Check.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAKEOFF CHECKS (CONT)

5. MPD SEL switch — Check all indications and set to FUEL QTY/ ENG TRQ% position. Fuel quantity should agree with reading on vertical scale indicators.

6. ACP switches — Set.

7. CPG cyclic — Engaged as required.

8. Crew, passengers, mission equipment, seat belts, and armor side panels — Check.

IN-FLIGHT CHECKS

1. Take off.

   a. Perform a normal takeoff. Check that control position and instrumentations are normal for conditions. J1,2,H15

   b. RAD/ALT HIGH altitude limit check. HI indicator flashes ± 10 feet of set altitude.

* c. Initiate fuel consumption check after level-off.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

d. **(CDS3/CDS4)** HSD — Note Fuel Burn Rate (FBR) and Fuel Time Remaining (FTR) display. Verify display changes with collective position changes.

2. Control Rigging Check.

NOTE

- Perform checks 2 through 6 into the wind.
- The helicopter may be in a slight dive during control rigging check depending on conditions.

a. While maintaining 100 KIAS and aircraft in trim, lower the collective to 70% mast torque.

(1) SCAS — Disengage.

(2) FORCE TRIM — ON. Check cyclic remains in place when hand pressure on cyclic is relaxed.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

NOTE

Pedal displacement check shall be made from pilot position only.

b. With FORCE TRIM switch OFF and aircraft in trim, check pedal position. Normal pedal position is neutral to 1.5 inches of right pedal. Relax pedal pressure. Pedals should not creep.

c. SCAS PITCH/ROLL ENGAGE and YAW ENGAGE switches — PITCH/ROLL and YAW.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

3. Autorotation RPM.

WARNING

- If AUTOROTATION RPM cannot be maintained in the normal operating range, terminate the test flight.
- Select an altitude that will allow a power recovery climb to be accomplished by 500 feet AGL.

NOTE

Ensure ENG ANTI ICE and HTR switches are off prior to next check.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

NOTE

- MTF MISSION GROSS WEIGHT – 4500 pounds. NR shall be stabilized at 100% ±2% at the selected baseline DA for your operating area. A DA baseline median for the operating area would be, for example; DA summer average is 4000 feet; DA winter average is 2000 feet: median is 3000 feet; this would be your baseline DA for NR AUTO COMPUTATION.

- NR will increase approximately 1% for every 1000 foot increase in density altitude or 100 pound increase in gross weight.

a. COLLECTIVE — Lower to the full down position when a safe touchdown area can be reached. Maintain 55 ±5 KIAS and aircraft in trim.

b. RPM — Confirm within limits.

c. Throttle — Reduce to idle. Check NG stabilized at 63–65%. Check MQ/EQ are at or near 0%.

* d. Aircraft — Check stabilized and in trim. Record NR.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

e. Aircraft — Check pedals for sufficient right pedal remaining, cyclic for normal position, and a marked increase or decrease in vibration/unusual noises.

f. Power recovery — Perform. Climb shall be accomplished by 500 feet AGL. Maintain airspeed above 50 KIAS on climbout.

g. NR — Compare recorded NR to NR required for aircraft weight and DA. Adjust as required.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

4. Hydraulic system check.

WARNING

Bank angles exceeding 45 degrees without hydraulic boost may cause roll rates to exceed controllable limits.

CAUTION

Brief CPG not to remove hand from HYD SYS switch until instructed to do so. If any control problems or abnormal forces are encountered, the pilot will instruct the CPG to place the HYD SYS switch to HYD SYS position.

a. While maintaining approximately 80 KIAS, turn HYD SYS switch Off. Note LOW HYD PRESS and SCAS DISENG caution messages displayed; acknowledge. Check that helicopter pitch and roll attitude can be maintained with no abnormal force present. More force should be required to move the cyclic right forward than left forward.

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

b. Decrease and increase collective to check that at least 17% down and 83% up mast torque can be reached without excessive force. Do not exceed any limitations during this check. Check tail rotor controllability by maintaining helicopter in trim during the collective check.

c. Stabilize helicopter and relax pressure on controls.

d. HYD SYS switch — HYD SYS.

e. SCAS PITCH/ROLL and YAW ENGAGE switches — PITCH/ROLL AND YAW.

5. Collective anticipator — Check.

a. Collective — While maintaining 80 KIAS, lower collective to attain 78% NG and allow to stabilize, then make a smooth increase of collective up to 85% mast torque in not more than 5 seconds. Note NR droop does not exceed **(OH-58D)** 4% or R 2%.

6. Vibration analysis — Complete. (See Section IV for detailed procedures and Section III, J, Troubleshooting References). F1 J1-3

PROCEDURE	TROUBLESHOOTING REFERENCE
IN-FLIGHT CHECKS (CONT)	
NOTE Eliminate or minimize all main rotor vibrations prior to the following checks.	
7. VSD page — Check for proper indications, no excessive fluctuations. Check that standby flight instruments correspond with VSD page indications.	
* 8. MPD — Check for normal indications. Leave in FUEL QTY/ ENG TRQ% and record fuel quantity and time for fuel consumption check.	
9. Avionics — Check each radio to determine proper operation. Two frequencies should be used. Check all floor and cyclic push-to-talk buttons.	K1-3
10. Secure radio equipment — See generic operating procedures in TM 1-1520-248-10 Operator's Manual, and Section III for Troubleshooting Procedures. Check if installed.	K4
11. Transponder — See operating procedures in TM 1-1520-248-10 Operator's Manual and accomplish checks as follows:	K6-11

PROCEDURE	TROUBLESHOOTING REFERENCE

IN-FLIGHT CHECKS (CONT)

a. Contact ATC for transponder check to include emergency.

b. IFF — Check if installed.

12. R RMS — Check.

a. MFDs — select RMS main page.

b. Display — Check.

(1) Center helicopter symbol.

(2) L-1 through L-4, R-1 through R-3 and R-5 line address labels.

(3) Selected map mode.

c. Select L-1 through L-4, R-1 through R-3 — Check operation.

d. SLEW key — Select.

e. L-1 — select. Enter waypoint; note that a cross symbol slews to the selected waypoint.

f. RMS key — Select; note that the helicopter symbol is displayed at known point and moves properly along a selected route.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE LANDING CHECKS

1. LASER OFF/STBY/NORM switch — as required.
2. MMS — Stowed as required.
3. ACP switches — Set.
4. Landing light — As required.

O 5. IR JAMMER circuit breaker switch — Set as required.

NOTE

During descent note that radar altimeter scale reappears at 180 ± 10 feet and LO indicator flashes at set altitude ± 10 feet with audio.

AFTER LANDING CHECKS

1. Landing light — As required.
2. Transponder — STBY.

O 3. ASE — Configure for operation and check. Refer to Section IV, Special Procedures.

* 4. Navigation system check — Perform as required. See Section IV, Special Procedures.

PROCEDURE	TROUBLESHOOTING REFERENCE

AFTER LANDING CHECKS (CONT)

5. MMS operational check — Perform as required. See Section IV, Special Procedures.

O 6. AVTR — Configure for operation and check. Refer to Section IV Special Procedures.

O 7. ADSS — Configure for operation and check. Refer to Section IV Special Procedures.

O 8. Weapons System operational checks — Perform as required. Refer to Section IV Special Procedures.

O 9. R IDM — Configure for operation and check. Refer to Section IV, Special Procedures.

ENGINE SHUTDOWN CHECKS

1. Flight controls — Cyclic centered, pedals neutral, collective down.

2. FORCE TRIM switch — FORCE TRIM. H8

3. Control frictions — as desired.

* 4. Systems — Check and record as follows: E6

a. XMSN OIL P

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN CHECKS (CONT)

b. XMSN OIL T

c. ENG OIL P

d. ENG OIL T

e. NG

f. ENG TRQ

g. TGT

h. MAST TRQ

5. FDL MENUs — Check pilot and CPG as follows:

a. INIT switch — Press.

b. FDL MENU key — Press.

c. BIT PAGE key — Press.

d. RECALL keys — Press.

e. **(OH-58D)** DIGITAL fuel control switch — Press. FUEL CONTROL advisory message should momentarily appear. Note GO/NO GO with any error codes.

f. MENU key — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN CHECKS (CONT)

* g. ENGINE HISTORY — Review, note indications and record limits exceeded. R Record FADEC maintenance codes.

6. MMS — OFF before reducing RPM below 95% NP.

7. Throttle — Reduce slowly to idle for 2 minutes minimum and check the following:

   a. LOW RPM ROTOR warning message and audio activate at 95 ± 2% NR.

   b. AC GEN FAIL and RECT FAIL messages activate at 91 to 88% NP.

   c. NG — Check stabilized at 63 to 65%.

8. BATT 1/BATT 2 — Check as follows:

   a. MPD SEL switch — Select RECT LD%/S GEN LD%.

   b. BATT 1 switch — Off.

   c. S GEN LD% — Check and note indication.

O d. BATT 2 switch — Off. Check S GEN LD% for a decrease which should not exceed 3%.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN CHECKS (CONT)

NOTE

Fluctuations of 3% or less indicate a fully charged battery.

e. BATT 1 switch — BATT 1. Check S GEN LD%, increase should not exceed 3%.

9. AC GEN switch — Off.

10. FUEL BOOST switch — OFF.

11. Standby attitude indicator — Caged.

12. SCAS PWR switch — Off.

13. **(CDS2)** DTR/**(CDS3/CDS4)** DRU — Mission store as required.

NOTE

Allow TGT to stabilize for 2 minutes prior to next check.

14. R Overspeed test — Perform as follows:

a. INIT switch — Press.

b. FDL MENU key — Press.

c. BIT key — Press.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN CHECKS (CONT)

d. OS TEST key — Press twice (2nd press within 15 seconds of the first). Verify OS TEST ACTIVE displays centered in bottom third of page.

e. Throttle — Closed after GO indication on test. Monitor for residual fires and note the following:

(1) ENGINE OUT warning — Displayed just prior to GO indication.

(2) LOW OIL PRESS ENG caution — Displays at 50 PSI.

(3) LOW OIL PRESS XMSN caution — Displays at 30 PSI.

15. Throttle — Off. Monitor for residual fires and note the following:

a. ENGINE OUT warning — Displays at 55 ± 3% NG.

b. LOW OIL PRESS ENG caution — Displays at 50 psi.

c. LOW OIL PRESS XMSN caution — Displays at 30 psi.

16. ESNTL BUS switch — START after NG goes below 10%.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN CHECKS (CONT)

17. Overhead switches — Off except batteries, required lights, and compartment blower. R IGN circuit breaker switch — OFF.

NOTE

R If BATT 1 and BATT 2 are turned off before NG reads 0%, the HMU pistons will not be properly parked.

* 18. Last flight recall — Check as follows:

a. BATT 1 switch — OFF after NG reads 0%. Guard cyclic for movement. BATT 1 switch — ON.

b. FDL MENU keys — Left and right — Press.

c. BIT keys — Left and right — Press.

* d. Last flight recall keys — Left and right — Press. Check last flight recall on PILOT MFD. Check last flight recall on CPG MFD by pulling BKUP knob on PILOT MFD. Record.

* e. ENGINE HISTORY page — **(OH-58D)** Record HSF. R Record ENG STARTS.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN CHECKS (CONT)

f. CW HISTORY — Review and note failures.

g. R Caution, warning, and advisory messages — (If FADEC check performed.) Verify NO AUTO START and FADEC MAINT messages are present. Confirm messages delete when throttle is advanced to idle.

19. BATT 1 and light switches — OFF after main rotor has stopped.

20. IGN switch — OFF. Remove key as required.

BEFORE LEAVING HELICOPTER

1. Post flight inspection — Completed.

   a. Ejector rack safety pins — Installed.

   b. Aircraft for damage, fluid leaks, fluid levels, and bypass indicators.

   c. AVTR tape — Remove as desired.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE LEAVING HELICOPTER (CONT)

d. **(CDS2)** DTC (programmable cartridge)/R DTM — Removed as required.

2. DA forms and MTF check sheet — Complete as required.

3. Main rotor blades — Tied down.

4. Helicopter covers — Installed.

5. Secure helicopter.

SECTION III. TROUBLESHOOTING GUIDE

General. This section contains troubleshooting information that has been referenced in Section II checklists. This section lists possible conditions, abnormal conditions and indications, and causes. This information is limited to immediate actions and is not all encompassing. Complete troubleshooting procedures can be found in the appropriate maintenance manuals.

Refer to Troubleshooting in **(OH-58D)** TM 55-2840-256-23/R TM 1-2840-263-23, TM 1-1520-248-23 and TM 11-1520-248-23.

TROUBLESHOOTING GUIDE A — STARTING

CONDITION

PROBABLE CAUSE

A1. Engine will not crank or fails to reach 12% NG.

a. Starter/ignition lock switch not on.

b. START or IGN circuit breaker/switch out/ OFF.

c. Battery cable connector not properly connected.

d. Battery cable connector corroded.

e. Battery power low.

f. GPU underrated.

A2. Engine fails to light off.

a. IGN circuit breaker/switch out/OFF.

b. FUEL valve handle off.

c. Air in fuel lines.

d. Loose fuel line.

e. Defective fuel pump check valve.

A3. Acceleration temperature too high during start.

a. Residual TGT in excess of 150 °C prior to start.

b. Battery weak.

c. **(OH-58D)** Start derichment set too high, or too low.

d. Leaking engine anti-icing valve or lines.

e. Obstructed air inlet.

f. Dirty particle separator or compressor.

g. Throttle improperly rigged.

h. **(OH-58D)** Electronic supervisory control failure / R Electronic control unit failure.

i. Defective starter which is not capable of dry motoring gas producer NG above 15%.

j. FOD or erosion to compressor.

A4. Main rotor not turning by 25% indicated NG, no NP indication, but normal NG and TGT indications.

a. Main or tail rotor tied down.

b. Foreign object binding main or tail rotor drive.

c. Transmission or gearbox failure.

d. NP turbine failed or locked.

e. Engine gear failure.

A5. Unintentional start termination.

a. Starter switch released too soon.

b. START or IGN circuit breaker/switch out/ OFF.

c. FUEL valve handle off.

d. Starter failure (electrical or mechanical).

e. Ignition system failure.

f. **(OH-58D)** Fuel control malfunction. R HMU malfunction.

A6. Main rotor not turning by 25% indicated NG: Normal NG, NP, and TGT indication.

a. Freewheeling unit failure.

b. Engine driveshaft failed.

c. Transmission failure.

A7. (OH-58D) When the START switch is released at 50% NG, if the NG spools down below 50% or the engine quits.

a. Fuel valve handle in the off position.

b. Air in fuel line.

c. Loose fuel line.

d. Defective fuel pump check valve.

TROUBLESHOOTING GUIDE B — INSTRUMENTS

CONDITION

PROBABLE CAUSE

B1. DC EXT power connected, power will not come on line.

a. DC GEN switch in GEN position.

b. Defective GPU.

c. Defective DC external power monitor.

B2. S GEN LD% does not appear on MPD.

a. Defective wiring or connector(s) between right MCPU and generator shunt.

b. Internal component malfunction as determined by CDS FDLS/BIT operational check.

TROUBLESHOOTING GUIDE C — ELECTRICAL

CONDITION

PROBABLE CAUSE

C1. Battery 1 or 2 BATT PRHT ON light not lit during Press-to-Test.

a. Defective Press-to-Test lamp.

b. Defective battery.

c. 9TH CELL circuit breaker out.

C2. Battery 1 or 2 BATT PRHT ON light is lit at temperature above 0 °F, -17 °C.

Defective battery.

C3. CPG MFD will not come on with MFD CPO circuit breaker closed, BATT 1 switch in BATT 1 position, and ESNTL BUS switch in RUN position.

a. Defective ESNTL BUS switch.

b. Defective wiring or connector(s) in bus system.

c. Defective power assured bus relay.

C4. Left (right) defog blower does not operate.

a. Defective or open DEFOG BLWR circuit breaker.

b. Defective L DEFOG BLWR (R DEFOG BLWR) switch.

c. Defective wiring or connector(s) in defog blower system.

d. Defective left (right) blower.

C5. CDS BIT provides NO GO error codes on MFD when checking MUX data bus.

Refer to Appendix Table A-1.

C6. MFK operation fails to enter data inputs on MFD.

a. Defective MFK.

b. Defective wiring or connector(s) to MFK.

c. Defective MCPU (left or right).

C7. CPG MFD does not operate with DC GEN or DC external power connected.

a. Defective or open MFD CPO circuit breaker.

b. Defective or open BUS INTCON circuit breaker.

c. Defective left MCPU.

d. Defective power assured bus relay.

C8. MFD does not display initial page on power up and image is not legible and/or clear.

a. Adjust bright control knob for maximum brightness.

b. Defective MFD.

c. Defective MCPU.

C9. Pitot tube will not heat.

a. Defective or open PITOT HTR circuit breaker.

b. Defective PITOT HTR switch.

c. Defective pitot heater.

C10. Transformer rectifier unit does not come on.

a. Defective or open RECT circuit breaker.

b. Defective ground at RECT circuit breaker, RECT RCCB, or TRU.

c. Defective wiring or connector(s) in system.

d. Defective RECT RCCB.

e. Defective TRU.

C11. Battery 1 will not come on with BATT 1 switch set to BATT 1.

a. Defective battery 1.

b. Internal component malfunction as determined by DC external power operation check.

c. Defective BATT 1 switch.

d. Defective battery 1 relay.

e. Defective charger monitor.

f. No ground wire jumper installed with battery charger removed.

g. Defective ground at charger monitor.

h. Defective ground at battery terminal.

C12. MFD (CPG) does not come on with ESNTL BUS switch in RUN position.

a. BRT control not properly adjusted.

b. Defective ESNTL BUS switch.

c. Defective left MCPU.

C13. Collective RPM switch adjustment does not increase and/or decrease engine rpm.

a. **(OH-58D)** Fuel control switch in analog position / R FADEC in manual mode.

b. Defective RPM switch.

c. Defective wiring/connector(s).

d. **(OH-58D)** Defective fuel control / R Defective HMU.

C14. Anticollision light(s) fail to illuminate.

a. Defective switch.

b. Defective/open circuit breaker.

C15. Position lights malfunction when POS switch is placed to BRT position.

a. Lamp filament open (burned).

b. Defective circuit breaker.

c. Defective switch.

C16. Position lights fail to burn or fail to go dim with switch in DIM position.

a. Defective dimming resistor.

b. All of item C15 above.

C17. Instrument or console lights fail to brighten or dim as INST LT or CONSOLE LT knob is rotated.

a. Defective instrument lights control transformer.

b. Defective INST/CONSOLE LT trim/balance potentiometer.

c. Defective circuit breaker.

d. Defective wiring/connector(s).

C18. EBF bypass door will not open.

1. Defective switch.
2. Defective/open circuit breaker.
3. Defective actuator.
4. Defective wiring/connectors.
5. Frozen shut.

TROUBLESHOOTING GUIDE D — CAUTION/ WARNING/ADVISORY SYSTEM

CONDITION

PROBABLE CAUSE

D1. INV FAIL caution message displayed on MFD and 115 is not displayed under ACV on MPD.

a. Defective inverter.

b. Defective or open INV circuit breaker.

c. Defective or open 26 VAC PWR circuit breaker.

d. Defective inverter relay.

D2. FUEL BOOST FAIL caution message does not come on momentarily with FUEL BOOST switch ON.

a. Defective fuel pressure switch.

b. Defective left MCPU.

D3. (OH-58D) FUEL CONTROL advisory message does not come on during test.

a. Defective wiring/connector(s).

b. Defective keyboard.

c. Defective fuel control panel switch.

d. Defective MCPUs.

TROUBLESHOOTING GUIDE E — POWERPLANT

CONDITION

PROBABLE CAUSE

E1. Throttle stiff.

a. Throttle friction too tight.

b. Defective flexible cable or cable improperly routed.

c. Flexible cable clevis too tight.

d. Foreign object obstructing control movements.

e. Fuel control shaft binding.

E2. At full open throttle and full governor increase, NP RPM not correct (not getting a 6% spread) (R not getting 10% spread).

Electronic control system failure.

E3. Governor RPM too high or low at full open throttle.

Electronic control system failure.

E4. No change in TGT when ENG ANTI ICE switch is turned ON or OFF (increase of 5 to 10 °C will ensure proper operation).

a. ENG ANTI ICE circuit breaker out or defective.

b. Bleed leakage in line to engine anti-icing solenoid valve.

c. Faulty switch or wiring.

d. Defective anti-icing solenoid.

E5. Compressor stall, fluctuating engine instruments, during start.

a. **(OH-58D)** Loose pneumatic fittings.

b. **(OH-58D)** Px and Py orifices clogged or dirty.

c. Electronic control system failure.

d. Dirty compressor.

E6. Engine torque indicator too high or too low at flat pitch and 100% NP. (Normal approximately 25%.).

a. Defective wire from MPD to MCPU (left or right).

b. Defective wire from MPD to ground module.

c. Defective ground module.

d. Defective MCPU (left or right).

e. Defective MPD.

f. Defective wire from MPD to module M of terminal board.

g. Defective wire from MCPU (left or right) to module M of terminal board.

h. Defective module M of terminal board.

i. Defective wiring from module M of terminal board to engine torque transducer.

j. Defective engine torque transducer.

E7. Unable to move throttle to below engine idle.

a. IDLE REL switch malfunction.

b. Throttle controls binding.

c. Throttle improperly rigged.

d. NG fuel control malfunction.

e. CPG collective stick not properly installed.

E8. Low power assurance troubleshooting procedure.

a. Check TGT and Q_E indications for proper accuracy and calibration.

b. Inspect engine inlet for cleanliness and FOD evidence.

c. Wash engine.

d. **(OH-58D)** Inspect engine for compressor air leakage, bleed air leakage, fuel control pneumatic leakage (anti-icing and overspeed control lines and **"**B nuts**"**), combustor case leakage, transfer tube flange leakage, etc.

e. Repeat power assurance check.

E9. (OH-58D) Engine flameout during fuel overspeed check.

a. Defective ESC.

b. Incorrect fuel control rigging.

c. Incorrect fuel nozzle flow pattern.

d. Lean fuel mixture.

TROUBLESHOOTING GUIDE F — ROTORS (POWER TRAIN)

CONDITION

PROBABLE CAUSE

F1. Excessive pylon motion.

a. Failed elastomeric corner mount.

b. Failed elastomeric fore and aft pylon spring.

c. Failed pylon beam.

d. Failed pylon attachment structure.

e. Failed attachment bolts not torqued to specifications.

TROUBLESHOOTING GUIDE G — HYDRAULIC

CONDITION

PROBABLE CAUSE

G1. Excessive feedback in flight or during power cylinder check, HYD SYS switch — HYD SYS.

a. Feedback in collective and cyclic.

(1) Air in system.

(2) Excessive out-of-track or out-of-balance rotor system.

(3) Low pump pressure.

(4) Main pressure relief valve defective.

b. Feedback felt in one flight control or cyclic jams during rapid movement.

(1) Loose servo assembly or attaching bolts.

(2) Excessively worn rod end bearings.

(3) Defective servo.

(4) Servo pilot valve malfunction.

(5) Pump malfunction, low pressure, or low fluid level.

(6) FOD in flight controls.

G2. Flight controls do not operate smoothly.

a. Sticking servo control valve.

b. Pivot bolts in input lever are sticking or overtorqued.

c. Low pump pressure.

d. Air in system.

e. Pump one-way check valve improperly installed.

G3. Excessive feedback with HYD SYS switch OFF.

a. Excessive out-of-track or out-of-balance of main rotor.

b. Irreversible valve malfunction.

c. Air in irreversible chamber.

d. Pilot valve malfunction.

G4. Unable to move controls sufficiently (HYD SYS switch — HYD SYS).

a. Defective servo.

b. Improper rigging or controls jammed.

TROUBLESHOOTING GUIDE H — FLIGHT CONTROLS

CONDITION

PROBABLE CAUSE

H1. Cyclic binding in certain areas with FORCE TRIM OFF.

a. Wiring harness binding at base of cyclic stick.

b. Foreign matter in base of stick.

c. Foreign matter under deck.

d. Rough spot in friction device.

e. Rod end bearings worn or dirty.

H2. With FORCE TRIM OFF, cyclic continues moving after small force applied or moves without cyclic input.

a. Moves forward or aft only.

(1) Cyclic centering spring improperly adjusted.

(2) Improperly rigged force gradient.

b. Moves mostly in a 45 degree angle.

(1) Servo cylinder control head bolts too tight.

(2) Defective servo.

c. Moves with less than 0.5 pound of force. Friction improperly adjusted.

H3. Pedals binding.

a. Foreign matter binding forward controls under center console.

b. Rod end bearing malfunction.

c. Control tube binding on phenolic block in tailboom.

d. Excessive friction applied on antitorque pedal friction device.

H4. Excessive play in pedals.

a. Worn pitch change mechanism.

b. Worn tube rod end bearings or pedal adjuster assembly.

H5. Unable to increase collective friction using pilot adjustable friction device.

a. Friction knob improperly adjusted.

b. Threads need cleaning.

H6. Collective built-in friction too light or too heavy.

Friction nut/clamp at jackshaft not adjusted properly.

H7. Collective stick binds and sticks or has abnormal breakaway force.

a. Friction device worn, rough, or improperly adjusted.

b. Electrical wire harness at base of collective fouling.

c. Obstruction of collective by CPG seat belt.

d. Obstruction of push-pull tubes from collective to swashplate.

e. Defective servo.

H8. Any magnetic brake fails to energize with FORCE TRIM switch in FORCE TRIM position.

Defective magnetic brake.

H9. Magnetic brake fails to deenergize when FORCE TRIM switches are pressed.

a. Defective switch.

b. Wiring is shorted out, grounded.

H10. Force trim weak, stiff or allows too much play in cyclic and/or pedals.

a. Improper built-in spring tension adjustment.

b. Improperly rigged.

c. Magnetic brake inoperative.

d. Wrong gradient spring assembly installed.

e. Cap nut with lockwire is not properly adjusted.

f. Spring tension out of adjustment.

H11. Excessive friction on cyclic with force trim released.

a. Adjustable friction not completely off.

b. Foreign matter in base of stick.

c. Magnetic brake unit stiff (dragging).

H12. Defective trim holds in same position with FORCE TRIM switch in OFF position.

a. Magnetic brake binding.

b. Defective wiring at switches.

c. Improperly rigged.

H13. Force trim inoperative.

a. Defective switches.

b. Open circuit breaker.

c. Open or shorted wire.

d. Defective magnetic brake.

e. No electrical power going to magnetic brake.

H14. Unable to get normal cyclic travel.

a. Improperly rigged cyclic or collective.

b. Control components improperly installed.

c. Force trim improperly rigged.

H15. Cyclic position abnormal for flight condition.

Cyclic improperly rigged.

H16. Cyclic stick not centered in stable hover.

a. Fore-and-aft CG not within limits.

b. Lateral CG not within limits.

c. Cyclic improperly rigged.

H17. Pedal creep.

a. Dynamic balance incorrect.

b. Helicopter not into wind.

c. Directional control eyebolt and spring installed.

H18. Unable to obtain a minimum of 83% up and/or 17% down mast torque during collective (HYD SYS OFF) check.

a. Collective binding.

b. Maximum power reached prior to 83% mast torque.

c. Defective or improperly installed elastomeric bearing.

d. Improperly installed main rotor hub.

TROUBLESHOOTING GUIDE I — NOT APPLICABLE

TROUBLESHOOTING GUIDE J — VIBRATIONS

CONDITION

PROBABLE CAUSE

NOTE

See Section IV, G for detailed information on vibrations.

J1. Low frequency vibrations.

NOTE

Low frequency vibrations are divided into two groups: laterals and verticals.

a. Laterals.

(1) Blades of unequal amounts of wear.

(2) Moisture in blades.

(3) Improper filling/repair techniques.

(4) Improper balancing techniques.

(5) Blades out of product balance.

(6) Blades out of track.

b. Verticals.

(1) 1/rev (6 to 7-cps, i.e., 395 rpm ÷ 60 sec = 6.6-cps).

(a) Excessively worn parts.

(b) Improper tracking techniques.

(c) Weak trim tabs.

(d) Insufficient friction on swashplate uniball (vertical occurs during entry to turn).

(2) Main rotor and control induced 4/rev (24 to 28 cps).

(a) Insufficient friction on swashplate uniball.

(b) Excessively loose control linkage or swashplate parts.

(c) Deteriorated or separated corner mount; worn transmission isolation mount attachment bolt or bearing.

J2. Pylon and fuselage induced medium frequency vibration (4/rev to 8/rev).

a. Skids or crosstubes loose.

b. Unstowed equipment.

c. Horizontal stabilizer attachment bolts loose.

d. Vertical fin attachment bolts loose.

e. Any loose airframe components.

f. Airframe skin is oil canning.

g. Loose tail skid.

J3. High frequency vibration.

a. Loose tail skid. (Tail rotor 1/rev, driveshaft 1/rev and 2/rev.)

b. Tail rotor hub and blade assembly unbalanced.

c. Worn or loose tail rotor blade bearing.

d. Worn tail rotor trunnion.

e. Loose or worn tail rotor pitch change link bearing.

f. Bent tail rotor pitch change link.

g. Loose tail rotor retaining nut.

h. Loose or worn tail rotor pitch change slider.

i. 90 degree gearbox alignment or failure.

j. Retaining bolts of 90 degree gearbox loose.

k. Loose bolts in flexible couplings.

l. Worn spline adapters.

m. Tail rotor driveshaft bent/out of alignment.

n. Shaft hanger bearing rough or failed.

o. Loose hanger bearing housing.

p. Oil cooler fan unbalanced or failed.

q. Engine malfunction.

r. Generator bearing failure.

s. Freewheeling unit failure.

t. Engine oil pump failure.

u. Loose engine mounts.

v. Main input shaft coupling failure.

w. Main transmission malfunction.

x. Hydraulic pump failure.

y. Transmission oil pump failure.

TROUBLESHOOTING GUIDE K — COMMUNICATION/NAVIGATION EQUIPMENT

CONDITION

PROBABLE CAUSE

K1. Radios inoperative.

a. Circuit breaker out.

b. Headset not plugged in completely.

c. Radios improperly tuned.

d. ICS panel malfunction.

e. Connector disconnected or broken.

f. Radio malfunction.

g. Antenna wire disconnected or crossed.

h. CDS malfunction.

i. ADU malfunction.

K2. ICS panel malfunction.

a. ICS panel defective.

b. ICS panel disconnected.

c. Headset not plugged in completely.

d. Circuit breaker out.

e. ADU malfunction.

K3. KY-58 and KY-75 malfunction.

a. Sets are zeroized.

b. Codes not set correctly.

c. Mode incorrectly set.

d. ADU malfunction.

e. Sets not connected properly.

f. Circuit breaker out.

K4. AN/APR-39A(V)1 malfunction.

a. Defective circuit breaker.

b. Defective radar warning control panel.

c. Defective azimuth indicator.

d. Defective comparator.

e. Defective dual receiver.

K5. AN/APX-100 IFF no output in any mode of operation.

a. Circuit breaker open or defective.

b. Mode key on IFF page set to OFF or STBY.

c. Defective cable or loose connections.

d. Defective fuse in receiver-transmitter.

e. Defective receiver-transmitter.

K6. AN/APX-100 IFF indication weak or intermittent in any or all modes of operation.

a. Power supply in receiver-transmitter abnormal.

b. Receiver-transmitter coder operations abnormal.

K7. AN/APX-100 IFF improper response from one mode. All others normal.

a. Applicable mode enable key on IFF page in OUT position.

b. Improper code setting.

c. Defective receiver-transmitter.

K8. AN/APX-100 IFF ANT illuminates in the self-test mode.

a. Defective coaxial antenna cable connector.

b. Defective receiver-transmitter.

K9. AN/APX-100 IFF KIT illuminates when Mode 4 is operated.

a. Defective transponder computer.

b. Defective receiver-transmitter.

c. Defective wiring.

K10. AN/APX-100 IFF ALT illuminates.

a. Defective altimeter encoder.

b. Defective receiver-transmitter.

c. Defective wiring.

SECTION IV. SPECIAL PROCEDURES

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

A. EGI Navigation System Check.

1. Helicopter — Position at a surveyed pad and land.

2. Pilot MFD **(CDS2)** HSD page / R NAV ALIGN key — Press.

   a. NAV MODE key — Press.

   b. INS mode for navigation — Select.

3. Waypoints — Select as follows.

NOTE

Accuracy of surveyed points will have a direct influence on the navigation system check.

   a. Two UTM coordinates for positions suitable for hovering over shall be surveyed accurately to eight digits.

   b. Each leg between coordinates should be a minimum of 10 km apart.

4. Waypoints — Enter to waypoint list.

5. Flight plan — Construct from present position to each point in turn and return to present position.

6. Target store — Perform while hovering over all three waypoints.

7. Manual update — Perform after storing position at start point. Verify FOM changes and update is accepted by the system.

8. Compute circular position error as follows:

   a. Easting error (E) = Surveyed (actual) Easting coordinates less NAV system Easting coordinates.

   b. Northing error (N) = Surveyed (actual) Northing coordinates less NAV system Northing coordinates.

   c. Circular error = $\sqrt{E^2 + N^2}$

Example: Coordinates:

Surveyed (actual) 10S PK 48165719
Stored Position 10S PK 48185722

E = 4816 – 4818 = –2 (20 meters)
N = 5719 – 5722 = –3 (30 meters)

circular error = $\sqrt{(-2)^2 + (-3)^2} = \sqrt{4 + 9} = \sqrt{13}$

= 3.6 (36 meters)

(TABLE I.D. 922112)

9. Circular error computed in step 8 shall be less than 8.0 (80 meters). If a particular test shows greater error than above, repeat the entire procedure. Occasional errors greater than 8.0 (80 meters) are allowed but should be consistently less for an acceptable system.

10. Computation of circular position error is invalid if the following is true:

    a. Waypoint coordinates are incorrect.

B. MMS Operational Checks.

NOTE

TM 9-1240-778-23 takes precedence over the MTF.

1. **PREFLIGHT CHECK.**

    a. CDS and MMS subsystem circuit breakers — Check circuit breakers are closed.

    b. NAV alignment — Complete AUTO/ MANUAL alignment.

    c. CPG AUX panel ALE, LMC, TIS INTEG, and ALFGL switches — OFF.

    d. CPG MFD, MMS mode key — Press.

NOTE

When MMS power is turned on, do not touch LOS CONT switch for first 5 seconds. Touching the switch during initial power-up may induce errors into stabilization system and cause MTA to drift. If switch is inadvertently touched, recycle MMS power.

    e. MMS mode selector switch — Select FWD. Allow MMS to stabilize.

    f. CPG cyclic MNL/SLAVE — Press.

    g. MMS mode selector switch — Select PREFLT.

2. **MECHANICAL TEST.**

a. **(CDS2)** ATHS/R IDM INIT switch — INIT.

b. FDL MENU key R-3 — Press.

c. MAINTAINER CHECKS key R-1 — Press.

d. MMS DIAGNOSTICS key L-2 — Press. The MMS DIAGNOSTICS page should be displayed during test, followed by NO FAILURES DETECTED message. If failures are displayed, perform corrective actions prescribed in failure log.

NOTE

Mechanical test requires approximately 1 minute for MTA to begin moving and 2.5 minutes for completion of entire test.

e. MECHANICAL TEST key R-4 — Press. MTA line of sight varies through its azimuth and elevation limits (±180 degrees and +24 degrees, respectively), and video field of view and focus on MFD vary as test progresses. TEST IN PROGRESS should be displayed during test, followed by TEST COMPLETE-GO or NO GO.

f. MMS Diagnostic key L-1 — Press. Check for error codes.

3. **GAP CURRENT TEST.**

NOTE

If MTA is pointing within 10 degrees of helicopter, actuate LOS switch to slew MTA out of this position.

a. EQUIPMENT MONITOR key L-5 — Press.

b. GAP CURNT AZ EL key R-5 — Press. With hands off cyclic control grip LOS CONT switch, observe MTA for several seconds to see that it is steady about its axes.

(1) With hands off cyclic control grip LOS CONT switch, observe on MFD positions and movements of elevation current EL (LOS reticle) and azimuth/ elevation current AZ/EL (laser hit point reticle) symbols. Acceptable vertical deflection of EL symbol is less than 1/2 distance to edge of display. AZ/EL symbol moves about both horizontal and vertical axes in random movement. Acceptable AZ/EL symbol deflection is less than 4/10 distance from center to edge of display.

(2) On cyclic control grip, exercise LOS CONT switch and verify on MFD that outside scene smoothly follows switch commands and AZ/EL symbol moves similar to previous step.

(3) Large amplitude, short duration deflection of AZ/EL symbol may occur, but is not required, when switch is first pressed in any direction.

4. EQUIPMENT MONITOR key L-5 — Press.

5. MMS DIAGNOSTICS key L-2 — Press.

6. MENU key — Press.

7. MMS mode key — Press.

8. **TVS VIDEO TEST.**

   a. MMS control panel VIDEO AUTO/MAN switches set to AUTO, then press CPG cyclic TV/TIS select switch to select TVS.

   b. VIDEO AUTO/MAN switches set to MAN.

   c. VIDEO SYS INTEN MFD rocker switch — Cycle and observe that alphanumeric character intensity adjusts on MFD.

   d. VIDEO SYS INTEN MMS rocker switch — Cycle and observe that LOS reticle and NFOV limit symbol intensity adjusts on MFD.

   e. VIDEO LEVEL rocker switch — Cycle and observe that TVS video brightness adjusts. (IMSP) Scale and scale cursor are displayed.

   f. (MSP) FOV SEL switch — Actuate and check narrow view and wide fields of view. Leave in narrow field of view.

   g. (IMSP) FOV SEL switch — Actuate and check narrow fields of view, narrow 2x and narrow 4x; and wide fields of view, wide 2x and wide 4x. Leave in narrow field of view.

   h. VIDEO FOC switch — Cycle and observe that TVS focus adjusts. (IMSP) Scale and scale cursor displayed.

i. VIDEO rocker switches — Set as desired for best TVS video display on MFD.

NOTE

The following steps j. thru s. are for IMSP equipped aircraft.

j. MMS control panel mode select switch — FWD. Allow MMS to stabilize.

k. CPG cyclic MNL/SLAVE — Press.

l. MFD NORM/INV key L-5 — Press twice. Verify NORM and INVERSE functional.

m. CPG cyclic MNL/SLAVE — Press.

n. CPG cyclic LOS CONT switch — Press

o. VIXL LIST key L-4 — Press.

p. VIXL LIST key L-4 — Press. Deselect VIXL LIST.

q. CPG cyclic MNL/SLAVE — Press. Forward mode.

r. MFD SPLT/MMS mode key — Press. TVS and TIS both displayed.

s. MFD SPLT/MMS mode key — Press. Deselect split screen.

9. **SYMBOLOGY TEST.**

a. On MMS control panel, set mode select switch to PREFLT.

b. **(CDS2)** ATHS INIT/R IDM INIT switch — INIT.

c. FDL MENU key R-3 — Press.

d. MAINTAINER CHECKS key R-1 — Press.

e. MMS DIAGNOSTICS key L-2 — Press.

NOTE

Duration of each display in following symbology test is approximately 3 seconds. If test sequence does not finish, an MSP/IMSP failure has occurred. All elements and symbols of following test must be present, complete, legible, correctly located, and undistorted.

f. SYMBOLOGY TEST key R-3 — Press.

g. Symbols and display — Check condition as test is sequenced.

(1) TIS Symbols — Check NFOV limit, LOS reticle, laser hit point, and (MSP) trackable target gate symbols display.

(2) TVS symbols — Check NFOV limit, LOS reticle, laser hit point, and (MSP) trackable target gate symbols display.

(3) TVS LOS reticle — Check reticle revolves clockwise around center of display.

(4) TIS LOS reticle — Check reticle revolves counterclockwise around center of display.

(5) Laser hit point reticle — Check reticle revolves clockwise around center of display.

(6) Trackable target gate — Check gate revolves clockwise around center of display.

(7) SEQUENCE COMPLETE message — Displayed on MFD.

10. MENU key — Press. Check FDL MENU page displayed.

11. MMS mode key — Press. Check PREFLT page displayed.

12. **TIS VIDEO TEST.**

NOTE

It takes up to 15 minutes after MMS has been powered up for TIS to cool down and a clear TIS image to appear on MFD.

a. CPG cyclic TV/TIS switch — Press to select TIS video.

b. VIDEO LEVEL rocker switch — Cycle and observe that TIS video brightness adjusts. (IMSP) Scale and scale cursor display.

c. VIDEO GAIN rocker switch — Cycle and observe that TIS video contrast adjusts. (IMSP) Scale and scale cursor display.

d. VIDEO FOC switch — Cycle and observe that TIS focus adjusts. (IMSP) Scale and scale cursor display.

e. VIDEO rocker switches — Set as desired for best TIS video display on MFD.

f. VIDEO GAIN rocker switch — Adjust for minimum contrast.

g. CPG AUX panel ALE switch — Set switch to ON for a minimum of 30 seconds, then OFF. Repeat step e. Check horizontal bands are equalized to one shade of gray.

h. LOS CONT switch — Steer MMS to high contrast target.

i. CPG AUX panel ALFGL switch — Set switch to ON, observe TIS image detail increases in hot area of target, then set OFF.

NOTE

Steps j. thru q. are for MSP-equipped aircraft.

j. CPG AUX panel TIS INTEG switch — Set switch to ON. Check TIS image quality improves.

k. TIS INTEG switch — INCR. Check TIS video quality changes on MFD, release switch, then set to OFF.

l. CPG cyclic FOV SEL switch — Select. Check selectability of four fields of view. Up for wide and wide 2X, then down for narrow and narrow 2X.

m. CPG cyclic FR FRZ switch — Press. TIS video freezes to frame being displayed at time switch is pressed.

n. CPG cyclic FR FRZ switch — Press to unfreeze TIS video.

o. MMS mode selector switch — Select FWD.

p. CPG cyclic MNL SLAVE switch — Press to enter forward mode.

q. W HOT/B HOT key L-5 — Press twice to determine if both modes of TIS image are functioning.

NOTE

Steps r. thru aa. are for IMSP-equipped aircraft.

r. CPG cyclic FOV SEL switch — Actuate and check narrow fields of view, narrow 2x and narrow 4x; wide fields of view, wide 2x and wide 4x. Leave in narrow field of view.

s. MMS mode select panel — FWD.

t. CPG cyclic MNL/SLAVE — Press twice to enter manual mode.

u. CPG cyclic LOS CONT switch — Press.

v. Freeze key L-4 — Press. Verify TIS video freezes to frame being displayed at time Freeze key is pressed.

w. Freeze key L-4 — Press. This deselects Freeze Frame.

x. CPG cyclic MNL/SLAVE switch — Press. Enter forward mode.

y. MFD SPLT/MMS mode key — Press. Verify TIS and TVS videos are both displayed.

z. MFD SPLT/MMS mode key — Press. Deselect split screen.

aa. MFD W HOT/B HOT key L-5 — Press twice. TIS image modes are displayed.

13. **BORESIGHT TEST.**

NOTE

If you have been loading boresight data constants (Task 2-8, TM 9-1240-778-23) and consequently only need to perform the automatic portion of the boresight test, go to step q.

a. MMS mode selector switch — Select PREFLT. Ensure MMS PREFLT page is displayed on CPG MFD.

NOTE

Ensure that MTA is not pointing within 10 degrees of tail of helicopter; otherwise, laser will not fire.

b. CPG cyclic TV/TIS switch — Press to select TIS video and select wide field of view.

c. BRST MAN key R-2 — Press. LR ARM and CODE LASR messages displayed.

d. LASER ARM/STBY/OFF switch — ARM. LR ARM and CODE LASR messages disappear.

NOTE

To control heat buildup, laser stops firing after 10 seconds. If procedure cannot be performed in 10 seconds; on cyclic grip, release then press LASER fire switch to refire laser.

e. After resolution target disappears, CPG cyclic LASER fire switch — Press and hold.

(1) LOS CONT switch — Steer LOS reticle to TIS hot spot. (IMSP) Adjust the TIS spot to nominally 3 to 4 lines (MSP 2 to 3 lines) with the VIDEO GAIN rocker switch. If LOS reticle was already centered, move LOS reticle and recenter it.

(2) LASER fire switch — Release.

f. BRST MAN key R-2 — Press to deselect manual boresight.

g. CPG cyclic FOV SEL switch — Select narrow field of view.

h. BRST MAN key R-2 — Press. Wait for resolution target to disappear.

i. CPG cyclic LASER fire switch — Press and hold.

(1) LOS CONT switch — Steer LOS reticle to TIS hot spot. (IMSP) Adjust the TIS spot to nominally 3 to 4 lines (MSP 2 to 3 lines) with the VIDEO GAIN rocker switch. If LOS reticle was already centered, move LOS reticle and recenter it.

(2) LASER fire switch — Release.

j. BRST MAN key R-2 — Press to deselect manual boresight.

k. CPG cyclic TV/TIS switch — Press to select TVS video and select wide field of view. Repeat steps h. thru j.

l. CPG cyclic FOV SEL switch — Select narrow field of view. Repeat steps h. thru j.

NOTE

Perform this step and proceed to next one within 30 seconds. Next step must be started while resolution target image is still displayed.

m. BRST AUTO key R-1 — Press. BRST message displayed in MMS status area. Check resolution target images appear, then disappear first for TIS, then TVS.

n. LASER fire switch — Press and hold while resolution target image is still displayed.

(1) Verify LOS reticle is centered on nominally (MSP) 2- to 3- or (IMSP) 3- to 4-line TIS hot spot.

(2) (MSP) Verify trackable target gate compresses tightly and remains steady about TIS hot spot. If display is incorrect, complete Task 2-8, TM 9-1240-778-23.

(3) (IMSP) Verify target acquisition gate changes to primary target gate and surrounds TIS hot spot but does not compress tightly. If display is incorrect, complete Task 2-8, TM 9-1240-778-23.

(4) (IMSP) Verify Scale cursor moves from bottom of scale to top.

(5) Verify video changes from TIS to TVS and displays 1/16- to 1/8-inch hot spot.

(6) (MSP) Verify trackable target gate compresses tightly and remains steady about innermost core of TVS

hot spot and not larger glowing area (halo) surrounding hot spot. If display is incorrect, complete Task 2-8, TM 9-1240-778-23.

(7) (IMSP) Verify target acquisition gate changes to primary target gate and surrounds TVS hot spot but does not compress tightly.

(8) (IMSP) Verify Scale cursor moves from bottom of scale to top.

o. BRST COMPLETE message — Check displayed.

p. LASER fire switch — Release.

q. MMS mode selector switch — Select PREPT. Check for REBORESIGHT message. If message does appear more than once, repeat manual and auto boresight procedures by returning to step a.

r. LASER ARM/STBY/OFF switch — OFF.

14. **FORWARD MODE TEST.**

a. MMS mode selector switch — Select FWD.

b. CPG cyclic MNL SLAVE switch — Press to enter forward mode. Check MMS slews to 0 degrees azimuth and nominally 0 degrees elevation and FWD message is displayed when MTA reaches fixed forward position.

c. LOS CONT switch — Press to manually slew MTA through ± 5 degrees forward trim, then return to 0 degrees azimuth.

NOTE

Steps d through m are for MSP-equipped aircraft.

d. CPG cyclic MNL SLAVE switch — Press to select manual mode. On MFD, MANUAL message appears and MTA line of sight is steady (outside video remains fixed).

e. LOS CONT switch — Press to slew MTA to an area with targets for tracking.

NOTE

System will not go into area track mode in the following step if MTA is not steady about its axes.

f. CPG cyclic AREA TRACK switch — Press. Check AREA TRK message is displayed on MFD and MTA remains fixed on area.

g. CPG cyclic PNT TRK switch — Press. Check ACQ OM message displayed on MFD along with target acquisition gate.

h. LOS CONT switch — Press to steer target acquisition gate to a trackable target. Release LOS CONT switch. Gate should lock on target.

NOTE

System will not go to point track mode in following step if LOS CONT switch on cyclic grip continues to be actuated.

i. CPG cyclic PNT TRK switch — Press.

(1) MTA slews to center trackable target gate and trackable target on display. If target moves, MTA follows to keep target and trackable target gate centered on display.

(2) PNT TRK message is displayed and trackable target gate surrounds trackable target.

j. CPG cyclic PNT TRK switch — Press. Check OSET ACQ message and laser hit point reticle are added to display.

k. LOS CONT switch — Press to verify that laser hit point reticle responds to switch input. Trackable target gate remains centered on display.

l. CPG cyclic PNT TRK switch — Press. Check OSET TRK message is displayed and laser hit point reticle moves to center of display. Trackable target is no longer in center of display.

m. CPG cyclic PNT TRK switch — Press. Check PNT TRK message displays and

trackable target moves to center of display.

15. **(IMSP) TRACKING MODE TEST.**

a. CPG cyclic MNL/SLAVE switch — Press. Manual message is displayed on MFD and LOS is steady (outside video remains fixed).

b. MFD TRACKER CENTRD/FEATURE key L-3 — Press. Select FEATURE mode.

c. CPG cyclic LOS CONT switch — Steer MMS to well-defined target.

d. CPG cyclic LOS CONT switch — Release when LOS reticle is over target.

e. CPG cyclic LOS CONT switch — Press to acquire target. Primary target gate surrounds target and PNT TRK message is displayed on MFD. If target moves MMS follows to keep target and primary target gate centered on display.

f. CPG cyclic MNL/SLAVE switch — Press. MANUAL message appears on MFD.

g. MFD TRACKER CENTRD/FEATURE key L-3 — Press. Select centroid mode.

h. CPG cyclic LOS CONT switch — Steer MMS to well-defined target.

i. CPG cyclic LOS CONT switch — Release when LOS reticle is over target.

j. CPG cyclic PNT TRK switch — Press to acquire target. Primary target gate compresses tightly around target and PNT TRK message displays on MFD. If target moves MMS follows to keep target and primary target gate centered on display.

k. CPG cyclic MNL/Slave switch — Press. MANUAL message appears on MFD.

l. CPG cyclic LOS CONT switch — Steer MMS to scene where there is motion.

m. CPG cyclic AREA TRK switch — Press. AREA TRK message is displayed on MFD.

n. MFD AUTOCUE ON/OFF key R-1 — Press. Cues surround potential target.

o. MFD AUTOCUE ON/OFF key R-1 — Press. Cues are removed.

p. CPG cyclic AREA TRK switch — Press. ACQ OM message and acquisition cursor are displayed on MFD.

q. CPG cyclic LOS CONT switch — Steer acquisition cursor to trackable target.

r. CPG cyclic LOS CONT switch — Release. Transition target gate surrounds target.

s. CPG cyclic AREA TRK switch — Press.

t. CPG cyclic LOS CONT switch — Steer acquisition cursor to another trackable target.

u. CPG cyclic LOS CONT switch — Release. Transition target gate now

surrounds target and secondary target gate surrounds target.

v. CPG cyclic PNT TRK switch — Press. MMS slews to center target and primary target gate surrounds target. If target moves, MMS follows to keep target and primary target gate centered on display. PNT TRK message is displayed.

w. CPG cyclic TGT SEL switch — Press. Transition target gate surrounds target.

x. CPG cyclic TGT SEL switch — Press. Transition target gate disappears.

y. CPG cyclic PNT TRK switch — Press. OSET ACQ message and laser hit point reticle are added to MFD display.

z. CPG LOS CONT switch — Press. Verify that laser hit point reticle responds to LOS CONT switch and primary target remains centered on MFD display.

aa. CPG cyclic PNT TRK switch — Press. OSET TRK message is displayed and laser hit point reticle moves to center of display. Primary target is no longer in center of display.

ab. CPG cyclic PNT TRK switch — Press. PNT TRK message is displayed.

16. **SEARCH MODE TEST.**

a. MMS mode selector switch — Select SRCH.

b. CPG cyclic MNL SLAVE switch — Press twice to enter search mode. Check SEARCH message is displayed.

c. MFD RAST/SPIRL key L-3 — Press key twice while observing video search pattern on MFD to determine if both search patterns are functioning.

d. MFD WIDE/NARROW key L-2 — Press key twice while observing video search pattern on MFD to determine if both search options are functioning.

e. MFD FAST/SLOW key L-4 — Press key twice while observing video search pattern on MFD to determine if both search speeds are functioning.

17. **PREPOINT MODE TEST.**

a. MMS mode selector switch — Select PREPT.

b. MFD PPT key R-2 — Press to enable keyboard for waypoint entry.

c. MFK — Enter known waypoint identification code, press MFK enter key.

NOTE

- EGI should be in an aligned condition and indicate correct location, heading, and altitude of helicopter. When possible, a navigation system accuracy check should be performed prior to this test.
- Check should be accomplished at a hover to confirm PREPT mode accuracy.

d. CPG cyclic MNL SLAVE switch — Press twice to enter prepoint mode. MTA turns to direction of selected waypoint,

prepoint reticle appears on MFD over selected target and within narrow field of view limit symbol.

e. If prepoint mode is not accurate, perform airborne calibration procedure and repeat prepoint mode test.

18. **DIAGNOSTICS CHECK.**

a. MMS MODE SELECTOR switch — Select PREFLT.

b. **(CDS2)** ATHS INIT/R IDM INIT switch — INIT.

c. FDL MENU key R-3 — Press.

d. MAINTAINER CHECKS key R-1 — Press.

e. MMS DIAGNOSTICS key L-2 — Press and record any error codes.

19. **SUBSYSTEM SHUTDOWN.**

CAUTION

Do not set MMS mode select switch to any other mode for 5 seconds (to ensure the OBS has stopped rotating); otherwise, damage to the OBS may occur.

NOTE

Do not set mode selector switch to OFF position until STORE COMPLETE message appears on MFD. Otherwise, MMS diagnostics records will be lost.

a. MENU key — Press.

b. MMS key — Press.

c. MMS mode selector switch — Select STOW.

(1) MTA slews to point aft at -6 degrees elevation.

(2) MFD PREFLT page is displayed for up to 5 minutes while MSP/IMSP communicates with IMUX. When completed, STORE COMPLETE message is displayed.

d. MMS mode selector switch — Select OFF.

C. Enter MMS Data Constants.

1. CDS and MMS subsystem circuit breakers — Check circuit breakers are closed.

2. **(CDS2)** ATHS INIT/R IDM INIT switch — INIT.

3. MMS mode selector switch — Select PREFLT.

4. FDL MENU key R-3 — Press.

5. GROUND SETUPS key R-2 — Press.

6. SHROUD CONSTRAINTS key L-2 — Press. Observe that cursor is displayed under SHROUD CONSTRAINTS key.

7. MFK — Enter one of the alphanumeric MMS data constants. Verify constant characters are correct, then press MFK ENTER key.

8. Repeat steps 6. and 7. for each MMS data constant to be entered.

9. MENU mode key — Press.

10. MMS mode key — Press.

CAUTION

Do not set MMS mode select switch to any other mode for 5 seconds (to ensure the OBS has stopped rotating); otherwise, damage to the OBS may occur.

11. MMS mode selector switch — Select STOW.

NOTE

On MFD, nothing is displayed for up to 5 minutes while MSP/IMSP communicates with IMUX.

12. When completed, STORE COMPLETE message is displayed on MFD.

NOTE

Do not set mode selector switch to OFF position until STORE COMPLETE message appears on MFD. Otherwise, new MMS data constants will not be stored in IMUX.

13. MMS mode selector switch — Select OFF.

D. Calibration Procedure — Airborne Cal. Refer to TM 1-1520-248-10/CL.

E. (CDS2) ATHS Operational Checks.

1. ATHS — Initialize (Refer to TM 1-1520-248-10, Chapter 4).

NOTE

This check must be accomplished with a suitable ground station or with another ATHS-equipped aircraft.

2. Send mayday message as follows:

   a. ATHS switch — Press. ATHS top menu page displays.

   b. MSGS/FTXT key R-4 — Press. Message type select page displays.

   c. MAYDAY key R-1 — Press. Mayday page displays. Verify that coordinates on the MAYDAY page agree with the present position on pilot MFD.

   d. SEND key R-5 — Press. TX 1 displays as message is transmitted. ACK 1 displays when message is received only if the DEST is changed to an individual subscriber identifier instead of the BC identifier.

3. Verify proper operation and grid location using voice communication with receiving station.

F. R IDM Operational Checks.

NOTE

(CDS4) The IDM must be initialized, using the Hands-On General User Interface (HOG), before TACFIRE or Joint Variable Message Format (JVMF) communication protocols are functional.

1. IDM — Initialize or load IDM data from the MDU. (Refer to TM 1-1520-248-10, Chapter 4/TM 1-1520-248-CL.)

NOTE

This check must be accomplished with a suitable ground station or with another IDM-equipped aircraft.

2. Send mayday message as follows:

   a. IDM switch — Press. IDM index page displays.

   b. MSGS/FTXT key R-4 — Press. Message type select page displays.

   c. MAYDAY key R-2 — Press. Mayday page displays. Verify that coordinates on the MAYDAY page agree with the present position on pilot MFD.

   d. SEND key R-5 — Press. TX 1 (**(CDS4)** XMTO) displays as message is transmitted. ACK 1 displays when message is received, only if the DEST is changed to an individual subscriber identifier instead of the BC identifier or **(CDS4)** TEAM.

3. Verify proper operation and grid location using voice communication with receiving station.

4. **(CDS4)** IDM — Complete IDM shutdown procedures.

G. Vibration Analysis.

NOTE

- Step-by-step procedures for solving vibration problems are shown in subparagraph 4.
- Vibrations as a whole may be identified by category based on their frequency.

1. **Low Frequency Vibration.**

Low frequency vibration is defined as vibration occurring at frequencies up to 15-cps. On the OH-58D this is divided between main rotor 1/rev vibration and frequencies above main rotor 1/rev.

Main rotor 1/rev vibration is caused by mass balance differences between rotor components or lift differences between main rotor blades. The magnitude of 1/rev vibration can be controlled by smoothing rotor using the procedures described in subparagraph 4. Main rotor 1/rev vibration is divided into inplane (fore-and-aft and lateral) and out-of-plane (vertical) components. Inplane 1/rev is an out-of-balance of the rotor caused by either a mass imbalance or an out-of-track condition. Vertical 1/rev is caused by a difference in lift between rotor blades which can be corrected using either pitch link or trim tab adjustments. Expeditious correction of 1/rev vibration can be accomplished by following the rotor smoothing procedures described in subparagraph 4.

The OH-58D possesses unique 1/rev characteristics which must be noted by the maintenance test pilot. These characteristics are:

a. An increase in 1/rev vibration accompanied by a knocking noise can occur at idle when the cyclic is displaced too far forward or aft. Corrective action is to center the cyclic at low rpm.

b. At 100% rpm, an increase in vertical 1/rev can occur at the collective position which generates enough thrust to unload rotor. Increasing or decreasing the collective or applying some forward cyclic will correct this condition.

c. In flight, the vertical 1/rev vibration can increase at different torque settings. This characteristic can be eliminated or minimized by following the proper procedures to work the rotor.

A low level of vibration at frequencies below main rotor 1/rev (6.5-Hz) can be felt on the ground at 100% rotor rpm. This is caused by interaction between the rotor and the skid gear and is normal. An increase in the levels of this vibration may indicate a degradation in the rubber pads in the skid gear supports or a deformation of the skid gear crosstubes due to high landing loads.

2. **Medium Frequency Vibration.**

Medium frequency vibrations are classified as vibrations at frequencies between 15 and 50-cps. On the OH-58D this would include primarily main rotor 4/rev and 8/rev vibrations as well as tail rotor 1/rev. A certain level of main rotor vibration will always be present in the airframe. An increase in these vibration levels can occur due to looseness in airframe components (tail skid, landing gear, engine supports, etc.) or due to degradation in the pylon support mounts.

Tail rotor 1/rev vibration is due primarily to tail rotor out-of-balance and can be corrected by balancing the tail rotor. A sudden increase in the level of tail rotor vibration would indicate degradation of components in the tail rotor hub or in the rotor blades.

3. **High Frequency Vibration.**

High frequency vibrations occur at frequencies above 50-cps and are related to tail rotor 2/rev and 1/rev excitation from drive train and engine components (gearboxes, generators, etc.). This will be perceivable to the flight crew as a buzz and/or a noise in the cabin. A change in these vibrations can indicate degradation of tail rotor hub or control system components or drive train components.

4. **Rotor Smoothing.**

The RADS AT is the primary piece of equipment used to smooth the main rotor, balance the tail rotor and to troubleshoot vibration problems that might be encountered during the life of the aircraft. The following procedures are provided as a quick reference guide and cover a complete main rotor track and main and tail rotor balance. Proper installation and system knowledge of the Aviation Vibration Analyzer (AVA) will not be discussed. AVA will be referred to in this guide as RADS AT or RADS.

NOTE

Use of the proper hardware is essential during the use of the RADS AT. If proper hardware is not available, system balancing will be a slow process.

a. Install RADS AT as outlined in the appropriate technical manual and verify the following:

(1) Check F/A accelerometer — ACC 1, connector aft.

(2) Check vertical accelerometer — ACC 2, connector down.

WARNING

Ensure accelerometer is clear of the CPG pedal travel.

(3) Check magnetic pickup — TACHO No. 1.

(4) Check tracker — Black lens forward, connected to TRACKER No. 1, day-night switch as appropriate.

(5) Check power connections, circuit breaker in, power switch on.

b. Rotor smoothing philosophy:

(1) Two basic RADS programs are used to smooth the main rotor of the OH-58D. One is named "OH-58DM" which is used on aircraft with a mast mounted sight and the other is "OH-58D" which is used when working on an aircraft without a mast mounted sight installed. These programs are stored in the RADS under the "Aircraft Type" menu found on the Initial Menu screen of the RADS. The test conditions for which data is obtained to smooth the rotor are defined in Table 4-1.

(2) The rotor on the OH-58D is smoothed in a two-phase approach. The first phase initially sets all rotor adjustments using a ground track and balance phase. The second phase is a flight phase where the final trimming adjustments are made to smooth the rotor. To expeditiously and correctly complete the flight phase the ground phase must be

conducted on new, overhauled, or problem rotors. Short-cutting the ground phase may result in 1/rev vibration that changes with gross weight, torque sensitive 1/rev vibration, and/or excessive 1/rev on the initial flight.

NOTE

- When type of landing gear makes a difference, the following will be assigned to the "Flight Plan" name:

  SG = Standard Gear

  RDG = Rapid Deployment Gear

- The "DIAG" flight plan works the rotor the same as the "Flight" plan, but includes the following two test conditions:

  "Turn" for measuring a turn

  "Hop" for measuring torque sensitive 1/rev.

- This flight plan provides the MTP the ability to better gage the condition of the aircraft.

- The HB-CK flight plan for the OH-58D is a production plan only and is not currently supported in the field.

Table 4-1. DESCRIPTION TEST CONDITIONS FOR THE OH-58D

Test Condition I.D.	Test Description	Used for Ground	Used For Flight
70% NR*	Flat Pitch at 70% NR (use MPD)	Yes	Yes
35% Tq	35% Torque at 100% NR (use MPD)	Yes	Yes
Hover	Hover	No	Yes
60K	Level Flight @ 60 Knots	No	Yes
100	Level Flight @ 100 Knots	No	Yes
Vh	Level Flight at Max Speed/ Continuous Power	No	Yes
L/Down	1000 FPM Letdown @ 60 Kts	No	Yes
*NOTE:	Some programs use 65% NR without the mast mounted sight.		

(TABLE I.D. 922109)

NOTE

- The sensitivities included in both programs were developed with no stores installed or only with empty pylons.
- The ground phase was designed to allow the aircraft to be operated for extended periods of time at 1/rev levels low enough not to impact crew proficiency without requiring dedicated rotor smoothing flights. The benefits of this are obvious when operating from forward bases during combat deployments.

c. Conducting the Ground Phase. The ground phase consists of tracking the rotor blades at both IDLE (65 or 70% NR) and at 35% TQ (100% NR and 35% rotor mast torque) and balancing the

rotor at 35% TQ. The sequence to be followed in this ground phase and the criteria for proceeding to flight are flow charted in figure 4-1. To conduct the ground mode:

(1) Select proper aircraft type, tail number and the INITIAL flight plan using the Initial Menu on the CADU.

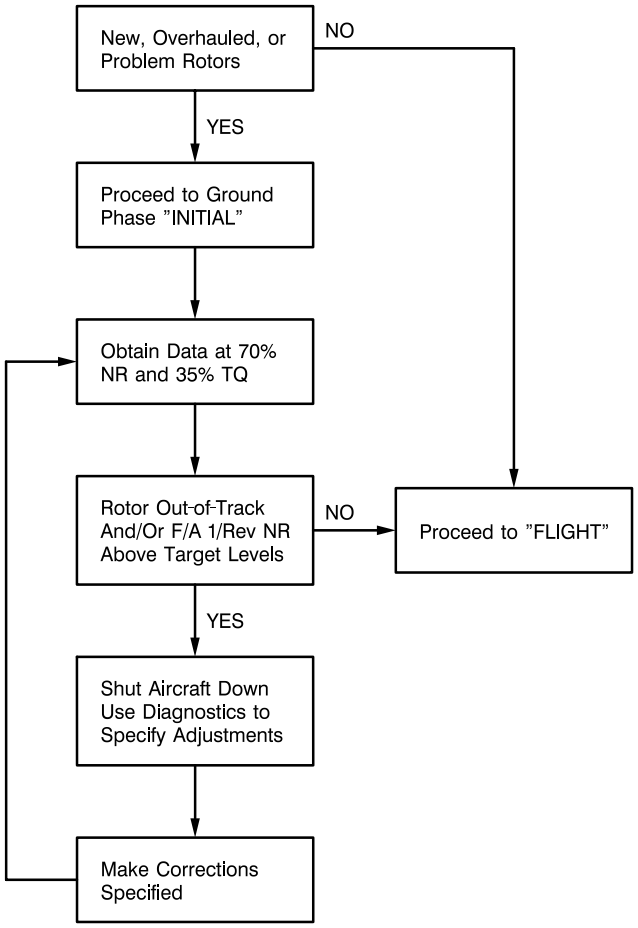
(2) Obtain data at both 65 or 70% NR and 35% TQ.

NOTE

To prevent inaccurate adjustments when editing, DO NOT turn ON the green and blue hub weights.

(3) Shut down the aircraft and use the diagnostics to specify the weight, pitch link, and tab adjustments required to track the rotor at both test conditions and to balance the rotor at 65 or 70% NR with the MMS installed or 35% TQ without the MMS installed. Note: No editing should be required during the ground mode unless only 65 or 70% NR data was obtained; if this is the case then switch all tab adjustments on the Edit Adjustables table to N. By turning off the trim tab, the RADS can calculate the proper adjustments.

(4) Record and implement the adjustments as specified.



406961-1422-1
J1973

Figure 4-1. Ground Flow Chart

(5) Repeat steps (2) through (4) until the following conditions are met:

(a) The track of all blades at 65 or 70% NR is 2 mm or less with opposite blades being within 2 mm of each other.

(b) The track of all blades at 35% TQ is 2 mm or less with opposite blades being within 2 mm of each other.

(c) The fore-and-aft (F/A) reading at 70% with the MMS installed is less than .3 ips, or the F/A reading at 35% TQ without the MMS installed is less than .2 ips.

(6) Once the ground criteria are met, the aircraft is ready to take to forward flight for the final rotor smoothing process.

d. Conducting the Flight Phase. Once the ground phase has been completed, the rotor is ready to be smoothed in forward flight. In this phase, data is taken at all the programmed test conditions, including 65 or 70% NR and 35% TQ. The purpose of this phase is to achieve the optimum level of 1/rev vibration throughout the flight regime of the aircraft. Figure 4-2 shows the flow chart used in the flight phase to smooth the rotor system. If the ground phase has been successfully completed, then the only adjustments required to smooth the rotor in forward flight should be trim tab and minor weight corrections.

The flight phase is completed when the 1/rev levels are reduced to below .2 ips at all test conditions or the lowest levels

possible are achieved. The flight phase is conducted as follows:

(1) Select aircraft type, tail number and flight plan using Initial Menu on CADU.

NOTE

To smooth aircraft having minor vibrations, use DIAG instead of FLIGHT. This will require two additional test states (HOP and TURN) to be flown. At this time HOP and TURN are NOT used by the AVA diagnostics. The test states have been added to assist the test pilot in troubleshooting vibrations encountered during the HOP range and for TURNS.

(2) Obtain data at all test conditions specified in Table 4-1 for flight phase (including 65 or 70% NR and 35% TQ).

(3) Land and shut down aircraft.

(4) Activate RADS diagnostics program.

(5) Press DO to view hub weight and tab moves specified. Record prescribed adjustments. Press DO to view predicted results. Based on predicted results, conduct the following:

(a) If predicted results are significantly better than levels encountered during flight and tab moves are large enough to be made, then make adjustments specified by RADS. This is the standard method.

(b) If tab moves are too small to be made, then use edit mode to turn off tabs and turn on pitch links. This allows **"**do-able**"** pitch link adjustments to replace small tab moves. If predicted results are significantly better than levels encountered during flight, make adjustments specified by RADS.

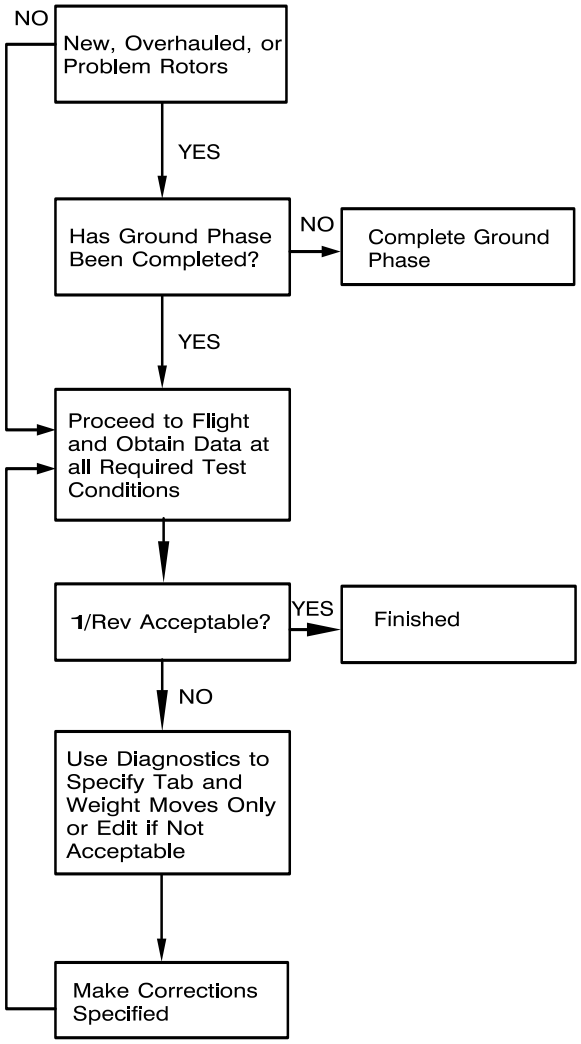


TABLE-ID-MTF-4-2

Figure 4-2. Flight Flow Chart

(c) If the predicted results obtained in (a) or (b) are not acceptable or are not significantly better than the current levels then return to the "Edit Adjustables" mode and turn on default adjustments by pressing F4. Then use the arrow keys to select a pitch link adjustment and press F1 to toggle from "N" to "Y". Repeat until all pitch links are turned on. Press DO and record the adjustments specified. View the predicted results. If the predicted results show an improvement in the vibration levels, make the adjustments specified.

NOTE

When editing, never turn on the green and blue hub weights.

(6) Repeat steps (2) through (5) until the 1/rev at all conditions is below .2 ips or the lowest obtainable level is achieved.

(7) Criteria for smoothing the Main Rotor. The target 1/rev levels for the OH-58D are .2 ips or less. While the RADS is capable of achieving levels significantly lower than .2 ips, a 1/rev level of .2 ips or less is considered totally acceptable and additional flights to improve on this level are probably not worth the time expended. If after repeated flights a level of .2 ips or less cannot be achieved, it is the responsibility of the test pilot to determine if the achieved level is acceptable. If the achieved level is unacceptable, inspect the blades for damage and the control

system for freeplay which may be contributing to the higher than normal 1/rev level. Review the RADS track and lag data to determine if a blade is behaving abnormally. Replace blades with abnormal behavior only if the problem continues after a complete retracking of the rotor using the combination ground run and flight phases described above.

(8) Once acceptable vibration levels have been obtained:

(a) Remove all test equipment from the aircraft.

(b) Print the final track, lag, and vibration levels from the last flight and store with the aircraft historical records.

(c) Store on computer disk and/or erase all data from the CADU.

(d) Record the final tab and hub weight settings and store with the aircraft historical records.

Table 4-2. Troubleshooting Chart

Problem	Solution
Balance moves are not making the rotor smoother.	Obtain clock angle and IPS from AVA and plot on the appropriate VIBREX chart. Make only one move and use clock angle corrector and rephase the clock. Do not remove AVA from the aircraft.
1/rev occurs during roll into turns. Not present in a steady turn.	Low swashplate friction. Check and adjust swashplate friction. Blade out of product balance, replace blade.
Excessive 1/rev during turns.	Tabs not set correctly. Use tabs to stop track change with airspeed. Then use pitch links to correct vertical 1/rev in level flight. Blade out of product balance, replace blade.
Unexplained changes in 1/rev or 4/rev.	Retorque lower hub to mast split cones. Retorque lead-lag damper bolts. Visually inspect for worn shims between hub and dampers. Check swashplate bearing for freeplay. Recheck swashplate friction. Check tail skid for looseness. Check aft crosstube mount for wear or rubber failure.
Excessive tab adjustment or balance weight required.	Replace suspected blade.
Unexplained changes in tail rotor 1/rev.	Check tail rotor balance. If slight change 1/rev levels are apparent from last reading, rebalance tail rotor. Check tail skid for looseness. Tighten as required. If large changes are apparent (magnitude of 1.0 or greater in IPS), inspect hub components for wear and replace as necessary. Inspect tail rotor blades for water absorption and replace as necessary. Rebalance tail rotor.

Table 4-2. Troubleshooting Chart (Cont)

Problem	Solution
Unexplained changes in tail rotor 2/rev.	Check tail rotor pitch link and hub bearings for wear. Replace as necessary.
Main rotor 4/rev.	Check lateral engine mount for looseness. Tighten or replace if necessary.
Driveshaft 1/rev.	Inspect driveshafts and couplings for damage. Replace if necessary. Inspect oil cooler fan for damage, replace if necessary.
Driveshaft 2/rev.	Inspect main driveshaft Kaflex couplings and tail rotor driveshaft Thomas couplings for separation or failure. Check engine-to-transmission alignment.

(TABLE I.D. 922121)

e. The RADS has full spectrum analysis capability which allows the magnitude of vibration at all frequencies to be obtained. The package delivered for use on the OH-58D is listed under **"**aircraft type**"** as **"**FFT**"**. Two types of analysis capability are available under the **"**flight plan**"** I.D.; these are:

ASYNC: This is a memory saving spectrum and is best used to look at frequencies of 200 Hz or less to ensure adequate frequency resolution. The test condition I.D. denotes the maximum frequency range.

ZOOM: This is a memory intensive program which can be used to look at low and high frequency vibration with high accuracy. The test condition I.D. denotes the maximum frequency range.

With this capability the operator can acquire the **"**vibration signature**"** of the

aircraft at any test condition for the accelerometer connected to channel 1 to determine the amount of vibration being generated by various dynamic components. This allows the operator to monitor changes in these vibration levels which could indicate wear or other degradation. A list of the frequencies of various components on the OH-58D is shown in Table 4-3.

Table 4-3. LIST OF MAJOR VIBRATION SOURCES

SOURCE	HARMONIC	RPM	FREQUENCY
MAIN ROTOR	1/REV	395	6.58
MAIN ROTOR	2/REV	790	13.17
MAIN ROTOR	4/REV	1,580	26.33
MAIN ROTOR	6/REV	2,370	39.48
TAIL ROTOR	1/REV	2,381	39.68
MAIN ROTOR	8/REV	3,160	52.67
HYDRAULIC PUMP (7 PISTON)	1/REV	4,234	70.57
TAIL ROTOR	2/REV	4,762	79.37
TAIL ROTOR DRIVESHAFT	1/REV	6,016	100.27
TAIL ROTOR	4/REV	9,524	158.73
HYDRAULIC PUMP (7 PISTON)	7/REV	29,638	493.97
ENGINE POWER TURBINE	1/REV	30,650	510.83
PLANETARY GEAR	MESH	39,120*	652.00
ENGINE COMPRESSOR	1/REV	51,000	850.00
90° GEARBOX GEARS	MESH	114,300*	1,905.00
XMSN SPIRAL BEVEL SET	MESH	114,300*	1,905.00

* NOTE: Mesh frequencies do not represent a true component RPM. These are equivalent RPM values obtained by simply multiplying the mesh frequency by 60. These frequencies reflect 100% operating speed.

(TABLE I.D. 922120)

H. ADSS Operational Check.

CAUTION

Ensure NVGs are protected from direct light.

NOTE

The following procedures are written for the pilot ODA. The same procedures may be used for the CPG ODA, except that no ODA switch function is available.

NVGs are required for the following check:

1. INIT switch — Press.
2. INIT PAGE 2 key R-5 — Press.
3. Pilot cyclic ODA switch — Press to activate ODA.
4. ADSS ODA TEST key L-1 — Press. Verify text becomes boxed and test pattern displays in ODA. Test pattern must be correct.
5. ADSS EYE SELECT LEFT/RIGHT key R-4 — Press. Verify symbology displays inverted. Adjust for appropriate display.
6. ADSS ODA TEST key L-1 — Press. Verify box deletes and ADSS TEST pattern deletes from ODA.
7. ADSS BRIGHTNESS — Verify function by pressing MFD keys R-1 or R-2 to increment level up and down. Intensity on ODA should change consistent with brightness level selected. Leave brightness level at 3.

8. ODA displays and indications — Check as follows:

   a. ADSS DECLUTTER key R-3 — OFF. Select VSD. HOVER and HOVER BOB-UP pages. In each mode, verify ODA symbology is present and consistent with MFD symbology.

   b. Repeat step a. for ADSS DECLUTTER LEVEL 1.

   c. Repeat step a. for ADSS DECLUTTER LEVEL 2.

9. VSD page — Select.

10. PITCH toggle switch on pilot auxiliary panel — Actuate while observing horizon line in ODA. Verify ODA horizon responds correctly.

11. **(CDS4)** Pilot or CPG — Action a weapon and display sparse weapons VSD page on MFD.

    a. Verify weapon symbology is also displayed on the respective ADSS ODA display.

    b. Verify arm status is indicated by an **"**A**"** above the engine torque readout.

    c. Select ADSS DECLUTTER LEVEL 2. Verify weapons symbology is removed.

12. Pilot cyclic stick ODA switch — Check as follows:

    a. ODA switch — Press. Verify ODA brightness level changes to full bright.

b. ODA switch — Press. Verify ODA display goes blank.

c. ODA switch — Press. Verify ODA brightness level changes to setting selected in step 7.

13. ADSS BRIGHTNESS — Select OFF position. Verify ODA display blanks.

14. INITIAL PAGE 1 key R-5 — Press.

I. NVG Power Supply. Test as required. Refer to TM 1-1520-248-T-1.

J. APX-100 Operational Check. Refer to TM 11-1520-248-23.

K. AN/APR-39A(V)1/AVR-2A Operational Checks.

CAUTION

Do not operate AN/APR-39A(V)1 within 60 yards of an operating ground based radar. Operation within 60 yards may cause damage to the antenna-detectors.

NOTE

- User Data Module (UDM) must be installed to complete this check.
- **(CDS2)** RADAR WARN circuit breaker switch must be in the RADAR (up/on) position prior to applying power to the aircraft.

1. RADAR WARN circuit breaker switch — WARN (down/off).

2. Pilot WEAPON SEL switch — Select ASE SET-UP/BIT page.

NOTE

If AVR-2A is not installed, disregard procedures relating to AVR-2A functions and displays.

3. AVR-2 PWR — Verify OFF displayed.

4. PULSE RADAR WARN PWR — Verify OFF displayed.

5. FULL TERSE — Verify displayed and FULL is boxed.

6. RADAR WARN circuit breaker switch — RADAR (up/on). Verify the following occurs:

   a. AVR-2 PWR indication changes from OFF to ON.

   b. PULSE RADAR WARN PWR indication changes from OFF to ON.

   c. **"**APR-39 POWER UP**"** synthetic voice — Verify voice is audible on headsets.

   d. (+) indicator — Verify centered within small circle at center of CRT.

CAUTION

Excessive indicator brightness may damage the CRT. Set BRIL control for readable display.

7. Indicator BRIL control knob — Rotate CW and CCW, verify brightness of (+) indicator adjusts accordingly. Set for best display.

NOTE

- Allow one minute for system warmup.
- Display indications occur quickly during the following checks. If a procedure or check cannot be accomplished prior to the end of BIT, repeat BIT procedure as required.

8. PULSE RADAR WARNING BIT key R-1 — Press. Verify text becomes boxed and FULL displays to the left of box.

9. **"**SELF-TEST SET VOLUME OFF thru 15**"** synthetic voice (**(CDS2/CDS3)** 12 and **(CDS4)** 15) — Verify audible on both headsets. Check audio level is adjustable with **(CDS2)** ICS NAV B volume knobs. R Adjust volume on ASE page using L-4 and L-5 keys.

10. OFP and EID data — Verify displayed at top and bottom of CRT respectively.

NOTE

A faulty C/D band amplifier in the processor is indicated by a flashing square in the center of the indicator.

11. Fore/aft receiver (APR-39) triangles — Verify displayed at 6 and 12 o'clock positions on CRT, and audio alarm initiates. If a fault is detected, the faulty receiver is shown as two triangles, with the faulty channel(s) flashing.

NOTE

If the AVR-2A is not installed, all four quadrant asterisks will be flashing. This is a normal indication and does not affect system status.

12. ASTERISKS (AVR-2 Sensors) — Check four asterisks displayed, one at each sensor quadrant. Check asterisks delete from CRT and audio alarm stops. If a fault is noted, the faulty quadrant is shown as a flashing asterisk.

13. **"**APR-39 OPERATIONAL**"** synthetic voice — Check audible on headset (successful test).

NOTE

AVR-2 faults are displayed on the CRT, but do not cause an APR-39 FAILURE synthetic voice message.

14. **"**APR-39 FAILURE**"** synthetic voice — Check audible on headset (unsuccessful test).

15. (+) indicator — Verify centered within small circle at center of indicator.

16. PULSE RADAR WARNING BIT — Check box deletes after short delay.

17. FULL TERSE — Select TERSE by pressing MFD key L-1. Verify TERSE becomes boxed.

18. PULSE RADAR WARNING BIT key R-1 — Press. Verify text becomes boxed and TERSE displays to left of box.

19. "SELF-TEST SET VOLUME 5 thru 1" synthetic voice — Verify audible on both headsets.

20. Repeat steps 10 thru 15. Displays and indications in TERSE mode are the same as FULL mode.

21. PULSE RADAR WARNING BIT — Check box deletes after a short delay.

22. FULL TERSE — Select FULL by pressing MFD key L-1. Verify FULL boxed.

23. RADAR WARN circuit breaker switch — WARN (down/off). Verify AVR-2 PWR and PULSE RADAR WARN PWR indications change from ON to OFF.

24. RADAR WARN circuit breaker switch — Set as required.

L. DTS Operational Check.

NOTE

- To complete this check, the **(CDS2)** programmable cartridge (DTC)/R data transfer module (DTM) must be loaded with known waypoint, frequency, flight plan and Mission ID Code data. As a minimum, Mission 1 must be programmed.
- **(CDS2)** Ensure that an operational battery is installed in the DTC before installation in the aircraft. If no internal battery power is available, the mission store function cannot be accomplished. No DTS FAIL message will be displayed under these conditions.

1. **(CDS2)** DTC/R DTM — Verify installed.

2. DTS BIT — Perform if not already completed.

3. MFD — Access INITIAL PAGE 1.

4. R-5 key — Press.

5. DATA LOADER TRANSFER key L-3 — Press. Verify DL TRANSFER page displays.

6. MFD — Verify known Mission ID Codes are displayed.

7. Desired LOAD MISSION key — Press. Verify selected LOAD MISSION page displays.

8. Select desired mission load data — Verify selected parameters are boxed.

9. LOAD mode key — Press to initiate loading.

   a. Verify a boxed LOADING message is displayed in center of page.

   b. MFD returns to DATA LOADER TRANSFER Page.

   c. Verify a boxed LOADED message is displayed next to mission selected, indicating loading is complete.

NOTE

LOAD FAIL message will display if data loading is unsuccessful.

10. Mission data — Access the following pages and verify data is correct.

a. HSD page — Check waypoints/routes displayed.

b. R RMS page — Check appropriate map displayed.

c. FPLN page — Check correct flight plan displayed.

d. WPT LIST — Check correct waypoints displayed.

e. COMM page — Check correct frequencies displayed for each radio.

f. FREQ page — Check correct frequencies listed.

11. Mission data — Access the following pages and alter data as indicated:

a. FREQ page — Delete one frequency.

b. FPLN page — Delete one waypoint.

c. WPT LIST — Delete same waypoint as in step b.

12. MFD — Access INITIAL PAGE 2.

13. DATA LOADER TRANSFER key L-3 — Press.

14. STORE DATA IN MISSION 3 key R-3 — Press. Verify STORE MISSION 3 page displays.

15. Select desired mission store data.

Verify selected parameters are boxed.

16. STORE mode key — Press. Verify cursor appears to the right of STORE legend.

a. Mission ID Code — Enter a code on MFK, then press MFK ENTER key.

b. Verify mission ID text displays below the title.

c. Boxed STORING message — Verify displayed on MFD.

d. Verify MFD returns to DATA LOADER TRANSFER Page when storing complete.

NOTE

STORE FAIL message will display if storing is unsuccessful.

e. Mission ID Code — Verify code entered in step a. is displayed under LOAD MISSION next to key L-3.

17. LOAD MISSION key — Press key that will reload original mission from step 7. Verify original mission data is unchanged.

18. LOAD MISSION key L-3 — Press key to load Mission 3. Verify that the altered mission data (step 9) is displayed.

19. PAGE 1 key — Press.

M. APR-44 Operational Check.

1. RADAR DETR circuit breaker switch — DETR (down/off).

2. Pilot WEAPON SEL switch — Select ASE SET-UP/BIT page.

3. CW RADAR WARN PWR — Verify OFF.

4. RADAR DETR circuit breaker switch — RADAR (up/on). Verify the following occur:

   a. CW RADAR WARN PWR — Changes to ON.

   b. MISSILE ALERT — SAM and MISSILE ALERT — AI advisory messages appear on MFD simultaneously.

   c. Low pitch audio tone, followed by brief higher pitch tone is audible on both headsets.

5. **(CDS2)** ICS panel NAV B volume knobs — Adjust as required. R Adjust volume on ASE page using L-4 and L-5 keys.

6. RADAR DETR circuit breaker switch — DETR (down/off). Verify the following occur:

   a. CW RADAR WARN PWR — Changes from ON to OFF.

   b. MISSILE ALERT — SAM and MISSILE ALERT — AI advisory messages delete.

N. AVTR Operational Check.

NOTE

MMS must be on and operational, with a cassette loaded, to accomplish this check.

1. MMS mode select switch — FWD. Verify VTR symbology appears.

2. MNL/SLAVE switch — Press to enter forward mode.

3. VTR CONTROL PAGE key R-4 — Press.

NOTE

Functions of the AVTR command keys will be boxed when that command is selected.

4. RECORD key R-3 — Press. Text RECORDING should display and counter begins to increment.

5. MMS — Press LOS CONT switch to acquire a trackable target and perform point track procedures. Allow VTR to record for at least 10 seconds.

6. MMS mode select switch — FWD. Press MNL/SLAVE switch twice to enter forward mode.

7. VSD mode key — Press. Allow VTR to record for at least 10 seconds.

8. ICS — Perform voice count to 10.

9. MMS mode key — Press.

10. VTR Control Page key R-4 — Press.

11. STOP key R-2 — Press. Verify RECORDING deletes.

12. REWIND key L-4 — Press to return tape to original tape counter position.

13. PLAYBACK key R-4 — Press. Verify recorded video displays on MFD.

14. STOP key R-2 — Press.

15. **(CDS2)** ATHS INIT/R IDM INIT switch — Press.

16. R-5 key — Press.

17. VTR manual unthread key L-2 — Press.

18. AVTR tape — Remove or pull VIDEO RCDR circuit breaker when tape has unthreaded.

O. R Rotorcraft Mapping System (RMS).

1. MFD — Access HSD page.

2. RMS mode key — Press. Verify RMS Page, Normal Mode displays.

3. Verify text adjacent to R-1 — CHART, DATA, NONE, or DTED.

4. NORTH/HDG key L-1 — Press. Verify HDG boxed.

5. NORTH/HDG key L-1 — Press. Verify NORTH boxed.

6. CNTR/OSET key L-2 — Press. Verify map, offset.

7. CNTR/OSET key L-2 — Press. Verify map, centered.

8. OVRLAY key L-3 — Verify ON boxed. Verify overlays selected on RMS SETUP page are displayed on map. Press to box OFF. Verify overlays not displayed.

9. SETUP key L-4 — Press. Verify RMS SETUP page displayed.

10. RMS key R-5 — Press. Verify RMS Page, Normal Mode displayed.

11. MODE key R-1 — Press. Select DTED mode.

12. ELEV BND key L-5 — Press to box ON. Verify elevation bands on map.

13. ELEV BND key L-5 — Press to box OFF. Verify elevation bands removed from map.

14. MODE key R-1 — Press. Cycle through four map modes: CHART, DETD, DATA and NONE and back to CHART.

15. ZOOM key R-2 — Press. Verify eight levels of zoom: 1:1, 1.125:1, 1.25:1, 1.375:1, 1.5:1, 1.625:1, 1.75:1, 1.875:1 and 2:1 are selectable.

16. SOURCE key R-3 — Press. Verify six scales: 1:50K, 1:2M, 1:1M, 1:500K, 1:250K, and 1:100K are selectable.

17. RMS SLEW.

    a. SLEW key R-5 — Press. Verify SLEW Mode.

    b. POS/LAT key L-1 — Press. Enter an invalid waypoint identifier on MFK, then press ENTER key. Verify map does not slew to new location.

    c. POS/LAT key L-1 — Press. Enter valid waypoint identifier on MFK, then press ENTER key. Verify map slews to new location.

18. RMS key R-5 — Press. Verify RMS Page, Normal Mode displays.

19. NORTH/HDG key L-1 — Press to box HDG.

20. SLEW key R-5 — Press. Verify SLEW mode and map is placed in NORTH orientation.

21. RMS SETUP PAGE.

a. RMS SETUP page key L-4 — Press. Verify RMS SETUP page.

b. FPLN key L-1 — Press. Verify boxed.

c. RMS key R-5 — Press. Verify flight plan displayed on RMS Page, Normal Mode.

d. SETUP key L-4 — Press to return to SETUP Page.

e. BFLD GRAPHICS key L-2 — Press. Verify boxed.

f. RMS key R-5 — Press. Verify battlefield graphics displayed on RMS Page, Normal Mode.

g. SETUP key L-4 — Press to return to SETUP Page.

h. ELEV BND key L-4 — Press. Verify ON boxed.

i. RMS key R-5 — Press. Verify flight plan displayed on RMS Page, Normal mode.

j. ELEV BND key L-4 — Press. Verify ON boxed and elevation is displayed.

k. SETUP key L-4 — Press to return to SETUP Page.

l. WAYPOINT key R-1 — Press. Verify WAYPOINT boxed.

m. RMS key R-5 — Press. Verify waypoints displayed on RMS Page, Normal Mode.

n. SETUP key L-4 — Press to return to SETUP Page.

o. Targets key R-2 — Press. Verify TARGETS boxed.

p. RMS key R-5 — Press. Verify targets displayed on RMS Page, Normal Mode.

q. SETUP key L-4 — Press to return to SETUP Page.

r. DATAFRAME key R-3 — Press. Enter valid dataframe number on MFK, then press ENTER key.

s. RMS key R-5 — Press. Verify RMS Page, Normal Mode.

t. MAP MODE key R-1 — Press. Select DATAFRAME and verify correct dataframe is displayed.

u. SETUP key L-4 — Press to return to SETUP Page.

22. RMS Feature selection.

a. FEATURE SELECT key — Press. Verify Feature Select Page.

b. Scroll key L-2(up) or L-3(down) — Press. Scroll through the list of features.

c. SELECT key L-4 — Press. Select several valid features for the available map data. Verify asterisk to the left of selected feature(s).

d. RMS key R-5 — Press. Verify RMS Page, Normal Mode.

e. OVRLAY key L-3 — Press to box ON. Verify selected features are displayed on the RMS Page.

P. Weapon System Operational Check. Refer to TM 1-1520-248-T-1.

Q. AN/ALQ-144 IR Jammer Operational Check. Refer to TM 11-1520-248-23.

SECTION V. CHARTS AND FORMS

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

List of Charts

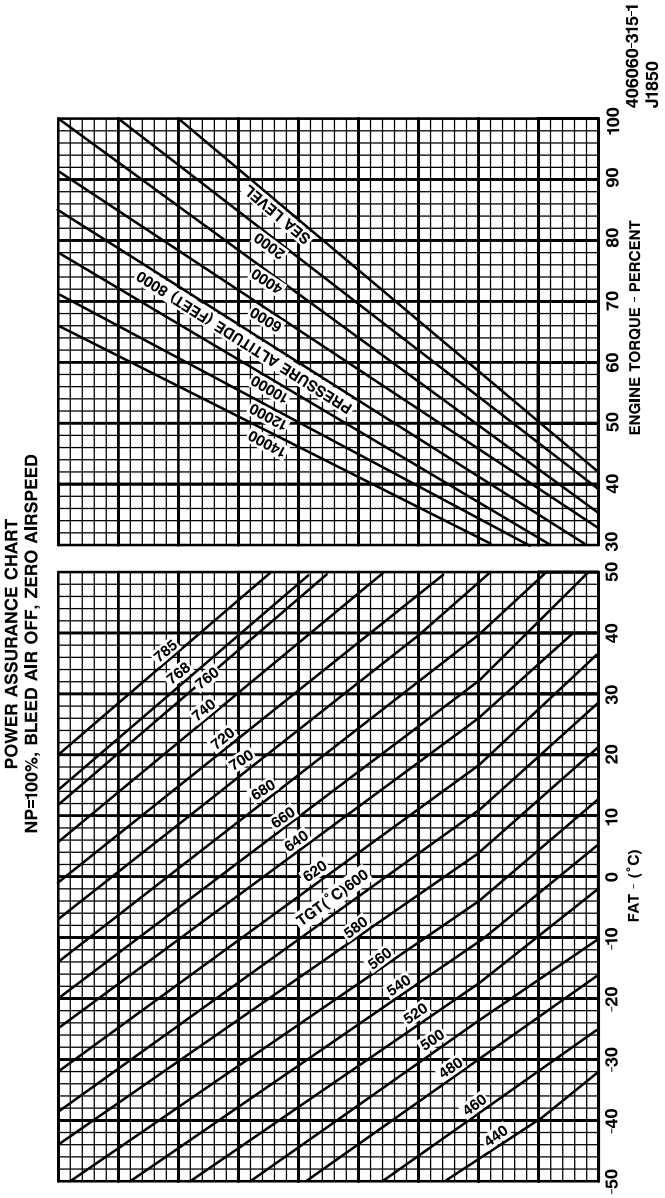


Figure 5-1. Power Assurance Chart (T703-AD-700A/250-C30R)(Sheet 1 of 2)

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Figure 5-1. Power Assurance Chart (250-C30R/)
(Sheet 2 of 2)

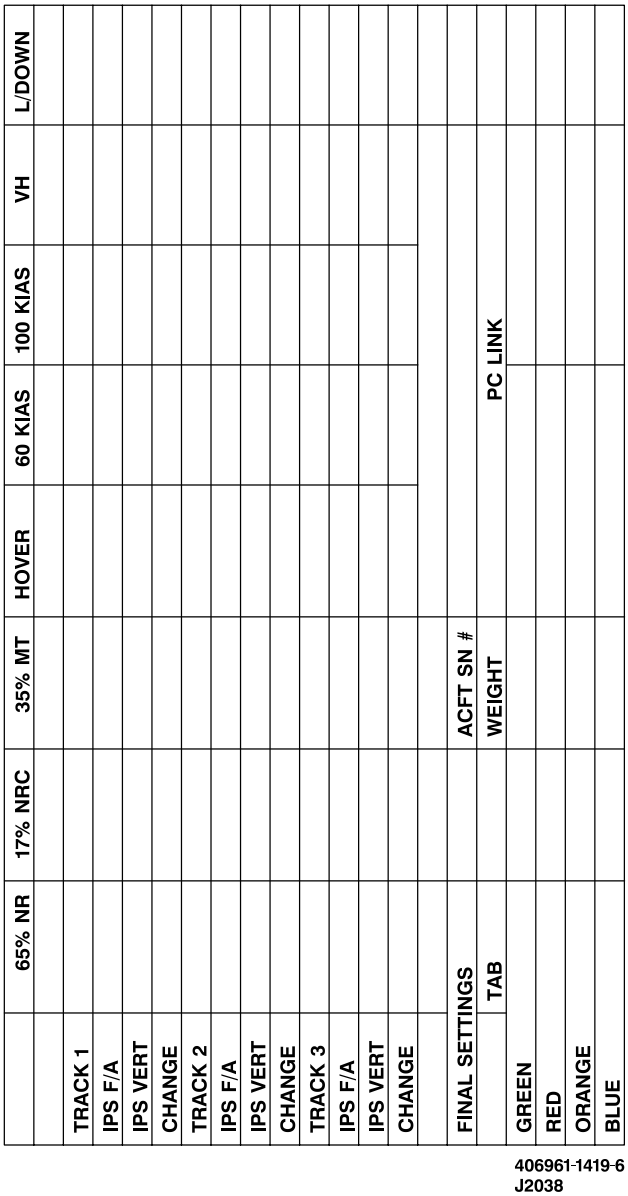
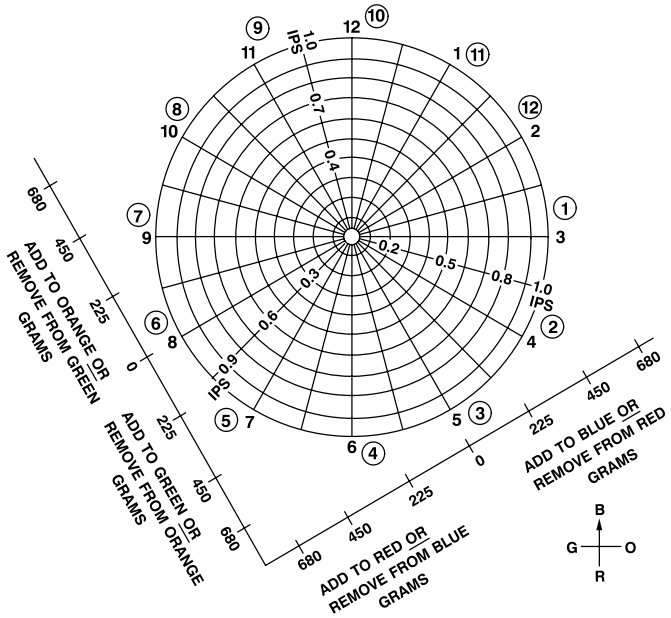


Figure 5-2. Main Rotor Track and Balance Record



APPROXIMATE TRACK SENSITIVITY AT IDLE	
P/C ADJUSTMENT	TRACK CHANGE
1 FLAT OF BARREL	0.1 INCH
1 TURN OF BARREL	0.5 INCH
1/2 TURN OF LOWER ROD END	0.8 INCH

NOTES:

1. DATA OBTAINED AT IDLE (65% NR).
2. SET RPM TUNE DIAL TO 256.
3. SET STROBEX RPM DIAL TO 375 INITIALLY.
4. USE FORE AND AFT ACCELEROMETER.
5. CIRCLED CLOCK POSITIONS ARE FOR MMS REMOVED.

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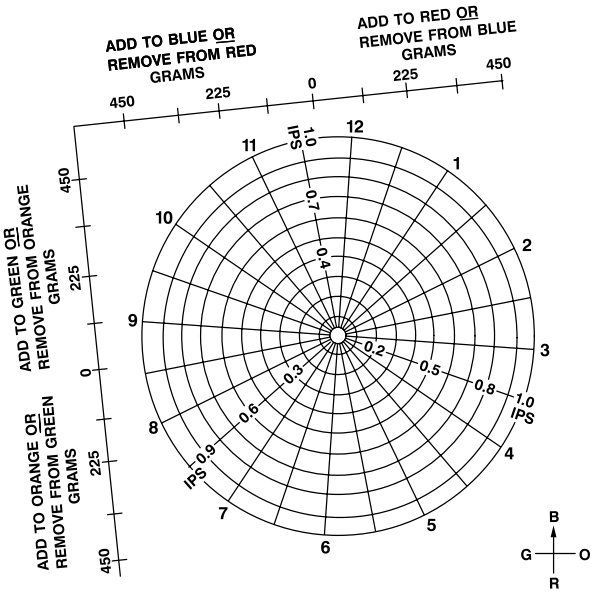
Figure 5-3. Fore-and-Aft Balance Chart at Idle 65% NR



APPROXIMATE TRACK SENSITIVITY AT 100% NR.

P/C ADJUSTMENT	TRACK CHANGE
1 FLAT OF BARREL	0.1 INCH
1 TURN OF BARREL	0.5 INCH
1/2 TURN OF LOWER ROD END	0.8 INCH
1° OF TAB	0.1 INCH

NOTES:

1. DATA OBTAINED AT 100% NR
2. SET RPM TUNE DIAL TO 394
3. SET STROBEX RPM DIAL TO 600
4. USE FORE AND AFT ACCELEROMETER

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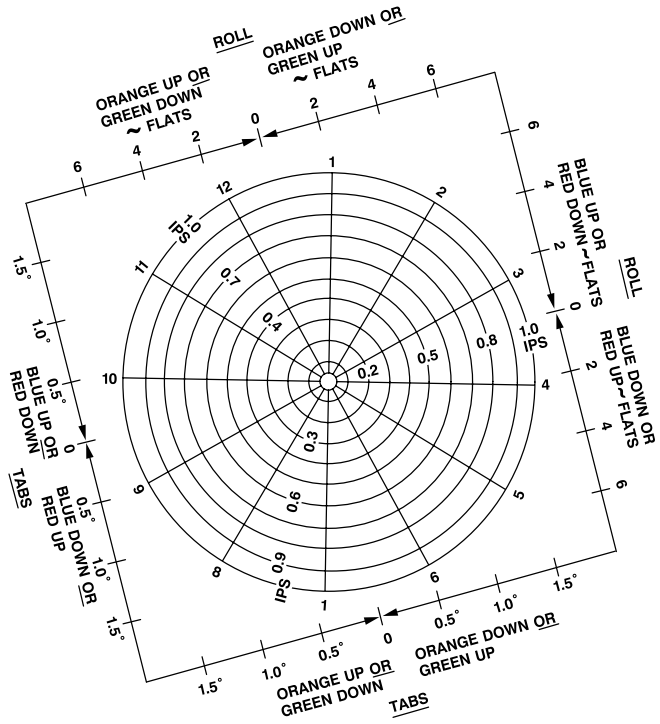
Figure 5-4. Fore-and-Aft Balance Chart at 100% NR



NOTES:

1. USE VERTICAL ON NOSE PANEL
2. SENSITIVITIES ARE FOR 110 KTS DOUBLE THE AMOUNT OF MOVE INDICATED FOR 60 KTS
3. ROLL SENSITIVITY IN LETDOWN IS THE SAME AS 110 KTS

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Figure 5-5. OH-58D Vertical 1/rev Chart

Date:

Serial No.

		1st Run	2nd Run	3rd Run	4th Run	5th Run
A	Clock Angle					
	BALANCE READINGS IPS					

C	MOVE	GRAMS (1)	1 gm.		

BALANCE READING WORK CHART

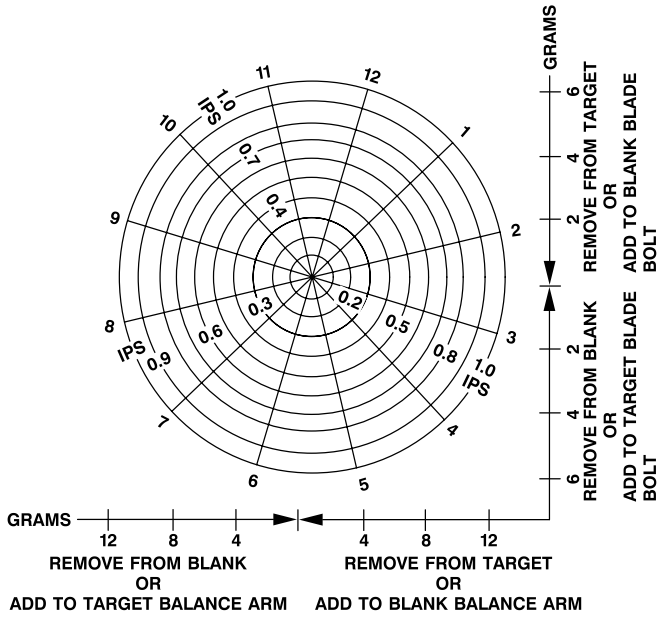

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Figure 5-6. Tail Rotor Balance Chart

OH-58D MTF CHECK SHEET

PURPOSE OF TEST FLIGHT			
ACFT S/N		DATE	
PILOT SIGNATURE		UNIT	
ACFT WT:	DA BASELINE		DA TODAY
SYMBOLS	✓ = SATISFACTORY		X = DEFICIENCY

	PRIOR TO MAINTENANCE TEST		19 DEFOG SYSTEM
	FLIGHT		20 HTR
	1 FORMS AND RECORDS		21 MASK BLWR
	2 FLIGHT READINESS INSP		22 PITOT HTR
	BEFORE STARTING ENGINE CHECKS		23 FUEL BOOST
	1 FAT_____ °C		24 AC GEN
	2 MAG COMPASS HDG _____		25 ENG ANTI-ICE
	3 CW SYSTEM		26 BATT PRHT
	4 ENGINE HISTORY		27 BIT CHKS
	5 MPD		28 AVX CHKS
	ENGINE START/RUNUP CHECKS		BEFORE HOVER CHECKS
	1 START TGT (PEAK) ____ °C		1 SYSTEMS
	2 START TIME ___ SEC		XMSN OIL P____ psi
	3 EGI CHECK		XMSN OIL T____ °C
	4 DELETED		ENG OIL P____ psi
	SYSTEM CHECKS		ENG OIL T____ °C
	1 MPD BIT CODE		NG____%
	2 RFD		ENG TRQ____%
	3 FORCE TRIM		TGT____°C
	4 CYCLIC CHECK (lbs)		MAST TRQ____%
	FORE ___ AFT ____		2 STBY ALTIMETER
	LEFT___ RIGHT ____		3 MFD CHECKS
	5 COLLECTIVE ___(lbs)		HOVER CHECKS
	6 PEDALS ___ (lbs)		1 POWER ASSURANCE CHECK
	7 HYDRAULIC SYSTEM		FAT____°C TGT____°C
	8 ENG IDLE SPEED		PA____feet
	9 IDLE RELEASE		ENG TRQ (chart)____%
	10 FUEL CONTROL OVERSPEED		ENG TRQ (actual) %
	11 THROTTLE OPEN CHKS		2 HOVER POWER CHECK
	12 NP TRIM		MAST TRQ____%
	13 MAST TRQ		TGT____°C NG ____%
	14 HIGH RPM ROTOR WARNING		3 CONTROL RIGGING CHECK
	15 SCAS REL		4 SCAS CHECK
	16 SCAS TEST		5 HEADING HOLD
	17 HEADING HOLD		6 POWER CYLINDER CHECK
	18 COMPT BLWR		

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Figure 5-7. OH-58D MTF Checksheet (Suggested Format) (Sheet 1 of 2)

OH-58D MTF CHECK SHEET (CONT)

	SYMBOLS ✓ = SATISFACTORY X = DEFICIENCY	
	7 ENGINE RESPONSE AND	MAST TRQ____%
	FUEL CONTROL CHECK	2 FDL/BIT
	8 HOVER BOB UP CHECK	3 BATTERY CHECKS
	9 FLT INSTRUMENTS	4 THROTTLE OFF CHECKS
	INFLIGHT CHECKS	5 LAST FLIGHT RECALL
	1 RADAR ALTIMETER	FC1____ FC2____
	2 CONTROL RIGGING	FC3____ FC4____
	3 AUTOROTATION NR____%	FC5____ FC6____
	4 HYDRAULIC SYSTEMS	6 POSTFLIGHT INSPECTION
	5 COLLECTIVE ANTICIPATOR	7 COMPLETE UPDATE FORMS
	6 VIBRATION ANALYSIS	AND RECORDS
	7 FLIGHT INSTRUMENTS	SPECIAL EQUIPMENT CHECKS
	VSD	1 ATHS
	SLIP INDICATOR	2 NAV SYSTEM
	8 STANDBY INSTRUMENTS	PRESENT POSITION _____
	MAGNETIC COMPASS	ACTUAL POSITION _____
	9 COMMUNICATIONS	CIRCULAR ERROR _____
	FM 1____ UHF____	3 GPS
	VHF____ HF____	4 AIRBORNE CALIBRATION
	FM 2____ HOMING____	5 COMPASS COMPENSATION
	SECURE EQUIP____	6 MMSS
	10 TRANSPONDER	7 ADSS
	11 FUEL CONSUMPTION CHECK	8 AVTR
	STOP TIME____ QTY____	9 DTS
	START TIME____ QTY____	10 ASE
	FLOW RATE ____ pph	APR-39____ AVR-2____
	ENGINE SHUTDOWN CHECKS	ALQ-144____ APR-44 ____
	1 SYSTEMS	11 WPNS SYS
	XMSN OIL P____ psi	PDU____ ATAS ____
	XMSN OIL T____°C	MG____HF____
	ENG OIL P____ psi	RKTS____
	ENG OIL T____°C	
	NG____%	
	ENG TRQ____%	
	TGT____°C	

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Figure 5-7. OH-58D MTF Checksheet (Suggested Format) (Sheet 2 of 2)

OH-58D(R) MTF CHECK SHEET

PURPOSE OF TEST FLIGHT			
ACFT S/N:		DATE:	
PILOT SIGNATURE:		UNIT:	
ACFT WT:	DA BASELINE:	DA TODAY:	
SYMBOLS	✓ = SATISFACTORY	X = DEFICIENCY	

	PRIOR TO MAINTENANCE TEST		17 HEADING HOLD
	FLIGHT		18 COMPT BLWR
	1 FORMS AND RECORDS		19 DEFOG SYSTEM
	2 FLIGHT READINESS INSP		20 HTR
	BEFORE STARTING ENGINE CHECKS		21 PITOT HTR
	1 FAT_____ °C		22 FUEL BOOST
	2 MAG COMPASS HDG _____		23 AC GEN
	3 AUDIO TONE		24 ENG ANTI-ICE
	4 FADEC MONITOR		25 BATT PRHT
	5 PARK HMU		26 BIT CHKS
	6 MPD		27 AVX CHKS
	ENGINE START/RUNUP CHECKS		BEFORE HOVER CHECKS
	1 START TGT (PEAK) _____ °C		1 SYSTEMS
	2 START TIME _____ SEC		XMSN OIL P_____ psi
	3 EGI CHECKS		XMSN OIL T_____ °C
	SYSTEM CHECKS		ENG OIL P_____ psi
	1 MFD BIT CODE		ENG OIL T_____ °C
	2 RFD		NG_____ %
	3 FORCE TRIM		ENG TRQ_____ %
	4 CYCLIC CHECK (lbs)		TGT _____ °C
	FORE_____ AFT _____		MAST TRQ_____ %
	LEFT_____ RIGHT_____		2 STBY ALTIMETER
	5 COLLECTIVE _____ (lbs)		3 MFD CHECKS
	6 PEDALS_____ (lbs)		HOVER CHECKS
	7 HYDRAULIC SYSTEM		1 POWER ASSURANCE CHECK
	8 ENGINE IDLE SPEED		FAT _____ °C TGT _____ °C
	9 IDLE RELEASE		PA_____ feet
	10 FADEC (PMA)		ENG TRQ (chart)_____ %
	11 THROTTLE OPEN CHKS		ENG TRQ (actual) _____ %
	12 NP TRIM		2 HOVER POWER CHECK
	13 MAST TRQ		MAST TRQ _____ %
	14 HIGH RPM ROTOR WARNING		TGT_____ °C NG_____ %
	15 SCAS REL		3 CONTROL RIGGING CHECK
	16 SCAS TEST		4 SCAS CHECK

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Figure 5-8. OH-58D(R) MTF Checksheet (Suggested Format) (Sheet 1 of 3)

OH-58D(R) MTF CHECK SHEET (CONT)

	SYMBOLS ✓ = SATISFACTORY X = DEFICIENCY		
	5 HEADING HOLD		3 BATTERY CHECKS
	6 POWER CYLINDER CHECK		4 OVERSPEED TEST
	7 ENGINE RESPONSE		5 THROTTLE OFF CHECKS
	8 FADEC MANUAL		6 RECALL L/R IMPCU
	9 HOVER BOB-UP CHECK		1960 CPU CCA
	10 FLT INSTRUMENT CHKS		1553 I/OC CCA
	INFLIGHT CHECKS		DIGITAL I/O CCA
	1 RADAR ALTIMETER		ANALOG I/O CCA
	2 CONTROL RIGGING		ADSS I/O CCA
	3 AUTOROTATION NR_____ %		(CDS4) GPP CCA
	4 HYDRAULIC SYSTEM		(CDS4) ASE/SCI CCA
	5 COLLECTIVE ANTICIPATOR		SYS GEN CCA
	6 VIBRATION ANALYSIS		WPNS CCA
	7 FLIGHT INSTRUMENTS		ASE CCA
	VSD		RMS CCA
	SLIP INDICATOR		VTR CCA
	8 STANDBY INSTRUMENTS		VIXL CCA
	MAGNETIC COMPASS		SCAS BIT
	9 COMMUNICATIONS		MISC BIT
	FM 1_____ FM 2 _____		7 POSTFLIGHT INSPECTION
	VHF_____ UHF _____		8 COMPLETE UPDATE FORMS
	VOX		AND RECORDS
	SECURE EQUIP_____		SPECIAL EQUIPMENT CHECKS
	10 TRANSPONDER		1 IDM
	11 RMS CHK		(CDS4) JVMF
	12 FUEL CONSUMPTION CHECK		(CDS4) TACFIRE
	STOP TIME_____ QTY _____		2 NAV SYSTEM
	START TIME_____ QTY _____		PRESENT POSITION _____
	FLOW RATE _____ pph		ACTUAL POSITION _____
	ENGINE SHUTDOWN CHECKS		CIRCULAR ERROR _____
	1 SYSTEMS		3 GPS
	XMSN OIL P_____ psi		4 AIRBORNE CALIBRATION
	XMSN OIL T_____ °C		5 COMPASS COMPENSATION
	ENG OIL P_____ psi		6 MMSS
	ENG OIL T_____°C		7 ADSS
	NG_____ %		8 AVTR
	ENG TRQ_____ %		9 DTS
	TGT_____°C		10 ASE
	MAST TRQ_____ %		APR-39_____ AVR-2 _____
	2 FADEC MAINT CODE		

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Figure 5-8. OH-58D(R) MTF Checksheet (Suggested Format) (Sheet 2 of 3)

OH-58D(R) MTF CHECK SHEET (CONT)

	SYMBOLS ✓ = SATISFACTORY X = DEFICIENCY		
	APR-44 _____ ALQ-144_____		
	11 WPN SYS		
	PDU _____		
	ATAS_____ MG _____		
	HF _____ RKTS _____		

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Figure 5-8. OH-58D(R) MTF Checksheet (Suggested Format) (Sheet 3 of 3)

APPENDIX A
CDS Fault Codes

The fault codes identify faulty LRUs. Replace an LRU when a number appears on the same line as the fault code. Replace the LRUs in sequence according to the number given on the chart. For example: when a fault code of 0007 is encountered, replace the left MCPU(1) with a new one. If this does not cure the problem, replace the left MCPU with the original left MCPU and replace the right MCPU(2) with a new one. If this also does not cure the problem then replace the right MCPU(2) with the original right MCPU and replace the KU(3).

Table A-1. CDS FAULT CODES

FAULT CODE	LRU TO BE REPLACED					
	LEFT MPD	RIGHT MPD	RFD	KU	LEFT MCPU	RIGHT MCPU
0001						1
0002					1	
0003					1	2
0004				1		
0005				2		1
0006				2	1	
0007				3	1	2
0008			1			
0009			2			1
000A					1	
000B			3		1	2
000C			1	2		
000D			2	3		1
000E			2	3	1	
000F			3	4	1	2
0010		1				
0011		1				2
0012		1			2	
0013		1			2	3
0014		1		2		
0015		1		3		2
0016		1		3	2	
0017		1		4	2	3
0018		1	2			
0019		1	3			2
001A		1	3		2	
001B		1	4		2	3
001C		1	2	3		
001D		1	3	4		2
001E		1	3	4	2	
001F		1	4	5	2	3
0020	1					
0021	1					2
0022	1				2	

Table A-1. CDS FAULT CODES (Cont)

FAULT CODE	LRU TO BE REPLACED					
	LEFT MPD	RIGHT MPD	RFD	KU	LEFT MCPU	RIGHT MCPU
0023	1				2	3
0024	1			2		
0025	1			3		2
0026	1			3	2	
0027	1			4	2	3
0028	1		2			
0029	1		3			2
002A	1		3		2	
002B	1		4		2	3
002C	1		2	3		
002D	1		3	4		2
002E	1		3	4	2	
002F	1		4	5	2	3
0030	1	2				
0031	1					2
0032	1	2			3	
0033	1	2			3	4
0034	1	2		3		
0035	1	2		4		3
0036	1	2		4	3	
0037	1	2		5	3	4
0038	1	2	3			
0039	1	2	4			3
003A	1	2	4		3	
003B	1	2	5		3	4
003C	1	2	3	4		
003D	1	2	4	5		3
003E	1	2	4	5	3	
003F	1	2	5	6	3	4

(TABLE I.D. 922117)

APPENDIX B
Fault Detection Location System (FDLS) Codes

B-1. FDLS CODES.

This appendix contains a listing of the FDLS fault codes.

NOTE

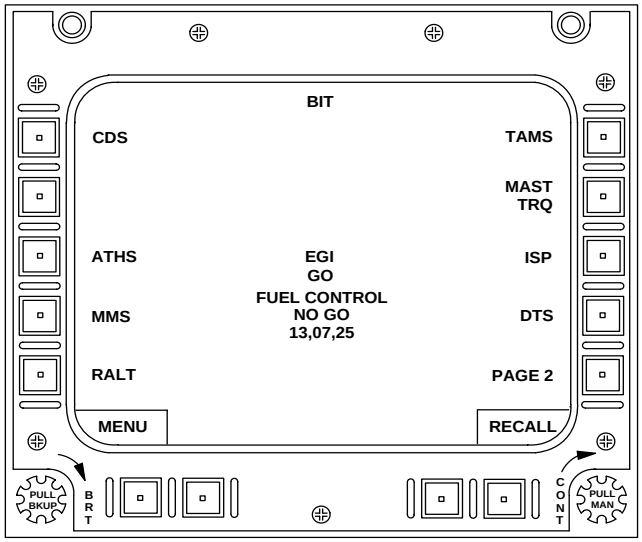
When multiple faults are indicated, replace or repair one unit at a time. If replacement or repair of first unit does not clear the fault, remove and install the original unit. Replace or repair the second unit. If replacement or repair of second unit does not clear the fault, install the original unit. Proceed through replacement or repair of multiple units utilizing this procedure.

B-2. BUILT-IN TEST.

An operator calls up the built-in test (BIT) page (figures B-1 through B-3) from FDL MENU by pressing BIT key. The helicopter must be on the ground to access this page. The BIT page provides control and display of built-in fault detection and location.

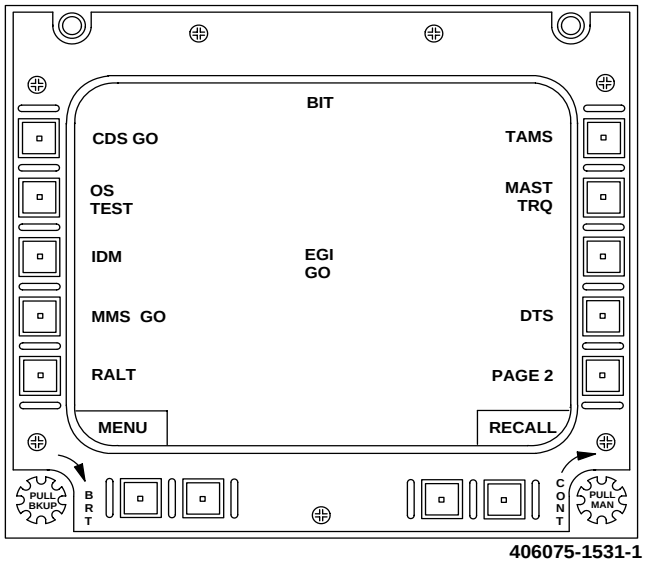
When the BIT page is called up, the result of the continuously running EGI BIT is displayed at the center of the screen. All other BITs must be initiated by the operator as described in subsequent paragraphs. In some cases a fault code is identified along with a NO GO status.

The ability to communicate with each subsystem through the aircraft wiring is verified when any BIT is selected. If the CDS is unable to communicate with a subsystem, a failure is noted and NO GO is displayed. An exit to FDL MENU is made by pressing the mode select key labeled MENU. The operator exits to the INITIAL PAGE by pressing the INIT button on the pilot or CPG auxiliary panel. Leaving the BIT page causes GO/NO GO conditions and fault codes to be cleared from the page.



406075-1512-3
J0671

Figure B-1. (CDS2) BIT (Built-In Test) Page



406075-1531-1
J0902

Figure B-2. R BIT (Built-In Test) Page

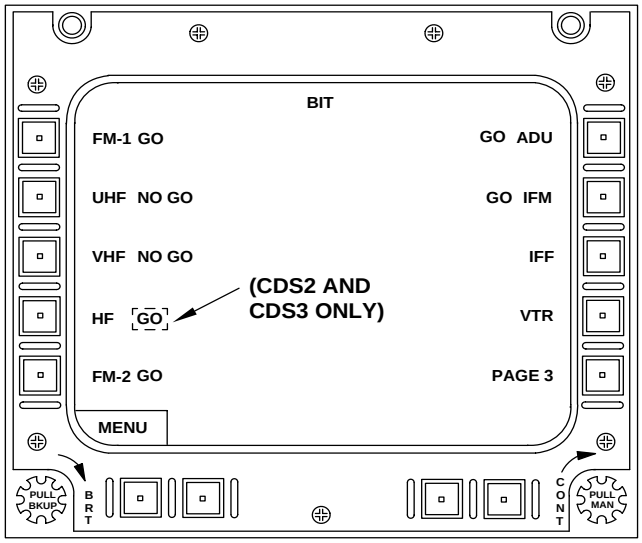


Figure B-3. BIT Page 2

The BIT functions and their respective paragraphs are:

BIT	PARAGRAPH
(CDS2) LAST FLIGHT RECALL	B-3
(CDS3) LAST FLIGHT RECALL	B-4
(CDS4) LAST FLIGHT RECALL	B-5
EGI	B-6
(CDS2) FUEL CONTROL	B-7
R R3 ENGINE	B-8
CDS	B-9
(CDS2) ATHS	B-10
R IDM	B-11
MMS	B-12
RADAR ALTIMETER	B-13
TAMS	B-14
MAST TORQUE	B-15
ADU	B-16
IFM AMPLIFIER	B-17
RADIO	B-18
R FM AN/ARC-201D	B-19
(CDS2/CDS3) HF RADIO	B-20
SCAS	B-21

Each digit of the fault code indicates the failure status for four built-in tests. See Table B-1 and R Table B-2. To learn which self-tests have failed, compare each digit with the table. An x indicates a built-in test has failed. The number 3 in the first digits indicates tests 12 and 13 have failed. The following are examples of typical fault codes and the built-in tests they indicate as having failed.

NOTE

Table B-2 applies to R Last Flight Recall only.

TYPICAL FAULT CODE	BUILT-IN TESTS FAILED
0040	06
1010	12, 04
A10B	15, 13, 08, 03, 01, 00
4230	14, 09, 05, 04

R

TYPICAL FAULT CODE	BUILT-IN TESTS FAILED
10064200	28, 18, 17, 14, 09
1E900000	28, 27, 26, 25, 23, 20
81002D00	31, 24, 13, 11, 10, 08
AC000010	31, 29, 27, 26, 04

Table B-1. Fault Code Conversion

406961-1424-4
J2622

NOTE

This table also applies to R/3 ENG BIT.

DIGIT DISPLAYED	FIRST DIGIT Tests Failed 15	14	13	12	SECOND DIGIT Tests Failed 11	10	09	08	THIRD DIGIT Tests Failed 07	06	05	04	FOURTH DIGIT Tests Failed 03	02	01	00
0																
1				X				X				X				X
2			X				X				X				X	
3			X	X			X	X			X	X			X	X
4		X				X				X				X		
5		X		X		X		X		X		X		X		X
6		X	X			X	X			X	X			X	X	
7		X	X	X		X	X	X		X	X	X		X	X	X
8	X				X				X				X			
9	X			X	X			X	X			X	X			X
A	X		X		X		X		X		X		X		X	
B	X		X	X	X		X	X	X		X	X	X		X	X
C	X	X			X	X			X	X			X	X		
D	X	X		X	X	X		X	X	X		X	X	X		X
E	X	X	X		X	X	X		X	X	X		X	X	X	
F	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

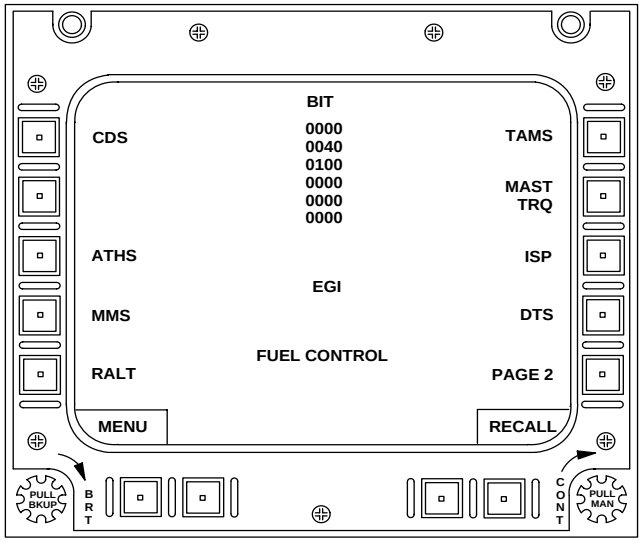
Table B-2. Fault Code Conversion R

DIGIT DISPLAYED	FIRST DIGIT Tests Failed				SECOND DIGIT Tests Failed				THIRD DIGIT Tests Failed				FOURTH DIGIT Tests Failed				FIFTH DIGIT Tests Failed				SIXTH DIGIT Tests Failed				SEVENTH DIGIT Tests Failed				EIGHTH DIGIT Tests Failed			
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0																																
1				X				X				X				X				X				X				X				X
2			X				X				X				X				X				X				X				X	
3			X	X			X	X			X	X			X	X			X	X			X	X			X	X			X	X
4		X				X				X				X				X				X				X				X		
5		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X
6		X	X			X	X			X	X			X	X			X	X			X	X			X	X			X	X	
7		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X
8	X				X				X				X				X				X				X				X			
9	X			X	X			X	X			X	X			X	X			X	X			X	X			X	X			X
A	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
B	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X
C	X	X			X	X			X	X			X	X			X	X			X	X			X	X			X	X		
D	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X
E	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X	
F	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

406075-1532-2 J0907

B-3. (CDS2) LAST FLIGHT RECALL.

Selecting the RECALL button will bring up the Recall page (Figure B-4). The recall data shows failures for the SCAS, Navigational System, and CDS when normal engine shutdown was performed at the end of the last flight. There are 66 possible tests. A fault code appears as a hexadecimal number. Five 4-digit fault codes are displayed along with a sixth unusable code of 0000. Refer to Table B-1 for hexadecimal to test code conversion. The fault codes provide information on built-in tests as follows:



406075-1512-2
J0671

Figure B-4. (CDS2) Recall Page

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION

NOTE

Replace shown aircraft LRU with known good one first. If problem still exists, fault is most likely airframe related. Refer to appropriate Maintenance Action Precise Symptoms (MAPS) contained in TM 1-1520-248-T Series manual.

(WORD 1)	(Replace)	
01	MCPU	Processor Test Failure
02	MCPU	ROM Check Sum Failure
03	MCPU	A/D + 15 Vdc Invalid
04	MCPU	+ 14 Vdc Invalid
05	MCPU	1553 Data Wraparound Invalid
06	MCPU	RTI Fail Line Test
07	MCPU	± 10 Vdc Ref Failed
08	MCPU	15 Vdc AET Failed
09	MCPU	Data Bus Test #1 Failure
10	MCPU	Data Bus Test #2 Failure
11	MCPU	Data Bus Test #3 Failure
12	**	UART Wraparound Failure
13	Discrete Deleted	Type G Radio Output Failure
14	MCPU	Type AA Radio Output Failure
15	Discrete Deleted	Type F Radio Output Failure

** Refer to TM 1-1520-248-T-3.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 2)	(Replace)	
00	EGI	EGI Data Not Changing
01	Discrete Deleted	EGI Validity Discrete (Hard Wire)
02	EGI	EGI Validity Discrete Invalid (1553)
03	**	EGI/Gyro Roll Rate Mistrack
04	**	EGI/Gyro Pitch Rate Mistrack
05	**	EGI/Gyro Yaw Rate Mistrack
06	**	Second Yaw Rate Mistrack
07	**	Pitch Stick Inputs Mistrack
08	**	Roll Stick Inputs Mistrack
09	**	Pedal Inputs Mistrack
11	**	Collective Stick Inputs Mistrack
13	**	Airspeed Input Mistrack
14	**	Engine Torque Input Invalid
15	MCPU	SCAS Summed Wraparound Invalid

** Refer to TM 1-1520-248-T-3.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 3)	(Replace)	
00	**	26 Vac Ref Failed
01	MCPU	± 5 Vac Failed
02	**	Left Cyclic Model Mistrack
03	**	Right Cyclic Model Mistrack
04	**	Yaw Model Mistrack
05	**	Second Yaw Model Mistrack
06	**	Trim Rate Model Mistrack
10	**	P/R Latch W/A Discrete Invalid
11	**	Yaw Latch W/A Discrete Invalid
12	**	P/R Solenoid W/A Discrete Invalid
13	**	Yaw Solenoid W/A Discrete Invalid
14	**	Trim Brake/Spare W/A Discrete Invalid
15	**	Trim/Clutch Transformer Rectifier Unit Control W/A Discrete Invalid

** Refer to TM 1-1520-248-T-3.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 4)	(Replace)	
00	MCPU	SCAS Discrete Output BIT Pattern Invalid
01		
02		
03	No Action Required	EGI Not Aligned
04	MCPU	Power Supply Over Temperature

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 5)	(Replace)	
01	Right MFD	RIGHT MFD 1 Failed
02	Left MFD	LEFT MFD 2 Failed
03	MFK	MFK Data Stream Check — Sum Valid
04	MFK	MFK Indicators Failed
05	MFK	MFK Test Pattern Invalid
06	MCPU	MUX #1 Test Failed
07	MCPU	MUX #2 Test Failed
08	MCPU	MUX #3 Test Failed
09	MCPU	MUX #4 Test Failed
10	MCPU	MUX #5 Test Failed
11	MCPU	MUX #6 Test Failed

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
12	MCPU	MUX #7 Test Failed
13	MCPU	+5 Vdc Test Failed
14	MCPU	MMS Failed

B-4. (CDS3) LAST FLIGHT RECALL.

Selecting the RECALL button will bring up the Recall page (Figure B-5). The recall data shows failures for the SCAS, Navigational System, and CDS when normal engine shutdown was performed at the end of the last flight. There are 212 possible tests. A fault code appears as a hexadecimal number. There are a total of 13 8-digit fault codes displayed in a two-column format. Each fault code corresponds to an MCPU CCA. Refer to Table B-2 for hexadecimal to test number conversion. The fault codes provide information on built-in tests as follows:

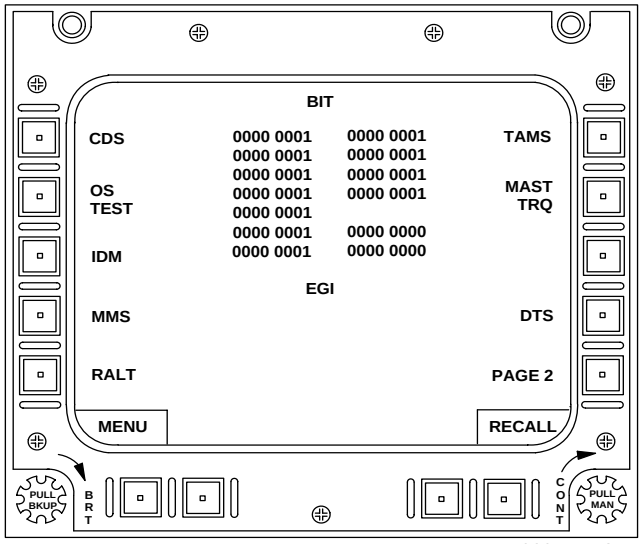


Figure B-5. (CDS3) Recall Page

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION

NOTE

Replace shown aircraft LRU with known good one first. If problem still exists, fault is most likely airframe related. Refer to appropriate Maintenance Action Precise Symptoms (MAPS) contained in TM 1-1520-248-T Series manual.

(WORD 1) 1960CPU CCA	(Replace)	
01	MCPU	WDT Fail
02	MCPU	RTC Fail
03	MCPU	Global Bus Fail
04	MCPU	Flash Checksum Fail
05	MCPU	Fault Fail
06	MCPU	CPU Fail
07	MCPU	NVM Fail
08	MCPU	Not Installed
15	MCPU	Partial RAM Test Fail
16	MCPU	10ms Task Overrun
17	MCPU	20ms Task Overrun
18	MCPU	40ms Task Overrun
19	MCPU	80ms Task Overrun
20	MCPU	160ms Task Overrun
21	MCPU	320ms Task Overrun
22	MCPU	1s Task Overrun
31	MCPU	Powerup Ram Test Fail

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 2) 1553 BIOC CCA	(Replace)	
01	MCPU	Term 2 Bus B Encoder Fail
02	MCPU	Term 2 Bus A Encoder Fail
03	MCPU	Term 2 Bus B Data Fail
04	MCPU	Term 2 Bus A Data Fail
05	MCPU	Term 2 Bus Seq Fail
06	MCPU	Term 2 Pri Seq Fail
07	MCPU	Term 2 FIFO Fail
08	MCPU	Term 2 Fail Safe Time Fail
09	MCPU	Term 2 Terminal Address Parity
10	MCPU	Term 2 Self Test Fail
11	MCPU	Term 2 Init Regs Fail
12	MCPU	Term 2 RAM Fail
13	MCPU	Term 2 EEPROM Fail
14	MCPU	Term 1 Bus B Encoder Fail
15	MCPU	Term 1 Bus A Encoder Fail
16	MCPU	Term 1 Bus B Data Fail
17	MCPU	Term 1 Bus A Data Fail
18	MCPU	Term 1 Bus Seq Fail
19	MCPU	Term 1 Pri Seq Fail
20	MCPU	Term 1 FIFO Fail
21	MCPU	Term 1 Fail Safe Time Fail
22	MCPU	Term 1 Terminal Address Parity

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
23	MCPU	Term 1 Self Test Fail
24	MCPU	Term 1 Init Regs Fail
25	MCPU	Term 1 RAM Fail
26	MCPU	Term 1 EEPROM Fail
27	MCPU	Not Installed

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 3) Digital I/O CCA	(Replace)	
01	MCPU	Tach Test
02	MCPU	Discrete Test
03	MCPU	UART Test
04	MCPU	KY-58 Test
05	MCPU	MPM Test
06	MCPU	Not Installed

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 4) Analog I/O CCA	(Replace)	
01	MCPU	Not Installed

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
02	MCPU	MPM Test
03	MCPU	MUX BIT
04	MCPU	Sequencer Failure

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 5) ADSS I/O CCA	(Replace)	
01	MCPU	Not Installed Fault
02	MCPU	EEPROM Test
03	MCPU	Cathode Test
04	MCPU	Anode Test
05	MCPU	RAM Page 1 Clear Test
06	MCPU	RAM Page 0 Clear Test
07	MCPU	RAM Page 1 Write Test
08	MCPU	RAM Page 0 Write Test

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 6) Sym Gen CCA	(Replace)	
01	MCPU	SG1 Not Installed Fault
02	MCPU	SG1 Tri Port RAM Failure
03	MCPU	SG1 Pong Delay Exceeded

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
04	MCPU	SG1 RAM Data
05	MCPU	SG1 RAM Address
06	MCPU	SG1 Multi Port RAM Data
07	MCPU	SG1 Multi Port RAM Address
08	MCPU	SG1 Checksum
09	MCPU	SG1 VRAM Data
10	MCPU	SG1 VRAM Address
11	MCPU	SG1 SYNC Interrupt
12	MCPU	SG1 Color Register
13	MCPU	SG1 VRAM Output
14	MCPU	SG1 DAC Palette
15	MCPU	SG1 Incorrect CPU Triport Patterns
16	No Action Required	Tests Completed
17	MCPU	SG2 Not Installed Fault
18	MCPU	SG2 Tri Port RAM Failure
19	MCPU	SG2 Pong Delay Exceeded
20	MCPU	SG2 RAM Data
21	MCPU	SG2 RAM Address
22	MCPU	SG2 Multi Port RAM Data
23	MCPU	SG2 Multi Port RAM Address
24	MCPU	SG2 Checksum
25	MCPU	SG2 VRAM Data
26	MCPU	SG2 VRAM Address
27	MCPU	SG2 SYNC Interrupt

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
28	MCPU	SG2 Color Register
29	MCPU	SG2 VRAM Output
30	MCPU	SG2 DAC Palette
31	MCPU	SG2 Incorrect CPU Triport Patterns

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 7) Weapons CCA	(Replace)	
01	MCPU	Not Installed Fault
02	MCPU	RAM Fault
03	MCPU	Output Discrete Fault
04	MCPU	BIT Volt 5 Fault
05	MCPU	BIT Volt 4 Fault
06	MCPU	BIT Volt 3 Fault
07	MCPU	BIT Volt 2 Fault
08	MCPU	BIT Volt 1 Fault
09	MCPU	Analog Out Sum Fault

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 8) ASE CCA	(Replace)	
01	MCPU	Not Installed Fault
03	MCPU	Tone Generator
04	MCPU	Type CW Fault
05	MCPU	Type CN Fault
06	MCPU	Type CK Fault
07	MCPU	Type DQ Fault
08	MCPU	Type CE Fault
09	MCPU	Type CD Fault

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
11	MCPU	Type CG Fault
12	MCPU	Type CH Fault
13	MCPU	Type CX Fault
14	MCPU	Type CF Fault
15	MCPU	Type CA Fault

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 9) RMS CCA	(Replace)	
01	MCPU	Not Installed Fault
02	MCPU	Test Timeout
03	MCPU	RAM Test Fail Flag
04	MCPU	320C40 #1 RAM Checksum
05	MCPU	320C40 #2 RAM Checksum
06	MCPU	34020 RAM Checksum
07	MCPU	MDU Receptacle
08	MCPU	Cache RAM #2 Memory
09	MCPU	Cache RAM #1 Memory
10	MCPU	34020 Multiport
11	MCPU	320C40 #2 Multiport
12	MCPU	320C40 #1 Multiport
13	MCPU	FFM1 Memory
14	MCPU	FFM2 Memory
15	MCPU	DAC
16	MCPU	320C40 #2 34020 VRAM
17	MCPU	320C40 #1 Interrupt 320C40 #2
18	MCPU	320C40 #2 Interrupt 320C40 #1
19	MCPU	320C40 #1 Interrupt 34020

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
20	MCPU	320C40 #2 Interrupt 34020
21	MCPU	320C40 COMM Port #2
22	MCPU	320C40 COMM Port #1
23	MCPU	34020 EEPROM Checksum
24	MCPU	320C40 EEPROM Checksum
25	MCPU	34020 Interrupt C40 #2
26	MCPU	34020 Interrupt C40 #1
27	MCPU	320C40 #1 34020 VRAM
28	MCPU	MDU Cartridge
29	MCPU	320C40 #2 RAM Memory
30	MCPU	320C40 #1 RAM Memory
31	MCPU	34020 RAM Memory

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 10) VTR CCA	(Replace)	
01	MCPU	Not Installed Fault
02	MCPU	Continuous BIT Count LSB
03	MCPU	Continuous BIT Count MSB
05	MCPU	RS-422 Wrap Test
06	MCPU	GP2/GP1 Communication Fail
07	MCPU	GP1/GP2 Communication Fail
08	MCPU	GP2 Display Interrupt
09	MCPU	GP1 Display Interrupt

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
10	MCPU	GP2 EEPROM Checksum
11	MCPU	GP1 EEPROM Checksum
12	MCPU	GP2 Video RAM
13	MCPU	GP1 Video RAM
14	MCPU	GP2 RAM
15	MCPU	GP1 RAM

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 11) VDU CCA	(Replace)	
01	MCPU	VTR Not Installed
02	MCPU	VDU Not Installed
03	MCPU	PBI Init Timeout
04	MCPU	PBI Test Timeout
05	MCPU	VDU BIT Timeout
06	MCPU	Shared RAM Failure
16	MCPU	PBI Fail
17	MCPU	VDU RAM Fail
18	MCPU	VDU EEPROM Fail
19	MCPU	VDU Discrete Fail
20	MCPU	VTR Installed
24	MCPU	Wrap-Around Fail

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 12) SCAS BIT	(Replace)	
00	MCPU	Cyclic FA Pos Sensor Fail
01	MCPU	Cyclic LAT Pos Sensor Fail
02	MCPU	Pedal Pos Sensor Fail
03	MCPU	Collective Pos Sensor Fail

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
04	MCPU	Summed Analog Out WA Fail
05	MCPU	Left Cyclic Model Mistrack
06	MCPU	Right Cyclic Model Mistrack
07	MCPU	First Yaw Model Mistrack
08	MCPU	Second Yaw Model Mistrack
09	MCPU	Trim Rate Model Mistrack
10	MCPU	Ref 9 and 5 Volts Fail
11	MCPU	Positive 15 Volts Fail
12	MCPU	Primary 26 Vac Fail
13	MCPU/EGI	EGI Not Responding on Bus
14	MCPU/EGI	EGI Not Aligned
15	MCPU/EGI	EGI Invalid
16	MCPU	EGI Gyro Roll Rate Mistrack
17	MCPU	EGI Gyro Pitch Rate Mistrack
18	MCPU	EGI Gyro Yaw Rate Mistrack
19	MCPU	Second Yaw Rate Mistrack
20	MCPU	Airspeed Input Invalid
21	MCPU	Engine Torque Invalid

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 13) MISC BIT	(Replace)	
00	MCPU	GBI Timeout
01	MCPU	CPU Fault
16	KBU	KB Data Is Bad
17	KBU	KB Toggle Fail

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
18	KBU	KB Test BIT Fail
19	MCPU	KU Bus Fail
20	MCPU	ARINC Bus Fail

B-5. (CDS4) LAST FLIGHT RECALL.

Selecting the RECALL button will bring up the Recall page (Figure B-6). The recall data shows failures for the SCAS, Navigational System, and CDS when normal engine shutdown was performed at the end of the last flight. A fault code appears as a hexadecimal number. There are a total of 12 8-digit fault codes displayed in a two-column format. Each fault code corresponds to an MCPU CCA. Refer to Table B-2 for hexadecimal to test number conversion. The fault codes provide information on built-in tests as follows:

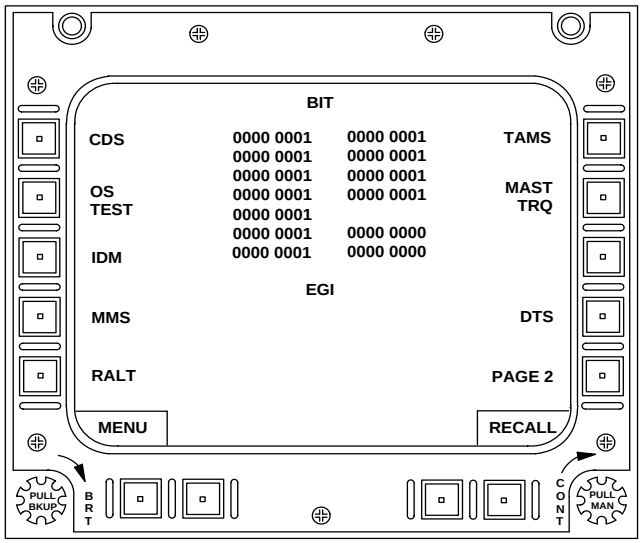


Figure B-6. (CDS4) Recall Page

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION

NOTE

Replace shown aircraft LRU with known good one first. If problem still exists, fault is most likely airframe related. Refer to appropriate Maintenance Action Precise Symptoms (MAPS) contained in TM 1-1520-248-T Series manual.

(WORD 1) GPP CCA	(Replace)	
01	MCPU	GPP Task Overrun
02	MCPU	GPP DP Fail
03	MCPU	GPP Timers
04	MCPU	GPP Fault
05	MCPU	GPP NVM Fail
06	MCPU	GPP ROM Fail
07	MCPU	GPP CPU Fail
08	MCPU	GPP RAM Fail
16	MCPU	1553 BIT Complete
17	MCPU	1553 ROM Failed
18	MCPU	1553 RAM Failed
19	MCPU	1553 DP RAM Failed
20	MCPU	1553 SMT1 Failed
21	MCPU	1553 SMT2 Failed
22	MCPU	1553 SMT3 Failed

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 2) Digital I/O CCA	(Replace)	
01	MCPU	Tach Test
02	MCPU	Discrete Test

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
03	MCPU	UART Test
04	MCPU	KY-58 Test
05	MCPU	MPM Test
06	MCPU	Not Installed

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 3) Analog I/O CCA	(Replace)	
01	MCPU	Not Installed
02	MCPU	MPM Test
03	MCPU	MUX BIT
04	MCPU	Sequencer Failure

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 4) ADSS I/O CCA	(Replace)	
01	MCPU	Not Installed
02	MCPU	EEPROM Test
03	MCPU	Cathode Test
04	MCPU	Anode Test
05	MCPU	RAM Page 1 Clear Test
06	MCPU	RAM Page 0 Clear Test

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
07	MCPU	RAM Page 1 Write Test
08	MCPU	RAM Page 0 Write Test

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 5) Sym Gen CCA	(Replace)	
01	MCPU	SG1 Not Installed
02	MCPU	SG1 Tri Port RAM Failure
03	MCPU	SG1 Pong Delay Exceeded
04	MCPU	SG1 RAM Data
05	MCPU	SG1 RAM Address
06	MCPU	SG1 Multi Port RAM Data
07	MCPU	SG1 Multi Port RAM Address
08	MCPU	SG1 Checksum
09	MCPU	SG1 VRAM Data
10	MCPU	SG1 VRAM Address
11	MCPU	SG1 SYNC Interrupt
12	MCPU	SG1 Color Register
13	MCPU	SG1 VRAM Output
14	MCPU	SG1 DAC Palette
15	MCPU	SG1 Incorrect CPU Triport Patterns
16	No Action Required	SG2 Tests Completed
17	MCPU	SG2 Not Installed

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
18	MCPU	SG2 Tri Port RAM Failure
19	MCPU	SG2 Pong Delay Exceeded
20	MCPU	SG2 RAM Data
21	MCPU	SG2 RAM Address
22	MCPU	SG2 Multi Port RAM Data
23	MCPU	SG2 Multi Port RAM Address
24	MCPU	SG2 Checksum
25	MCPU	SG2 VRAM Data
26	MCPU	SG2 VRAM Address
27	MCPU	SG2 SYNC Interrupt
28	MCPU	SG2 Color Register
29	MCPU	SG2 VRAM Output
30	MCPU	SG2 DAC Palette
31	MCPU	SG2 Incorrect CPU Triport Patterns

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 6) Weapons CCA	(Replace)	
01	MCPU	Not Installed
02	MCPU	RAM Fault
03	MCPU	Output Discrete Fault
04	MCPU	BIT Volt 5 Fault
05	MCPU	BIT Volt 4 Fault
06	MCPU	BIT Volt 3 Fault

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
07	MCPU	BIT Volt 2 Fault
08	MCPU	BIT Volt 1 Fault
09	MCPU	Analog Out Sum Fault

TEST NUMBER (WORD 7) ASE/SCI CCA	ACTION ITEM (Replace)	TEST DESCRIPTION
01	MCPU	Not Installed
03	MCPU	Tone Generator
04	MCPU	Type CW Fault
05	MCPU	Type CN Fault
06	MCPU	Type CK Fault
07	MCPU	Type DQ Fault
08	MCPU	Type CE Fault
09	MCPU	Type CD Fault
11	MCPU	Type CG Fault
12	MCPU	Type CH Fault
13	MCPU	Type CX Fault
14	MCPU	Type CF Fault
15	MCPU	Type CA Fault

TEST NUMBER (WORD 8) RMS CCA	ACTION ITEM (Replace)	TEST DESCRIPTION
01	MCPU	Not Installed
02	MCPU	Test Timeout
03	MCPU	RAM Test Fail Flag
04	MCPU	320C40 #1 RAM Checksum
05	MCPU	320C40 #2 RAM Checksum

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
06	MCPU	34020 RAM Checksum
08	MCPU	Cache RAM #2 Memory
09	MCPU	Cache RAM #1 Memory
10	MCPU	34020 Multiport
11	MCPU	320C40 #2 Multiport
12	MCPU	320C40 #1 Multiport
13	MCPU	FFM1 Memory
14	MCPU	FFM2 Memory
15	MCPU	DAC
16	MCPU	320C40 #2 34020 VRAM
17	MCPU	320C40 #1 Interrupt 320C40 #2
18	MCPU	320C40 #2 Interrupt 320C40 #1
19	MCPU	320C40 #1 Interrupt 34020
20	MCPU	320C40 #2 Interrupt 34020
21	MCPU	320C40 COMM Port #2
22	MCPU	320C40 COMM Port #1
23	MCPU	34020 EEPROM Checksum
24	MCPU	320C40 EEPROM Checksum
25	MCPU	34020 Interrupt C40 #2
26	MCPU	34020 Interrupt C40 #1
27	MCPU	320C40 #1 34020 VRAM
29	MCPU	320C40 #2 RAM Memory
30	MCPU	320C40 #1 RAM Memory
31	MCPU	34020 RAM Memory

TEST NUMBER (WORD 9) VTR CCA	ACTION ITEM (Replace)	TEST DESCRIPTION
01	MCPU	Not Installed
02	MCPU	Continuous BIT Count LSB
03	MCPU	Continuous BIT Count MSB
05	MCPU	RS-422 Wrap Test
06	MCPU	GP2/GP1 Communication Fail
07	MCPU	GP1/GP2 Communication Fail
08	MCPU	GP2 Display Interrupt
09	MCPU	GP1 Display Interrupt
10	MCPU	GP2 EEPROM Checksum
11	MCPU	GP1 EEPROM Checksum
12	MCPU	GP2 Video RAM
13	MCPU	GP1 Video RAM
14	MCPU	GP2 RAM
15	MCPU	GP1 RAM

TEST NUMBER (WORD 10) VDU CCA	ACTION ITEM (Replace)	TEST DESCRIPTION
01	MCPU	VTR Not Installed
02	MCPU	VDU Not Installed
03	MCPU	PBI Init Timeout
04	MCPU	PBI Test Timeout
05	MCPU	VDU IBIT Timeout
06	MCPU	Shared RAM Failure
16	MCPU	PBI Fail
17	MCPU	VDU RAM Fail
18	MCPU	VDU EEPROM Fail
19	MCPU	VDU Discrete Fail
20	MCPU	VTR Installed
24	MCPU	Wrap-Around Fail

TEST NUMBER (WORD 11) SCAS BIT	ACTION ITEM (Replace)	TEST DESCRIPTION
00	MCPU	Cyclic FA Pos Sensor Fail
01	MCPU	Cyclic LAT Pos Sensor Fail
02	MCPU	Pedal Pos Sensor Fail
03	MCPU	Collective Pos Sensor Fail
04	MCPU	Summed Analog Out WA Fail
05	MCPU	Left Cyclic Model Mistrack
06	MCPU	Right Cyclic Model Mistrack
07	MCPU	First Yaw Model Mistrack
08	MCPU	Second Yaw Model Mistrack
09	MCPU	Trim Rate Model Mistrack
10	MCPU	Ref 9 and 5 Volts Fail
11	MCPU	Positive 15 Volts Fail
12	MCPU	Primary 26 Vac Fail
13	MCPU/EGI	EGI Not Responding on Bus
14	MCPU/EGI	EGI Not Aligned
15	MCPU/EGI	EGI Invalid
16	MCPU	EGI Gyro Roll Rate Mistrack
17	MCPU	EGI Gyro Pitch Rate Mistrack
18	MCPU	EGI Gyro Yaw Rate Mistrack
19	MCPU	Second Yaw Rate Mistrack
20	MCPU	Airspeed Input Invalid
21	MCPU	Engine Torque Invalid

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(WORD 12) MISC BIT	(Replace)	
00	MCPU	GBI Timeout
01	MCPU	CPU Fault
16	KBU	KB Data Is Bad
17	KBU	KB Toggle Fail
18	KBU	KB Test BIT Fail
19	MCPU	KU Bus Fail
20	MCPU	ARINC Bus Fail

B-6. EGI BIT.

A GO or NO GO condition is indicated at the center of the display when the BIT page is called up. No operator interaction is required.

B-7. (OH-58D) FUEL CONTROL BIT.

The operator presses the DIGITAL test switch on the Fuel Control Test Panel (figure B-7) to initiate the fuel control BIT. The words GO or NO GO appear on the line below FUEL CONTROL when the BIT is completed (figure B-1). If the NO GO condition is indicated, fault codes are displayed on the line below. There are 28 possible fault codes. A fault code appears as a two-digit number. Multiple fault codes are separated by commas with four fault codes per line. Only the first eight fault codes generated will be displayed. The fault codes are as follows:

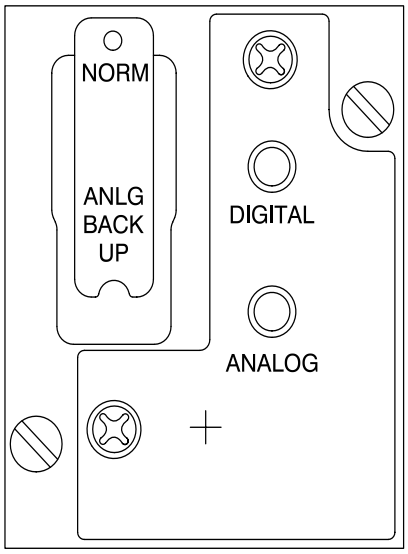


Figure B-7. (OH-58D) Fuel Control Test Panel

ESC FAULT CODE LIST

Code	Fault	Eng Cont	O'Speed Protect	Analog Gov	Notes
*00	No PWR ESC	M	No	No	1
*01	End of MSG not Rec'd	UNK D	UNK	UNK	2
*11	NP A vs B	D	A/D	Av	9
*12	NG A vs B	D	A/D	Av	10
*13	NP B	D	A/D	Av	3,9
*14	NP A	D	D	No	3,9
*15	NG B	D	A/D	Av	10
*16	NG A	D	A/D	Av	10
21	Internal	A	A	Op	4,5,6
22	Internal	A	A	Op	4,5,6
23	Internal	M	A/D	No	4,5,6
*24	PY TM coil open	M	A/D	No	4,5,7, 11
*25	PY TM coil	M	A/D	No	4,5,7, 11
26	Internal	M	A/D	No	4,5,6
*31	Internal	D	No	Av	12
*32	TGT	D	A/D	Av	4,13
33	PA	D	A/D	Av	5,6,8
*34	Collective Pitch	D	A/D	Av	5,14
35	Internal	A	A	Op	4,5,6
36	Internal	A	A	Op	4,5,6
41	Internal	A	A	Op	4,5,6
42	Internal	A	A/D	Op	4,5,6
43	Internal	A	A/D	Op	4,5,6
44	Internal	D	A/D	Op	6
45	Internal	D	A/D	Op	6
54	Internal	D	A/D	Op	
55	Internal	A	A	Op	4,5,6
56	Internal	A	A	Op	4,5,6
61	Internal	A	A	Op	4,5,6
62	Internal	A	A	Op	4,5,6
	Digital Power Loss	A	A	Op	4,5
	Complete Power Loss	M	No	No	4,5

* Perform troubleshooting using maintenance manuals for the appropriate signal required prior to replacing the Electronic Supervisory Control Unit.

NOTES:

1. Power not reaching ESC, check wiring for continuity.

2. Possible MCPU or ESC problem, replace/ test MCPU, if ok replace ESC.

3. Loss of signal will cause loss of analog governor control.

4. Start temperature limiting not available.

5. System performance degraded.

6. Replace electronic supervisory control (ESC).

7. Replace fuel control unit (FCU).

8. Code 33 will illuminate the "FUEL CONTROL" advisory message anytime ambient pressure is greater than 15.23 PSIA.

NOTE

This ambient pressure (15.23 PSIA) is equal to a density altitude of approximately minus 1200 feet and can be computed using the E6B computer (i.e., whiz wheel). The selection of 15.23 PSIA as the fault latch for code 33 was an arbitrary number and future software revisions to the ESC should correct this problem. Disregard "FUEL CONTROL" advisory message if only code 33 displays under heading "FUEL CONTROL" on BIT/FDL page while performing a digital fuel control check and you calculate the DA to be below approximately minus 1200 feet.

9. Perform the following:

   a. Inspect/check NP speed pickup and replace as necessary.

   b. Perform FUEL CONTROL BIT test. If fault persists, inspect/check NP branch of engine wiring harness.

   c. Perform FUEL CONTROL BIT test. If fault persists, replace ESC.

10. Perform the following:

   a. Inspect/check NG speed pickup and replace as necessary.

   b. Perform FUEL CONTROL BIT test. If fault persists, inspect/check NG branch of engine wiring harness.

   c. Perform FUEL CONTROL BIT test. If fault persists, replace ESC.

11. Perform the following:

    a. Inspect/check electrical torque motor on fuel control and replace as necessary.

    b. Perform FUEL CONTROL BIT test. If fault persists, inspect/check fuel control branch of engine wiring harness.

    c. Perform FUEL CONTROL BIT test. If fault persists, replace ESC.

12. Perform the following:

    a. Inspect/check NP overspeed solenoid and replace as necessary.

    b. Perform FUEL CONTROL BIT test. If fault persists, inspect/check overspeed branch of engine wiring harness.

    c. Perform FUEL CONTROL BIT test. If fault persists, replace ESC.

13. Perform the following:

    a. Inspect/check thermocouple probes and replace as necessary.

    b. Perform FUEL CONTROL BIT test. If fault persists, inspect/check thermocouple branch of engine wiring harness.

    c. Perform FUEL CONTROL BIT test. If fault persists, replace ESC.

14. Perform the following:

    a. Inspect/check collective pitch transducer and replace as necessary.

    b. Perform FUEL CONTROL BIT test. If fault persists, inspect/check collective

pitch transducer branch of engine wiring harness.

c. Perform FUEL CONTROL BIT test. If fault persists, replace ESC.

Abbreviations:

A.....Analog

D.....Digital

M.....Manual

UNK.....Unknown

Av.....Available

Op.....Operating

TM.....Torque Motor

B-8. R R3 ENGINE BIT.

The operator calls up the ENGINE HISTORY 3 page (figure B-8) by pressing the L-4 key on the FDL MENU page and the R-5 key on the ENGINE HISTORY 1 page and the ENGINE HISTORY 2 page. The helicopter must be on the ground to access this page. Each fault code appears as a hexadecimal number. Six four-digit fault codes are displayed. Use Table B-1 or TM 1-2840-263-23. The fault codes provide information on built-in tests as follows:

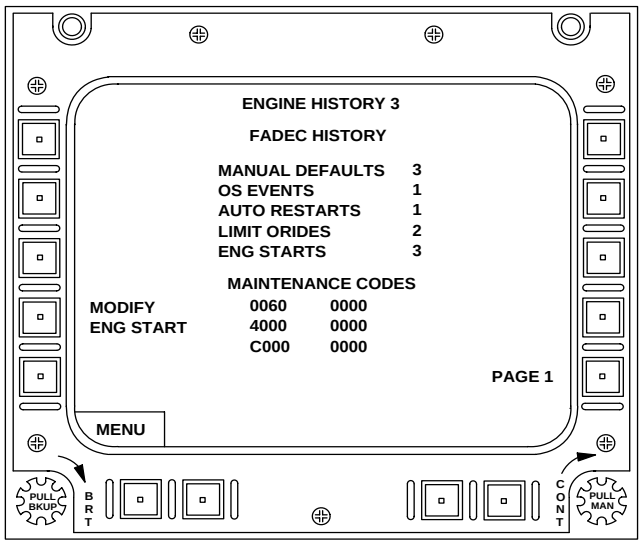


Figure B-8. R ENGINE HISTORY 3 Page

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(ESW1)	(Failed LRU)	
07		Override Limits Selected
08	ECU	12-bit A/D Conversion Fault
09	ECU	8-bit A/D Conversion Fault
10	A/C CP Pot*	Collective Pitch Fault Status
11	ECU	Watchdog Timer Hard Fault
12	ECU	Gain Fault
13	ECU	High Level Reference Voltage Fault
14	ECU, NG Sensor*	NG Hard Fault

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
15	ECU, NP Sensor*	NP Hard Fault

* Harness interconnections are also probable failure cause.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(ESW2)	(Failed LRU)	
00	A/C Bus*	Loss of Airframe 28V
01	PMA*	Alternator Failure
02	HMU, ECU*	Auto/Manual Mode Solenoid Failure
03	A/C Switch, ECU*	Auto/Manual Switch Fault
04	ECU	Low Level Offset Fault
05	A/C Switch*	Cockpit NR Beep Fault
06	ECU	Thermocouple Cold Junction Comp Fault
07	ECU	P1 Hard Fault
08	HMU*	PLA Hard Fault
10	A/C Installation	ECU Exceeding Allowable Temperature
11	A/C Relay, ECU*	Ignition Circuit Fault
12	A/C Relay, ECU*	Ignition Relay Fault
13	Thermocouple*	TGT Thermocouple Fault
14	Ng Pickup*	Engine Speed Pickup 1 Fault

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
15	Np Pickup*	Engine Speed Pickup 2 Fault

* Harness interconnections are also probable failure cause.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(ESW3)	(Failed LRU)	
00	Np Pickup*	Power Turbine Speed Pickup 1 Fault
01	Np Pickup*	Power Turbine Speed Pickup 2 Fault
02	Nr Sensor*	Rotor Speed Pickup Fault
03	ECU	PLA Reference Voltage Fault
04	ECU	PROM Hardware Fault
05	HMU, ECU*	Overspeed System Functional Fault
06	A/C Switch*	Overspeed Test Switch Fault
07	ECU	P1 Pressure Sensor Fault
08	ECU	10 Volt Pulse Width Modulator Fault
09	HMU*	PLA Potentiometer Input 1 Fault
10	HMU*	PLA Potentiometer Input 2 Fault
11	Q-Sensor*	Torque Sensor Fault
12	Engine	Engine Surge Occurrence

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
13	HMU, ECU*	Stepper Motor Fault
14	ECU, A/C Relay*	Starter Motor Circuit Fault
15	HMU, ECU*	Start Solenoid Current Fault

* Harness interconnections are also probable failure cause.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(ESW4)	(Failed LRU)	
00	T1 Sensor*	Engine Inlet Temp Signal 1 Fault
01	T1 Sensor*	Engine Inlet Temp Signal 2 Fault
02	T1 Sensor*	Engine Inlet Temp Signal A/B Difference
03	ECU*	Indicating Test Cell Mode on Aircraft
04	HMU*	Fuel Metering Valve Fault
05	ECU	RAM Hardware Fault
06	HMU*	Fuel Flow Has Been Limited for More than 10 Seconds
07	HMU, ECU*	Step Count Fault
08	T1 Sensor*	T1 Hard Fault
09	ECU	15 Volt Power Supply Fault
10	ECU	5 Volt Power Supply Fault
11	HMU*	Hard Fault on Fuel Flow

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
12	HMU, ECU*	Fuel Flow Step Count Fault

* Harness interconnections are also probable failure cause.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(ESW6)	(Failed LRU)	
00	ECU	Np O/S Power Supply Fault
01	ECU	OR Diode Fault
02	ECU	ARINC Hardware Fault
03	ECU	Background Complete Fault
04	ECU	EEPROM Calibration Data Fault
05	ECU	EEPROM Hardware Fault
06	HMU*	Open Metering Valve Warning Prior to Start
07	HMU*	PLA Hard Fault
08	HMU, ECU*	Start Solenoid VBIT Fault
09	ECU	Foreground Complete Fault
10	ECU	28 Volt OR'ed Power Fault
11	ECU	Software Interrupt Fault
12	ECU	UART Hardware Fault
13	ECU	Unused Interrupt Fault

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
14	ECU	Watchdog Timer First Timeout Fault
15	ECU	Watchdog Timer Fault

* Harness interconnections are also probable failure cause.

B-9. CDS BIT.

(CDS2) Pressing L-1 on BIT Page 1 initiates the CDS BIT. A GO or NO GO condition is displayed next to the legend CDS. When a NO GO condition exists, fault codes (which are decoded by maintenance personnel to identify failed components) are displayed below the GO or NO GO status.

R Since the CDS is a continuous BIT subsystem, pressing L-1 on BIT Page 1 blanks the status and displays the current status (GO or NOGO) of the continuous BIT. When a NOGO condition exists, the failed LRU will be identified by a four-digit fault code appearing below NOGO. The fault codes, decoded using Table B-1, identify tests that failed. Replace LRU that corresponds to failed test numbers. For example, a fault code of 000C indicates the RFD and the MFK must be replaced, and a fault code of 0010 indicates the right MFD must be replaced. (Table A-1 can also be used.)

NOTE

When a multiple fault is indicated, replace one LRU at a time. If replacement of first LRU does not clear the fault, remove the replacement LRU and install the original LRU. Replace the second LRU. If replacement of second LRU does not clear the fault, remove the replacement LRU and install the original LRU. Proceed through replacement of multiple LRU's utilizing this procedure.

TEST NUMBER (CDS3/CDS4)	ACTION ITEM (Replace)	TEST DESCRIPTION
00	Right MCPU	Right MCPU
01	Left MCPU	Left MCPU
02	MFK	MFK
03	RFD	RFD
04	Right MFD	Right MFD
05	Left MFD	Left MFD

R TEST NUMBER (CDS3/CDS4)	ACTION ITEM (Replace)	TEST DESCRIPTION
00	Right MCPU	Right MCPU
01	Left MCPU	Left MCPU
02	MFK	MFK

B-10. (CDS2) ATHS BIT.

Pressing line address key L-3 initiates the ATHS BIT. A GO or NOGO condition is indicated next to the word ATHS.

In some cases the BIT can identify a faulty LRU. A four-digit fault code appears beneath the words ATHS NOGO when a built-in test has failed. Refer to Table B-1 for decoding. The fault code provides information on 13 built-in tests as follows:

TEST NUMBER	ACTION ITEM (Replace)	TEST DESCRIPTION
01	**	AVIONIC CONTROLLER
02	**	AUDIO SWITCH
03	**	MODEM
04	**	MODEM CONTROL
05	**	READ/WRITE MEMORY
06	**	EPROM NO. 3
07	**	EPROM NO. 2
08	**	EPROM NO. 1
09	**	CPU
10	**	1553 SUBSYSTEM INTERFACE
11	**	1553 ENCODE/ DECODE
12	**	1553 VALIDATION
13	**	1553 ANALOG

** ATHS signal condition.

B-11. R IDM BIT.

Pressing line address key L-3 initiates the IDM BIT. A GO or NOGO condition is indicated next to the word IDM.

In some cases the BIT can identify a faulty LRU. A four-digit fault code appears beneath the words IDM NOGO when a built-in test has failed. Refer to Table B-1 for decoding. The fault code provides information on seven built-in tests as follows:

TEST NUMBER	ACTION ITEM (Replace)	TEST DESCRIPTION
(CDS3/CDS4) 09	IDM	GIP Failure
(CDS3/CDS4) 10	IDM	DSP # 2 Failure
(CDS3/CDS4) 11	IDM	DSP # 1 Failure
(CDS3) 12	IDM	System Self-Test Failure
(CDS3) 13	IDM	System Self-Test Failure
(CDS3) 14	IDM	System Self-Test Failure
(CDS3) 15	IDM	System Self-Test Failure

B-12. MMS BIT.

When MMS is on, pressing MMS key updates the current continuous BIT results of the mast mounted sight built-in test. A GO or NOGO condition is indicated next to the word MMS.

In some cases the BIT can identify a faulty LRU. A four-digit fault code appears beneath the words MMS NOGO when a built-in test has failed. The fault code provides information on 16 built-in tests as follows:

NOTE

Verify failure codes through the MMS diagnostics.

TEST NUMBER	ACTION ITEM (Replace)	TEST DESCRIPTION
00	-	MMS Power on BIT
01	MCPS	MCPS BIT Status
02	MSP	MSP DSC BIT
03	MSP	MSP VTS BIT
04	MSP	MSP 771 BIT
05	MSP	MSP General BIT
06	-	Turret BIT
07	IEA	IEA BIT
08	OBS	OBS BIT
09	TCU	TCU BIT
10	TIS	TIS BIT
11	TVS	TVS BIT
12	GEA	GEA BIT
13	GBA	GBA BIT
14	LRF/D	LRF/D BIT
15	-	MMS LRU Continuous BIT

R TEST NUMBER	ACTION ITEM (Replace)	TEST DESCRIPTION
00	-	Spare

(Cont)

R TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
01	MCPS	MCPS BIT Status
02	MSP	MSP DSC BIT
03	MSP	MSP VTS BIT
04	MSP	MSP 771 BIT
05	MSP	MSP General BIT
06	-	Turret BIT
07	IMUX	IMUX BIT
08	OBS	OBS BIT
09	TCU	TCU BIT
10	TIS	TIS BIT
11	TVS	TVS BIT
12	GEA	GEA BIT
13	GBA	GBA BIT
14	LRF/D	LRF/D BIT
15	-	MMS LRU Continuous BIT

Each digit of fault code indicates the failure status for four built-in tests. See table B-1. To learn which self-tests have failed, compare each digit with the table. An X indicates a built-in test has failed. The number 3 in the first digit indicates tests 12 and 13 have failed. The following are examples of typical fault codes and the built-in tests they indicate as having failed.

TYPICAL FAULT CODE	BUILT-IN TESTS FAILED
0040	06
1010	12, 04
A108	15, 13, 08, 03
4230	14, 09, 05, 04

B-13. RADAR ALTIMETER BIT.

Pressing line address key L-5 initiates the radar altimeter (RALT) BIT. A GO or NOGO condition is indicated next to the word RALT. No fault codes are identified.

If a NOGO is indicated without a failure code:

a. Verify the NOGO is valid by performing Radar Altimeter operational check (TM 11-1520-248-23).

b. Proceed to appropriate troubleshooting procedure (MAPS).

B-14. TRANSMISSION ATTITUDE MEASUREMENT SUBSYSTEM (TAMS) BIT.

Pressing line address key R-1 initiates the TAMS BIT. A GO or NOGO condition is indicated next to the word TAMS. A four-digit fault code appears beneath the words NOGO TAMS when a self-test has failed. The fault codes, shown in Table B-1, indicate which unit has failed. Replace or repair a unit when an X appears in the same line as the fault code. For example, a fault code of 0003 indicates the left aft LVDT and the TAMS signal conditioning unit must be replaced.

NOTE

When a multiple fault is indicated, replace or repair one unit at a time. If replacement or repair of first unit does not clear the fault, remove (if no repair was required) and install the original unit. Replace or repair the second unit. If replacement or repair of second unit does not clear the fault, install the original unit. Proceed through replacement or repair of multiple units utilizing this procedure.

TEST NUMBER	ACTION ITEM (Replace)	TEST DESCRIPTION
00	TAMS Signal Conditioning Unit	Signal Conditioning Unit
01	Left Aft LVDT	Left Aft LVDT
02	Left Fwd LVDT	Left Fwd LVDT
03	Right Aft LVDT	Right Aft LVDT
04	Right Fwd LVDT	Right Fwd LVDT

B-15. MAST TORQUE BIT.

Pressing MAST TQ key initiates the mast torque built-in test. A GO or NOGO condition is indicated next to the word MAST TQ. No fault codes are identified.

If a NOGO is indicated without a failure code:

a. Verify the NOGO is valid by performing Mast Torque operational check (TM 1-1520-248-T-1).

b. Proceed to appropriate troubleshooting procedure (MAPS).

B-16. AUDIO DISTRIBUTION UNIT (ADU) BIT.

Pressing ADU key on BIT page 2 initiates the audio distribution unit built-in test. A GO or NOGO condition is indicated next to the word ADU. No fault codes are identified.

If a NOGO is indicated:

a. Verify the NOGO is valid by performing ADU operational check (TM 11-1520-248-23).

b. Proceed to appropriate troubleshooting procedure (MAPS).

B-17. IFM AMPLIFIER BIT.

(CDS2) Pressing IFM key on BIT Page 2 initiates the improved FM BIT. A GO or NO GO condition is indicated next to the word IFM.

(CDS3) Pressing IFM key on BIT page 2 initiates the improved FM built-in test. A GO or NOGO condition is indicated next to the word IFM. The following fault codes are identified if NOGO appears:

FAULT CODE (CDS3)	ACTION ITEM (Replace)	TEST DESCRIPTION
0001	*	VPA Fault
0004	*	Power Level Fault
0005	*	VPA and Power Level Fault

* IFM amplifier.

(CDS4) Pressing IFM key on BIT page 2 initiates the improved FM BIT. A GO or NOGO condition is indicated next to the word IFM. The following fault codes are identified if NOGO appears:

FAULT CODE (CDS4)	ACTION ITEM (Replace)	TEST DESCRIPTION
0008	*	Power Level Failure
0009	*	RF Input Fault
0010	*	VPA Fault

* IFM amplifier.

B-18. RADIO BIT.

On BIT page 2 keys are provided to perform built-in tests on FM-1, UHF, VHF, and FM-2 radios. If NOGO appears, replace radios. If this does not clear fault, perform operational check (TM 11-1520-248-23).

B-19. R FM AN/ARC-201D BIT.

Pressing FM-1 or FM-2 key on BIT page 2 initiates the FM built-in test. A GO or NOGO condition is indicated next to the word FM-1 or FM-2. Three 4-digit fault codes are displayed. The second 4-digit code provides additional clarification of the Receiver-Transmitter (RT) test and the third 4-digit code provides additional clarification of the RF test. The following table provides fault codes for the first 4-digit code:

NOTE

- A NOGO without fault codes indicates that the radio is not responding to the bus. Possible problems include no power to the radio and/or both 1553 buses are not connected to the radio.
- A NOGO with fault codes of all zeros indicates that the radio did not respond to a BIT complete status in the allotted 30 second time frame. A time-out has been added to prevent the CDS and radio from being hung in a BIT always in progress condition. These results will most often occur if BIT is performed on the radio prior to the radio finishing its POWER-ON BIT.

If a NOGO is indicated with fault codes of all zeros:

1. Perform BIT again.
2. If same problem exists, cycle power to the radio, wait at least 30 seconds, and

perform BIT a third time. A third failure indicates a radio failure.

TEST NUMBER	ACTION ITEM (Replace)	TEST DESCRIPTION
07	Battery	HUB Low
09	Radio	1553 Test Fail
10	Radio*	COMSEC Test Fail
11	Radio	Control Processor Test Fail
12	Radio	Data Processor Test Fail
13	Radio	ECCM Processor Test Fail
14	Radio	RF Test Fail
15	Radio	RT Test Fail

* May be recoverable with COMSEC HOPSET refill.

B-20. (CDS2/CDS3) HF RADIO BIT.

Pressing HF key on BIT page 2 initiates the HF radio built-in test. A GO or NOGO condition is indicated next to the word HF.

If a NOGO is indicated without a failure code:

a. Verify the NOGO is valid by performing HF radio operational check (TM 11-1520-248-23).

b. Proceed to appropriate troubleshooting procedure (MAPS).

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
0001	Check/Replace Antenna Connections	Antenna Coupler

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
0002	Replace HF Radio	Receiver/Exciter Fail
0003	Do both ACTION ITEMs above	Antenna Coupler and Receiver/ Exciter Fail

B-21. SCAS BIT.

Pressing L-3 on the MAINTENANCE CHECKS page calls up the SCAS DIAGNOSTIC page and initiates the SCAS DIAGNOSTIC TEST. The actual test procedures are described in TM 1-1520-248-T-1. The test results are displayed on the MFD. **(CDS4)** Top line of fault codes provides left IMCPU test results. Bottom line of fault codes provides right IMCPU test results. Fault codes are displayed below text NO GO in four-character hexadecimal words. If the test is successful, the text GO is displayed two lines beneath the title legend. If the test fails, then the text NO GO is displayed with two lines of fault codes. This test is inhibited if the rotor RPM is ≥ 20% or the SCAS is disengaged. If either of these two limitations is true when the test is initiated, the text TEST INHIBITED appears centered on the page, immediately below title. If the test is not inhibited, the automatic portion of the test is initiated. Upon completion of the automatic SCAS test, the text PROCEED TO TEST 1 is displayed at the center of the displayed page immediately below the title. The appearance of this legend indicates to the operator that the system is ready to perform the MANUAL SCAS TEST 1. After this test is completed, the PROCEED TO TEST 1 changes to PROCEED TO TEST 2. The SCAS DIAGNOSTIC page is exited by the mode select button A labled MENU. The following is a list of the failure codes and corresponding failures for each code as seen on the MFD. The fault codes shown on Table B-1 identify the faulty LRU. Replace an LRU when an * appears on the same line as the ACTION ITEM on pages B-56 and B-57.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(CDS2)		
(FAULT CODE 1)		
00	*Right MCPU	Right MCPU Test
01	*Left MCPU	Left MCPU Test
02	-	Not Used
03	-	Not Used
04	-	Not Used
05	-	Not Used
06	*Yaw Actuator	Yaw Actuator Test
07	*Right Cyclic Actuator	Right Cyclic Actuator
08	*Left Cyclic Actuator	Left Cyclic Actuator
09	*Pitch Rate Gyro	Pitch Rate Gyro
10	*Roll Rate Gyro	Roll Rate Gyro
11	*Yaw Rate Gyro	Yaw Rate Gyro
12	*Fore/Aft Cyclic CMT	Fore/Aft Cyclic CMT
13	*Lateral Cyclic CMT	Lateral Cyclic CMT
14	*Pedal CMT	Pedal CMT
15	Collective CMT	Collective CMT
(FAULT CODE 2)		
00	*Airspeed Sensor	Airspeed Sensor
01	*Torque Sensor	Torque Sensor Not Used
02	-	Not Used
03	*Trim Motor	Trim Motor
04	Check 26 Vac	26 Vac System Test
05 thru 15	-	Not Used

R TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
00	*Right MCPU	Right MCPU Failure
01	*Left MCPU	Left MCPU Failure
03	*Trim Motor	Trim Motor Failure
04	Check 26 Vac	26 Vac Failure
06	*Yaw Actuator	Yaw Actuator Mistrack Failure
07	*Right Cyclic Actuator	Right Cyclic Actuator Mistrack Failure
08	*Left Cyclic Actuator	Left Cyclic Actuator Mistrack Failure
09	*Pitch Rate Gyro	Pitch Gyro Mistrack Failure
10	*Roll Rate Gyro	Roll Gyro Mistrack Failure
11	*Yaw Rate Gyro	Yaw Gyro Mistrack Failure
12	*Fore/Aft Cyclic CMT	Fore/Aft Cyclic Position Sensor Failure
13	*Lateral Cyclic CMT	Lateral Cyclic Position Sensor Failure
14	*Pedal CMT	Pedal Position Sensor Failure
15	Collective CMT	Collective Position Sensor Failure

NOTE

In-flight failures of the SCAS system are displayed with the LAST FLIGHT RECALL fault codes (paragraphs B-3, B-4, and B-5).

B-22. IFF BIT.

Pressing IFF key on BIT page 2 causes the IFF page 2 (figure B-9) to be displayed for the IFF. No fault codes are displayed for the IFF. Six self-tests can be selected. GO or NO GO is displayed for each test.

M1 TEST (MODE 1)
M2 TEST (MODE 2)
(CDS3) M3 TEST (MODE 3)
(CDS4) M3A TEST (MODE 3)
M4 TEST (MODE 4)
MC TEST (MODE C)
RAD TEST (Transmitter Test)

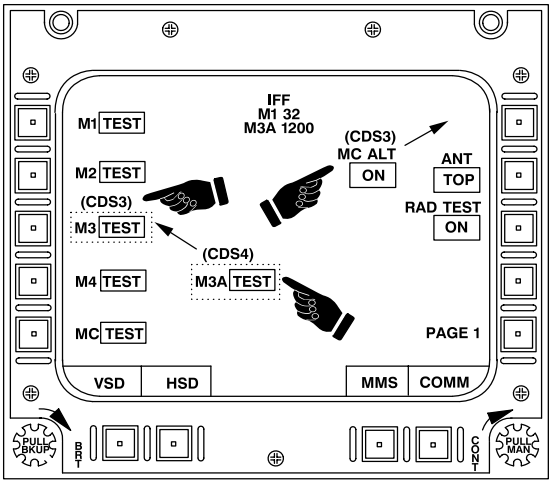


Figure B-9. IFF Page 2

NOTE

The IFF must be in NORM mode for the test to pass. All tests will fail if either antenna is disconnected and the respective antenna is also selected for use.

B-23. (CDS2) ISP BIT.

Pressing ISP key on BIT page 1 initiates the ISP built-in test. A GO or NO GO condition is indicated next to the acronym ISP. No fault codes are identified.

B-24. (CDS2) DTS BIT.

Pressing DTS key on BIT page 1 initiates the DTS built-in test. A GO or NO GO condition is identified next to the acronym DTS. No fault codes are identified.

B-25. R DTS BIT.

Pressing DTS key on BIT page 1 initiates the DTS built-in test. A GO or NO GO condition is identified next to the acronym DTS. Two lines of four-digit fault codes appear beneath the word DTS.

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(FAULT CODE 1)	(Failed LRU)	
02	DRU	RAM Program Checksum Test Fail
03	DRU	DMA 2 Test Fail
04	DRU	DMA 1 Test Fail
05	DRU	RS422 Serial B Wrap Test Fail
06	DRU	RS422 Serial B Loopback Test Fail
07	DRU	RS422 Serial A Loopback Test Fail

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(CDS4) 08	DRU	DTM Fail
(CDS4) 09	DRU	DTM Flash Fail
(CDS4) 10	DRU	DRU Fail
11	DRU	Watchdog Timer Fault Fail
12	DRU	RAM Test Lower Byte Fail
13	DRU	RAM Test Upper Byte Fail
14	DRU	PROM Program Checksum Test Fail
15	DRU	Processor Instruction/Register Test Fail

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
(FAULT CODE 2)	(Failed LRU)	
00	DRU	SCSI Register Test Fail
02	DRU	1553 Internal Test Fail
03	DRU	RT Address Parity Test Fail
04	DRU	1553 Channel B Loopback Test Fail
05	DRU	1553 Channel A Loopback Test Fail
06	DRU	1553 Memory/ Addressing Test Fail
07	DRU	1553 Register Test Fail
09	DRU	DTM Memory Access Test Fail

(Cont)

TEST NUMBER	ACTION ITEM	TEST DESCRIPTION
10	DRU	DTM Formatted Test Fail
11	DRU	DTM Power Regulator Test Fail
12	DRU	DTM Communication Monitor Test Fail
13	DRU	DTM Configuration Monitor Test Fail
14	DRU	DTM Power Wrap Test Fail
15	DRU	DTM Data Wrap Test Fail

B-26. VTR BIT.

Pressing VTR key on BIT page 2 initiates the VTR built-in test. A GO or NO GO condition is identified next to the acronym VTR. No fault codes are identified.

B-27. MUX Bus Status.

BIT page 3 displays the status of LRUs interfaced on the MIL-STD-1553 multiplex (MUX) data bus. Two bus cables, Bus A and Bus B, are installed in the helicopter. Each LRU can use either bus. The system periodically tests each LRU on each bus. The results are displayed on BIT page 3, (figures B-10 and B-11). The device refers to the LRU being tested and a GO or NO GO status is displayed for both Bus A and Bus B. Since these buses are redundant, a NO GO status can be displayed for a device, but since the other bus is still GO, the device will still function normally with no apparent problem.

1. The MUX BUS STATUS data is used to update failures of the data bus cables and also the devices. A NO GO means:

   a. The cable to that device is defective.

b. The device has an internal failure.

c. The device is off or not installed.

2. Use the following guidelines:

a. If a device is NOGO for one bus and all other devices on that bus are GO, repair the bus cable to the device.

NOTE

If replacing the cable segment does not solve the problem, replace the data bus coupler module.

b. If a device is NO GO for both buses, check for proper installation of and wiring to the device. If they are okay, replace the device.

c. If all or several devices are NO GO on the same bus, repair the bus cable. By comparing the devices that are NO GO with the physical layout of the bus, the problem can be isolated to one cable segment or coupler.

NOTE

If replacing the cable segment does not solve the problem, replace the data bus coupler module.

d. For the example shown in figure B-9, the EGI BUS A cable, IFM BUS B cable, and the VHF radio should be replaced.

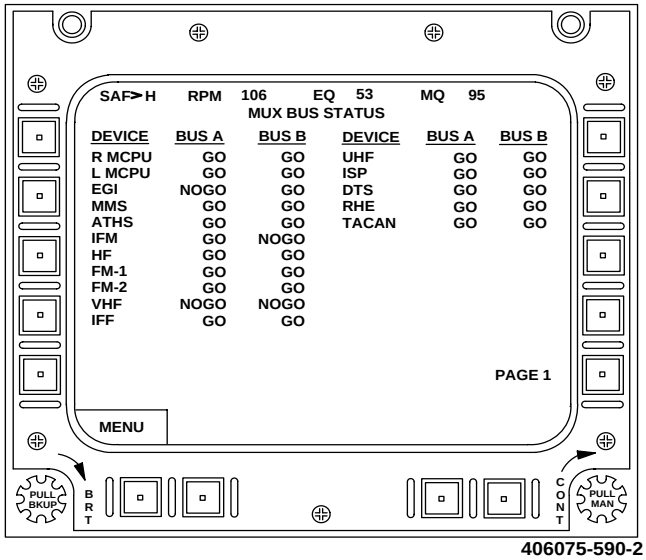
NOTE

If replacing the cable segment does not solve the problem, replace the data bus coupler module.

e. For the example shown in figure B-11, the R MCPU BUS A cable, IFM BUS B cable, and the VHF radio should be replaced.

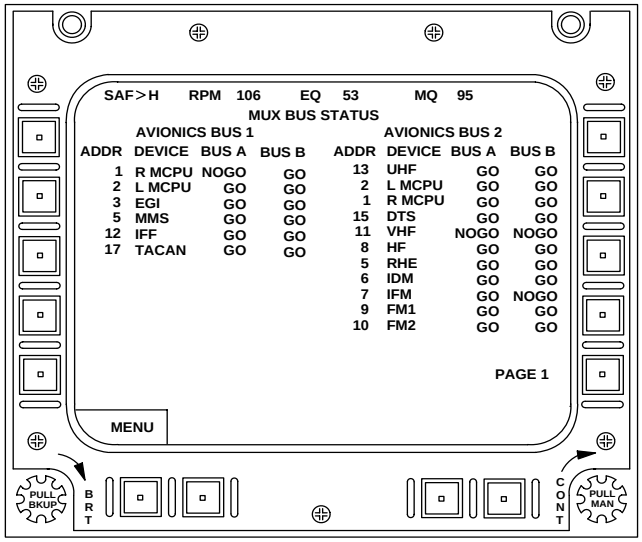
NOTE

If replacing the cable segment does not solve the problem, replace the data bus coupler module.



406075-590-2
J2215

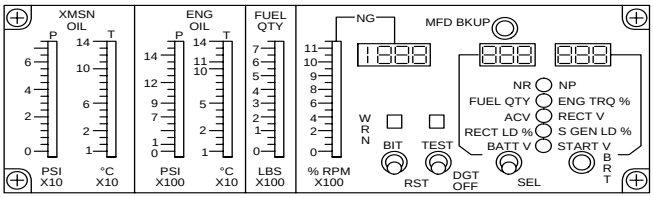
Figure B-10. (CDS2) MUX Bus Status



406075-1531-3
J0902

Figure B-11. R MUX Bus Status

B-28. MPD BIT. The operator places MPD BIT/ RST switch (figure B-12) to the BIT position to initiate the MPD BIT.



406075-1391
J0902

Figure B-12. Multiparameter Display

The first set of digits displayed will be the MPD program number (for example Pn 150 004). If a fault code is present, the display will show "Err 1" followed by the code number "F1 07". If multiple codes are present, the display will show "Err 2" followed by "F1 07", "F1 08" and will continue to cycle through each fault code and back to the total number of faults until the MPD BIT/RST switch is positioned to RST (center). The fault codes are as follows:

	Code	Fault
F1	01	HARD FAILURE, PROCESSOR
	02	SOFT FAILURE, PROCESSOR
	03	LEFT UART FAILURE
	04	RIGHT UART FAILURE
	05	ROTOR ERROR
	06	POWER FAILURE, MPD RCVR
	07	LOGIC FAILURE, MPD RCVR
	08	POWER FAILURE, MPD RCVR
	09	LOGIC FAILURE, MPD RCVR
	10	POWER FAILURE, MPD RCVR
	11	LOGIC FAILURE, MPD RCVR
	12	FUSE FAILURE, MPD
F2	01	POWER FAIL, TGT/TRQ RECEIVER
	02	TGT RECEIVER FAILURE
	03	TRQ RECEIVER FAILURE
	04	TGT/TRQ DISPLAY
	05	TGT/TRQ INDICATOR NOT CONNECTED
	06	TGT RCVR LOGIC FAILURE
	07	TRQ RCVR LOGIC FAILURE
F3	01	POWER FAIL, NR/NP
	02	RECEIVER FAIL, NR/NP
	03	NR/NP DISPLAY FAILURE
	04	NR/NP LOGIC FAILURE
	05	NR/NP INDICATOR NOT CONNECTED
F4	01	INVALID, (BATT V) BATTERY VOLTS
	02	ABOVE-SCALE, (BATT V) BATTERY VOLTS

(Cont)

	Code	Fault
	03	INVALID, (NG) GAS PRODUCER SPEED
	04	ABOVE-SCALE, (NG) GAS PRODUCER SPEED
	05	INVALID, (XMSN T) TRANSMISSION OIL TEMP
	06	ABOVE-SCALE, (XMSN T) TRANSMISSION OIL TEMP
	07	INVALID, (ENG P) ENGINE OIL PRESSURE
	08	ABOVE-SCALE, (ENG P) ENGINE OIL PRESSURE
	09	INVALID, (TGT) TURBINE GAS TEMP
	10	ABOVE-SCALE, (TGT) TURBINE GAS TEMP
	11	INVALID, (TRQ) MAST TORQUE
	12	ABOVE-SCALE, (TRQ) MAST TORQUE
	13	INVALID, (RECT LD) RECTIFIER LOAD
	14	ABOVE-SCALE, (RECT LD) RECTIFIER LOAD
	15	INVALID, (NR) ROTOR SPEED
	16	ABOVE-SCALE, (NR) ROTOR SPEED
F5	01	INVALID, (ENG T) ENGINE OIL TEMP
	02	ABOVE-SCALE, (ENG T) ENGINE OIL TEMP
	03	INVALID, (NP) POWER TURBINE SPEED
	04	ABOVE-SCALE, (NP) POWER TURBINE SPEED
	05	INVALID, (ENG TRQ) ENGINE TORQUE PRESSURE
	06	ABOVE-SCALE, (ENG TRQ) ENGINE TORQUE PRESSURE
	07	INVALID, (XMSN P) TRANSMISSION OIL PRESSURE
	08	ABOVE-SCALE, (XMSN P) TRANSMISSION OIL PRESSURE
	09	INVALID, (TGT2) TURBINE GAS TEMP
	10	ABOVE-SCALE, (TGT2) TURBINE GAS TEMP
	11	INVALID, (FUEL QTY) FUEL QUANTITY
	12	ABOVE-SCALE, (FUEL QTY) FUEL QUANTITY
	13	INVALID, (START V) START VOLTS
	14	ABOVE-SCALE, (START V) START VOLTS
	15	INVALID, (NR2) ROTOR SPEED
	16	ABOVE-SCALE, (NR2) ROTOR SPEED
	17	INVALID, (RECT V) DC BUS VOLTS

(Cont)

Code	Fault
18	ABOVE-SCALE, (RECT V) DC BUS VOLTS
19	INVALID, (ACV) AC BUS VOLTS
20	ABOVE-SCALE, (ACV) AC BUS VOLTS
21	INVALID, (S GEN LD) STARTER GENERATOR LOAD
22	ABOVE-SCALE, (S GEN LD) STARTER GENERATOR LOAD

NOTES:

F4 AND F5 CODES INDICATE ABNORMAL INPUT SIGNALS AND DO NOT DICTATE VSI MAINTENANCE ACTION.

THE "ABOVE-SCALE" CODES MEAN THAT THE PARAMETER VALUE IS ABOVE DISPLAY RANGE. FOR EXAMPLE, THE MAXIMUM ENGINE OIL PRESSURE THAT CAN BE DISPLAYED IS 150 PSI. IF ENGINE OIL PRESSURE EXCEEDS 150 PSI, THE WRN LIGHT WILL FLASH AND ERROR CODE F4 08 WILL BE DISPLAYED UNTIL THE PRESSURE RETURNS TO DISPLAY RANGE.

THE "INVALID" CODES APPEAR WHEN A PARAMETER VALUE IS NEGATIVE (BELOW ZERO). CERTAIN OF THESE CODES MAY APPEAR MOMENTARILY DURING ENGINE START-UP AND SHOULD BE DISREGARDED. CODES F5 09, F5 10, F5 15, AND F5 16 ARE LEFT MCPU OUTPUTS WHICH ARE NOT ACTIVE UNLESS THE RIGHT MCPU FAILS.

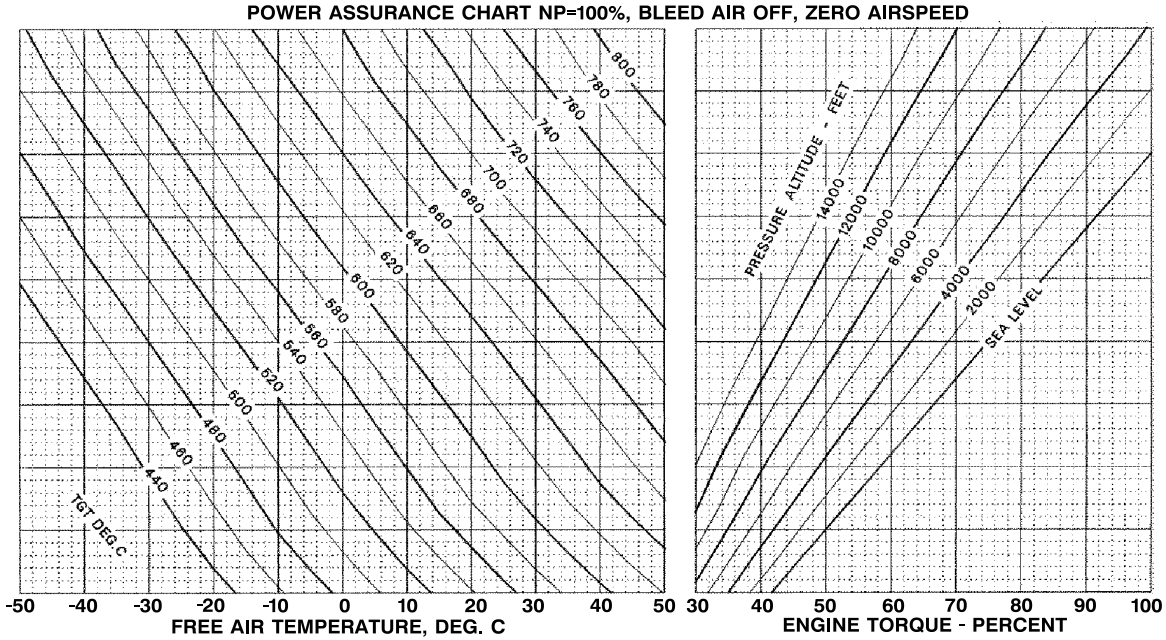


Figure 1. Power Assurance Chart (250-C30R/3) (Sheet 2 of 2)

TM 1-1520-248-MTF

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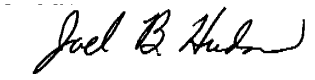

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