TM 55-1510-222-MTF

MAINTENANCE TEST FLIGHT MANUAL

ARMY MODEL RC-12K

Approved for public release, distribution unlimited

HEADQUARTERS
DEPARTMENT OF THE ARMY
30 April 1991

WARNING

A maintenance test flight is an exceptionally demanding operation and requires a thorough flight readiness inspection (PRE-FLIGHT). The flight readiness inspection is prescribed in TM 55-1510-222-10 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 should be used only by qualified maintenance test flight pilots as required in AR 95-1.

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URGENT

TM 55-1510-222-MTF
C1

CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 01 October 2009

MAINTENANCE TEST FLIGHT MANUAL

ARMY MODEL
RC-12K
AIRCRAFT

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

TM 1-1510-222-MTF, 30 April 1991 is changed as follows:

1. Remove and insert pages as indicated below. A vertical bar in the margin indicates new or changed text material. A miniature pointing hand indicates an illustration change.

Remove pages	Insert pages
- - - - - - - - - -	A and B
i and ii	i and ii
2-49 through 2-52	2-49 through 2-52.2
4-3 and 4-4	4-3 and 4-4
5-5 and 5-6	5-5 and 5-6

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

3. This change incorporates SAFETY OF FLIGHT, OPERATIONAL, RCS CSGLD-1860 (R1), RC-12 SERIES AIRCRAFT, STALL WARNING SYSTEM TEST, C-12-04-02 MSG DTG 141200Z JUN 04.

By Order of the Secretary of the Army:

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General, United States Army
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Secretary of the Army
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LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGE PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and change pages are:
Original . . . . . 0 . . . . . 30 April 1991
Change . . . . . 1 . . . . . 1 October 2009

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 172, CONSISTING OF THE FOLLOWING:

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b blank	0
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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) located in the back of the applicable Aircraft Operator's manual, ensure the publication number and title reflect this MTF) directly to Program Executive Office-Aviation, ATTN: SFAE-AV-AS-FW, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also send your comments electronically to our e-mail address, troy.brown@redstone.army.mil, by fax 256-955-0887/DSN 645-0887. A reply will be furnished to you.

SECTION I. INTRODUCTION

1. Purpose.

The purpose of this manual is to provide complete instructions for performing a maintenance test flight of RC-12K aircraft. For the specific conditions which require a general or limited maintenance test flight. refer to applicable FAR's and manufacturer's maintenance manuals.

2. Definitions.

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

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

WARNING

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

CAUTION

An operating procedure, practice, etc.. which, if not strictly observed. 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 flight of RC-12K aircraft and in no way supersedes any information contained in TM 55-1510-222-10 or -CL, but is to be used in conjunction with the -10 or -CL. For the purpose of maintenance test flights only, this manual satisfies all the requirements of the -CL from Interior Check through Engine Shutdown.

b. Crew requirements will be as specified in TM 55-1510-222-10.

4. Special Instructions.

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

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

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

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

e. References. When a maintenance test flight is required to insure 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 check sheet be anno-

tated with a specific reading. Also a check (✓) for satisfactory performance, or a (X) for problem detected will be recorded and a short statement entered in the remarks block of the Check Sheet.

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

h. Maintenance Test Flight Check Sheet. The check sheet contained in Section V will be used for all test flights. When a test flight is performed to determine if specific equipment or systems are operating properly. completion of only that portion of the maintenance test flight check sheet applicable to the specific equipment or systems being tested is required. The aircraft test flight check sheets may be locally reproduced. 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 immediately after termination of the flight. The sheet will be attached to the DA Form 2408-13 upon completion. After accumulation of two or more sheets, the data should be reviewed to determine if trends are developing.

i. Free Air Temperature (FAT) and Outside Air Temperature (OAT). For the purposes of this manual. free air temperature (FAT) is to be considered the same as outside air temperature (OAT).

SECTION II. MAINTENANCE TEST FLIGHT CHECKLIST

General. This section contains the maintenance test flight requirements peculiar to Army Model RC-12K aircraft. The requirements contained herein are established to insure a thorough inspection of the aircraft 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 'through'; and 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. Weight and balance - Maintenance test flights shall be flown with ballast if required to remain within weight and center-of-gravity limits. The average takeoff weight shall be 14,200 ±200 pounds for the maximum cruise power and speed check and stall flights. All other tests shall be conducted within normal weight limits.	
*3. Thorough flight readiness inspection in accordance with the requirements contained in TM 55-1510-222-10 - Performed.	
4. Special preflight checks:	
a. Keylock switch - On.	
b. Battery switch - On.	C7-11

PROCEDURE	TROUBLESHOOTING REFERENCE

PRIOR TO MAINTENANCE TEST FLIGHT (CONT)

*c. Interior, exterior, and annunciator lights - Check. — C39

*d. Fuel control panel - Check the standby pumps and firewall valves as follows to insure that they are powered through the essential bus:

(1) Battery switch - OFF.

(2) Standby pump circuit breakers (left and right) - Pull.

(3) Firewall shutoff valve circuit breakers (left and right) - Pull.

(4) Firewall shutoff valve switches - Close (listen for operation).

(5) Standby pump switches - ON, then listen for operation. — C41

(6) Battery switch - ON. Check #1 FUEL PRESS and #2 FUEL PRESS annunciator lights illuminated.

(7) Firewall shutoff valve switches - OPEN. Check #1 FUEL PRESS and #2 FUEL PRESS annunciator lights extinguished.

(8) Standby pump switches - OFF.

PROCEDURE	TROUBLESHOOTING REFERENCE
(9) Standby pump circuit breakers (left and right) - In.	
(10) Firewall shutoff valve circuit breakers (left and right) - In.	
(11) Crossfeed valve switch - Set alternately to left and right system. Check that FUEL CROSSFEED annunciator light illuminates. and that the #1 and #2 FUEL PRESS annunciator lights are extinguished.	C40
(12) Crossfeed valve switch - OFF.	
*e. Fuel quantity indicators - Check as follows:	B6-8
(1) Fuel quantity indicator selector switch - MAIN.	
(2) Fuel quantity, indicators - Compare indication. With full fuel tanks, left and right fuel quantity indicators must indicate within 82 pounds of each other with fuel quantity indicator selector switch set to MAIN.	
(3) Fuel quantity indicator selector switch - AUXILIARY.	
(4) Fuel quantity indicators - Compare indication. With full fuel tanks, left and right fuel quantity indica-	

PROCEDURE	TROUBLESHOOTING REFERENCE
PRIOR TO MAINTENANCE TEST FLIGHT (CONT)	
tors must indicate within 35 pounds of each other with fuel quantity indicator selector switch set to AUXILIARY.	
*f. Pitot tubes (2), stall warning vane. heated fuel vents (2), and TAS temperature probe - Check as follows:	
(1) Stall warning heat switch - ON.	
(2) Pitot heat switches - ON.	
(3) Fuel vent heat switches (3) - ON.	
(4) Left wing heated fuel vent - Check by feel for heat and condition.	
(5) Stall warning vane - Check by feel for heat and condition.	
(6) Left pitot tube - Check by feel for heat. condition, and free of obstructions.	C33
(7) Right pitot tube - Check by feel for heat, condition. and free of obstructions.	C33
(8) TAS temperature probe - Check by feel for heat and condition.	
(9) Right wing heated fuel vent - Check by feel for heat and condition.	

PROCEDURE	TROUBLESHOOTING REFERENCE
(10) Stall warning heat switch - OFF.	
(11) Pitot heat switches (2) - OFF.	
(12) Heated fuel vent switches (2) - OFF.	
*g. Flaps - Check in full down and full up positions.	
h. Battery switch - OFF.	
*i. Seat belts - Check for security and proper connections.	
*j. Emergency equipment - Check that all required emergency equipment is available and that tire extinguishers and first-aid kits have current inspection dates.	
(0)*k. Parachutes - Check secure and for current inspection and re-pack dates.	
*l. Check all interior and exterior placards and markings.	
*m. Trim tab travel and direction - Check. Trim tabs shall be operated through the full range of travel, noting any excessive friction or binding. Tab direction and neutral position will be checked at the control and the surface.	
*n. Flight controls - Check operation and direction. Check movement of control surfaces for direction with movement of cockpit controls. Check for any	

PROCEDURE	TROUBLESHOOTING REFERENCE

PRIOR TO MAINTENANCE TEST FLIGHT (CONT)

abnormal friction or obstructions through full range of travel.

INTERIOR CHECK

1. Cargo/loose equipment - Check secure.

*2. Cabin/cargo doors - Test and lock:

a. Cabin door - Check closed and latched by the following:

(1) Safety arm and diaphragm plunger - Check position (lift door step).

(2) Index marks on rotary cam locks (6) - Check aligned with indicator windows.

b. Cargo door - Check closed and latched by the following:

(1) Upper handle - Check closed and latched. (Observe through cargo door latch handle access cover window.)

(2) Yellow index marks on rotary cam locks (4) - Check aligned with indicator windows.

(3) Lower pin latch handle - Check closed and latched. (Observe through cargo door lower latch handle access cover window.)

PROCEDURE	TROUBLESHOOTING REFERENCE

(4) Carrier rod - Check orange indicator aligned with orange stripe on carrier rod. (Observe through window. aft lower corner.)

c. Battery switch - OFF.

d. Cargo door - Check closed and latched.

e. Cabin door - Close but leave unlatched. Check CABIN DOOR annunciator light illuminated.

f. Cabin door - Open. Check CABIN DOOR annunciator light extinguished.

g. Battery switch - ON. Check CABIN DOOR annunciator light illuminated.

h. Cabin door - Close and latch. Check CABIN DOOR annunciator light extinguished.

NOTE

The above procedures check both cargo and cabin door security provisions.

*3. Emergency exit - Check secure and key removed.

*4. Mission cooling ducts - Check open and free of obstructions.

5. Crew briefing - As required.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE STARTING ENGINES

1. Seats, pedals, belts, harnesses - Adjust.
2. Flight controls - Check for free and correct movements.

*3. Parking brake - Check. Confirm that brakes are set by applying additional toe pressure.

*4. Oxygen system - Check as follows:

a. Oxygen supply pressure gages - Check.

b. Supply control lever (green) - ON.

c. Diluter control lever - 100% OXYGEN.

d. Emergency control lever (red) - Set to TEST MASK position while holding mask directly away from face, then return to NORMAL.

e. Oxygen masks - Put on and adjust.

f. Emergency pressure control lever - Set to TEST MASK position and check mask for leaks, then return lever to NORMAL.

g. Flow indicator - Check (during inhalation blinker appears. during exhalation blinker disappears). Repeat a minimum of 3 times.

5. Circuit breakers - Check in.
6. Overhead control panel switches - Set as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

a. Light dimming controls - As required.

b. Cabin air mode selector switch-OFF.

c. Engine anti-ice switches - ON.

NOTE

The ice vane switches shall be left on during ground operations to preclude foreign object damage to the engines.

d. Ice and rain switches - Off.

e. Instrument light switches - As required.

f. Exterior light switches - As required.

g. Master panel lights switch - As required.

h. Inverter switches - Off.

i. Avionics master power switch - Off.

j. Environmental switches - As required.

k. Autofeather switch - OFF.

l. #1 engine start switches - OFF.

m. MASTER SWITCH - Off.

n. #2 engine start switches - OFF.

7. Fuel panel switches - Check as follows:

a. Standby fuel pump switches - OFF.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE STARTING ENGINES (CONT)

b. Auxiliary transfer override switches - AUTO.

c. Crossfeed switch - Off.

*8. Magnetic compass - Check for fluid, heading, and current deviation card.

9. Pedestal controls - Set as follows:

CAUTION

Movement of power levers into reverse range while engines are shut down may result in bending and damage to control linkages.

a. Power levers - IDLE. E6

b. Propeller levers - HIGH RPM.

c. Condition levers - FUEL CUT-OFF.

d. Flaps - UP.

e. Friction locks - Check and set.

10. Pedestal extension switches - Set as follows:

a. Flare/chaff dispenser control - SAFE.

b. Avionics - As required.

c. Rudder boost switch - ON.

11. Gear alternate extension pump handle - Stowed.

PROCEDURE	TROUBLESHOOTING REFERENCE
*12. Free air temperature gage - Check. note current reading.	
13. Pilot's instrument panel - Check and set as follows:	
a. Course indicator switch - As required.	
b. RMI switch - As required.	
c. Compass switch - As required.	
d. Microphone switch - As required.	
e. Gyro switch - SLAVE.	
*f. Flight instruments - Check instruments for protective glass. warning flags (12), static readings, and heading correction card.	
g. APR-39 and APR-44 - OFF.	
h. Radar - OFF.	
*i. Engine instruments - Check for protective glass and static readings.	
j. Propeller synchronization switch - OFF.	
14. Copilot's instrument panel - Check and set as follows:	
a. Course indicator switch - As required.	
b. Compass switch - As required.	
c. RMI switch - As required.	
d. Microphone switch - As required.	

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE STARTING ENGINES (CONT)

e. Gyro switch - SLAVE.

*f. Flight instruments - Check instruments for protective glass. warning flags (6), and static readings.

g. Mission panel switches and circuit breakers - Set.

15. Pilot's subpanel - Check and set as follows:

a. Landing, taxi, and recognition lights - OFF.

b. Landing gear control switch - Recheck DN.

c. Cabin lights switch - As Required.

d. Pilot's static air source - NORMAL.

e. Audio control panel - As required.

16. Copilot's subpanel - Check and set as follows:

a. Audio control panel - As required.

b. Fire protection test switch - OFF.

c. Cabin controller - Set (field elevation + 500 feet).

d. Rate control - Set (approximately 1 o'clock position).

e. Cabin pressurization switch - PRESS.

PROCEDURE	TROUBLESHOOTING REFERENCE
17. DC GPU - As required.	C12
18. External power advisory annunciator light - Check for appropriate indication.	
19. Battery switch - ON.	
*20. DC power - Check, 24 VDC minimum for battery starts, 28 VDC maximum for GPU starts.	
21. AC external power - Connect as required. Check that the EXT AC PWR ON annunciator light on the mission control panel is illuminated.	
*22. Annunciator panels - Test as follows:	D1-4
a. MASTER CAUTION. MASTER WARNING, #1 FUEL PRESS, #2 FUEL PRESS. GEAR DN, L BL AIR FAIL, R BL AIR FAIL. and INST AC warning lights; and #1 DC GEN, #2 DC GEN, #1 NO FUEL XFR, #2 NO FUEL XFR, #1 INVERTER, #2 INVERTER, CABIN DOOR (if open), and REV NOT READY caution/advisory lights - Check illuminated.	
b. ANNUNCIATOR TEST switch - Press and hold. Check that the annunciator panels, FIRE PULL handle lights, marker beacon lights, ANT Azimuth indicator, MASTER CAUTION and MASTER WARNING lights are illumi-	

PROCEDURE	TROUBLESHOOTING REFERENCE
BEFORE STARTING ENGINES (CONT)	
nated. Release switch and check that all lights except those in step (a) are extinguished.	
c. MASTER CAUTION and MASTER WARNING lights - Press. Check that both lights extinguish.	
*23. Stall and gear warning system - Check as follows:	C34,35
a. STALL WARN TEST switch - TEST. Check that warning horn sounds.	
b. LDG GEAR WARN TEST switch - TEST. Check that warning horn sounds and that the LDG GEAR CONTR handle warning lights (2) illuminate.	
*24. Hydraulic fluid level sensor - Check as follows:	
a. Hydraulic fluid sensor test button - Depress and hold. Check that HYD FLUID LOW caution annunciator light illuminates after approximately 2 seconds.	
b. Hydraulic fluid sensor test button - Release. Check that HYD FLUID LOW caution annunciator light extinguishes after approximately 6 seconds.	
*25. Fire Protection system - Check as follows:	C43-47

PROCEDURE	TROUBLESHOOTING REFERENCE
a. Engine fire protection test switches - Hold to DET position, check that FIRE PULL handle warning lights, and MASTER WARNING lights illuminate.	
b. Engine fire protection test switches - Hold switches to EXT position, check that SQUIB OK and EXTGH DISCH annunciators, and MASTER CAUTION lights illuminate.	
26. INS - Align as required.	

FIRST ENGINE START (BATTERY START)

NOTE

The engines must not be started until after the INS is placed into the NAV mode or OFF as required.

1. Exterior light switches - As required.	
2. Strobe beacon lights switch - Off.	
3. Propeller - Clear.	
4. Ignition and engine start switch - ON. Propeller should begin to rotate and associated IGN ON light should illuminate. Associated FUEL PRESS light should extinguish.	A1-7

PROCEDURE	TROUBLESHOOTING REFERENCE

FIRST ENGINE START (BATTERY START) (CONT)

CAUTION

If ignition does not occur within 10 seconds after moving condition lever to LOW IDLE, initiate ENGINE CLEARING procedure. If for any reason a starting attempt is discontinued, the entire starting sequence must be repeated after allowing the engine to come to a complete stop (1 minute minimum).

5. Condition lever (after N_1 RPM stabilizes, 12% minimum) - LOW IDLE. E1,J1

CAUTION

Monitor TGT to avoid a hot start. If there is a rapid rise in TGT, be prepared to abort the start before limits are exceeded. During starting, the maximum allowable TGT is 1000°C for five seconds. If this limit is exceeded, use ABORT START procedure and discontinue start. Enter the peak temperature and duration on DA Form 2408-13.

6. TGT and N_1 - Monitor (TGT 1000°C maximum, N_1 61% minimum).
7. Oil pressure - Check (60 PSI minimum). E7-9
8. Ignition and engine start switch - OFF, after TGT peaks.

PROCEDURE	TROUBLESHOOTING REFERENCE
9. Condition lever - HI IDLE. Monitor TGT as the condition lever is advanced.	E2
10. Generator switch - RESET. then ON.	

SECOND ENGINE START (BATTERY START)

1. Propeller - Clear.	
2. Ignition and engine start switch - ON. Propeller should begin to rotate and associated IGN ON light should illuminate. Associated FUEL PRESS light should extinguish.	A1-7
3. Condition lever (after N_1 RPM passes 12% minimum) - LOW IDLE.	E1,J1
4. TGT and N_1 - Monitor (TGT 1000°C maximum. N_1 61% minimum).	
5. Oil pressure - Check (60 PSI minimum).	E7-9
6. Ignition and engine start switch - OFF after TGT peaks.	
7. Condition levers - HIGH IDLE.	E 2
8. Power levers - GROUND FINE.	
9. Propeller levers - Retard to feather detent.	
10. Battery charge light - Check (light should illuminate approximately 6 seconds after generator is brought on line. Light should extinguish within 5 minutes following a normal engine start on battery).	

PROCEDURE	TROUBLESHOOTING REFERENCE

SECOND ENGINE START (BATTERY START) (CONT)

11. Inverter switches - ON, check INVERTER annunciator lights extinguished.
12. Second engine generator switch - RESET, then ON.
13. Strobe beacon lights switch - DAY or NIGHT as required.

ABORT START

1. Condition lever - FUEL CUTOFF.
2. Ignition and engine start switch - STARTER ONLY.
3. TGT - Monitor for drop in temperature.
4. Ignition and engine start switch - OFF.

ENGINE CLEARING

1. Condition lever - FUEL CUTOFF.
2. Ignition and engine start switch - OFF (1 minute minimum).

CAUTION

Do not exceed starter limitation of 40 seconds ON and 15 minutes OFF, 40 seconds ON, then 30 minutes OFF before additional starter operation.

3. Ignition and engine start switch - STARTER ONLY (15 seconds minimum, 40 seconds maximum).

PROCEDURE	TROUBLESHOOTING REFERENCE
4. Ignition and engine start switch - OFF.	

FIRST ENGINE START (GPU START)

1. INS - As required.

NOTE

The engines must not be started until after the INS is placed into the NAV mode or OFF as required.

2. Exterior light switches - As required.
3. Strobe beacon lights switch - Off.
4. Ice vane switches - ON.
5. Propeller - Clear.
6. Ignition and engine start switch - ON. Propeller should begin to rotate and associated IGN ON light should illuminate. Associated FUEL PRESS light should extinguish. — X1-i
7. Condition lever (after N_1 RPM stabilizes, 12% minimum) - LOW IDLE. — E1,J1
8. TGT and N_1 - Monitor (TGT 1000°C maximum. N_1C 61% minimum).
9. Oil pressure - Check (60 PSI minimum). — E7-9
10. Ignition and engine start switch - OFF after TGT peaks.

PROCEDURE	TROUBLESHOOTING REFERENCE

FIRST ENGINE START (CPU START) (CONT)

11. Condition lever - HIGH IDLE. Monitor TGT as the condition lever is advanced. — E2

12. DC GPU - Disconnect as required.

CAUTION

Do not turn on generators with GPU connected.

13. First engine generator switch - RESET, then ON.

SECOND ENGINE START (CPU CONNECTED)

1. Propeller - Clear.

2. Ignition and engine start switch - ON. Propeller should start to rotate and associated IGN ON light should illuminate. Associated FUEL PRESS light should extinguish. — A1-7

3. Condition lever (after N_1 RPM passes, 12% minimum) - LOW IDLE. — E1,J1

4. TGT and N_1 - Monitor (TGT 1000°C maximum, N_1 61% minimum).

5. Oil pressure - Check (60 PSI minimum). — E7-9

6. Ignition and engine start switch - OFF after TGT peaks.

PROCEDURE	TROUBLESHOOTING REFERENCE
7. Condition levers - HIGH IDLE.	E2
8. Propeller levers - FEATHER.	
9. AC and DC GPU's - Disconnect as required (check aircraft external power and mission external power annunciator lights extinguished).	
10. Propeller levers - Retard to feather detent (low RPM).	
11. Power levers - GROUND FINE.	
12. Aircraft inverter switches - ON. Check #1 INVERTER and #2 INVERTER annunciator lights extinguished.	C36,37
13. Generator switches - RESET, then ON.	
14. Strobe beacon lights switch - DAY or NIGHT as required.	

BEFORE TAXIING

1. Brake deice - As required. To activate the brake deice system proceed as follows:
   a. Bleed air valves - OPEN.
   b. Brake deice switch - DEICE. Check BRAKE DEICE ON advisory annunciator light illuminated.
2. Cabin air mode and temperature switches - Set.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAXIING (CONT)

CAUTION

Verify airflow is present from aft cockpit eyeball outlets to insure sufficient cooling for mission equipment.

NOTE

For maximum cooling on the ground, turn the bleed air valve switches to ENVIRO OFF position.

*3. AC/DC power - Check for:

a. AC frequency - 394 to 406 Hz.

b. AC voltage - 104 to 124 VAC.

c. DC load - Check.

d. DC voltage - 27.0 to 28.5 VDC.

WARNING

Do not operate the weather radar set while personnel or combustible materials are within 18 feet of the antenna reflector. When the weather radar set is operating, high-power radio frequency energy is emitted from the antenna reflector. which can have harmful effects on the human body and can ignite combustible materials.

PROCEDURE	TROUBLESHOOTING REFERENCE

CAUTION

Do not operate the weather radar system in a confined space where the nearest metal wall is 50 feet from the antenna reflector. Scanning such surfaces within 50 feet of the antenna reflector may damage receiver crystals.

WARNING

Do not operate radar in congested areas. Injury could result to personnel in close proximity to operating radar.

4. Avionics master switch - ON.
5. Mission panel - Set and check.

*6. Automatic flight control system - Check as follows:

a. Altitude alerter.

NOTE

Pause a few seconds between each step to allow time for the proper indications.

(1) Set alert controller more than 1000 feet above altitude indicated on pilot's altimeter. The pilot's altimeter alert light should be extinguished.

(2) Decrease the alert controller to within 1000 feet of

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAXIING (CONT)

the pilot's altimeter setting. The alert light should illuminate.

(3) Decrease the controller to less than 250 feet above the pilot's altimeter setting. The alert light should extinguish.

(4) Increase the controller to 300 ± 50 feet above the pilot's altimeter indication and check that the alert light illuminates.

(5) Set the desired altitude.

b. Autopilot.

NOTE

The autopilot must be disengaged upon completion of autopilot testing.

(1) Autopilot controller UP TRIM, DN TRIM annunciators - Check not illuminated.

PROCEDURE	TROUBLESHOOTING REFERENCE
A steady illumination of UP TRIM or DN TRIM annunciator indicates that the automatic synchronization is not functioning and the autopilot should not be engaged.	
(2) Turn knob - Center.	
(3) Elevator trim control switch - ON.	
(3) Control wheel - Hold to mid travel.	
(5) AP button - Press. AP ENGAGE and YD ENGAGE annunciators on autopilot controller will illuminate. Servo clutches will engage.	

WARNING

The autopilot system has a built-in test that starts when the avionics master switch is turned on. The autopilot is functional if the STBY annunciator light on the autopilot mode selector is illuminated within 10 seconds. If not. the system is considered non-operative and should not be used. (However, if the STBY annunciator light does not illuminate, the autopilot/yaw damper will not engage.) The elevator trim system must not be forced beyond the limits which are indicated on the elevator trim tab indicator.

(6) Elevator trim follow-up - Check as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAXIING (CONT)

(a) Control wheel - Hold aft of mid travel. Trim wheel should run nose down after approximately 3 seconds. DN TRIM annunciator should illuminate after approximately 8 seconds.

(b) Control wheel - Hold forward of mid travel. Trim wheel should run nose up after approximately 3 seconds, UP TRIM annunciator should illuminate after approximately 8 seconds, and AP TRIM annunciator should illuminate after approximately 15 seconds.

(7) AP/YD & TRIM DISC button - Depress to second level. Autopilot and yaw damper should disengage and ELECT TRIM OFF annunciator should illuminate. AP ENG and YD ENG annunciators on instrument panel should flash 5 times.

(8) Elevator trim control switch - OFF, then on. (ELEC TRIM OFF annunciator should extinguish.)

(9) Autopilot - Re-engage.

PROCEDURE	TROUBLESHOOTING REFERENCE
(10) Turn controller - Check that control wheel follows in each applied direction, then center.	
(11) Pitch wheel - Check that trim responds to pitch wheel movement. (UP TRIM and DN TRIM annunciators may illuminate.)	
(12) Heading marker - Center and engage HDG. Check that control follows a turn in each direction.	
(13) Disengage autopilot by selecting GA. Check that autopilot disengages and flight director commands 7° nose up, wings level attitude.	
*7. Electric elevator trim - Check.	
a. Elevator trim switch - ON.	
b. Pilot and copilot trim switches - Check operation.	

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAXIING (CONT)

WARNING

Operation of the electric trim system should occur only by movement of pairs of switches. Any movement of the elevator trim wheel while depressing only one switch element denotes a system malfunction. The electric elevator trim control switch must then be turned OFF and flight conducted by operating the elevator trim wheel manually. Do not use autopilot.

(1) Check pilot and copilot individual trim switch elements for no movement of trim, then check proper operation of both elements.

(2) Check pilot switches override copilot switches while trimming in opposite directions, and trim moves in direction commanded by pilot.

c. Check pilot and copilot trim disconnects autopilot while activating trim.

d. Elevator trim switch - OFF then ON (ELECT TRIM OFF annunciator extinguishes).

8. Avionics - Check and set as required.

9. INS - NAV mode, if on.

PROCEDURE	TROUBLESHOOTING REFERENCE

10. Flaps - Check.
11. Altimeters - Set and check.

DURING TAXIING

*1. Brakes - Check. G1-4,6-8

NOTE

If brakes have been overhauled they should be "burned in" by applying near maximum braking (short of locking) for one or two landings or high speed taxi runs. After this. brakes should be checked for any tendency to drag.

*2. Flight instruments - Check for normal operation.

*3. Nosewheel steering - Check. No turning tendency should exist while taxiing straight ahead with the same RPM on both engines with no braking and no rudder applied to either side. (This check must be performed with minimum cross wind.) Check freedom of movement and ability to turn aircraft using rudder pedals, engines and brakes. Note any indication of nosewheel vibration or shimmy during takeoff or landing.

*4. Magnetic compass - Check for freedom of movement. B4

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP

1. Nose wheel - Center.

*2. Parking brake - Set. The parking brake must lock without undue pressure on the brake pedals and release cleanly when parking brake handle is reset. — G5

CAUTION

Monitor oil temperature closely during ground operation with propellers in FEATHER due to lack of air flow over oil cooler.

*3. Engine low idle speed - Check 60 to 62% N_1, with propellers feathered. — E1

*4. Propeller feathering - Check as follows: — F14,15

a. Condition lever - LOW IDLE.

b. Left propeller lever - FEATHER. Check that propeller feathers with no hesitation.

c. Check for proper pedestal control detent position.

d. Left propeller lever - HIGH RPM.

e. Repeat procedure for right propeller.

*5. Engine acceleration - Check as follows: — E14-20

a. Left power lever - Set 64% N_1, then rapidly move lever to maximum.

PROCEDURE	TROUBLESHOOTING REFERENCE
b. Record the time required for N_1 to reach 93.5%.	
c. Left power lever - Immediately retard to IDLE as N_1 passes through 93.5%. Acceleration time should be 2.5 to 4.0 seconds.	
*6. Engine high idle speed - Check 71 to 73% N_1.	E2,3,5
*7. Brake deice system - Check as fol-	
a. Left bleed air valve switch - PNEU & ENVIRO OFF.	
b. Right bleed air valve switch - OPEN.	
c. Brake deice switch - Turn on and observe that the BRAKE DEICE ON light is illuminated.	
d. Pneumatic pressure gage - Check for a momentary pressure decrease.	
e. Repeat procedure for opposite bleed air valve.	
*8. N_1 speed switch (air conditioning) - Check as follows:	
a. Right engine propeller lever - FEATHER.	
b. Right engine condition lever - LOW IDLE.	
c. Cabin temperature mode selector switch - MANUAL COOL.	
d. Right engine condition lever - Advance to increase N_1 to above 64%.	

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP (CONT)

e. AIR COND N_1 LOW light should extinguish.

*9. Pneumatic pressure - Check as follows:

a. Condition levers - HIGH IDLE.

b. Power levers - IDLE.

c. Left bleed air valve switch - PNEU & ENVIRO OFF.

d. Pneumatic pressure - Check 12 to 20 PSI.

e. Left bleed air off light - Check illuminated.

f. Right bleed air valve switch - PNEU & ENVIRO OFF.

g. Left and right bleed air off lights - Check illuminated.

h. Left and right bleed air fail lights - Check illuminated.

i. Left bleed air valve switch - OPEN. Check L BL AIR OFF and L&R BL AIR FAIL lights off. and pneumatic pressure at 12 to 20 PSI.

j. Right bleed air valve switch - OPEN.

k. Right bleed air off light - Check extinguished.

*10. Pressurization system - Check as follows:

a. Bleed air valve switches (2) - PNEU AND ENVIRO OFF.

PROCEDURE	TROUBLESHOOTING REFERENCE
b. Pneumatic pressure gage - Check. Pressure should drop to zero.	
c. Bleed air warning lights - Check illuminated.	

NOTE

Setting either bleed air valve switch to the PNEU AND ENVIRO OFF position will cause the bleed air warning lights to extinguish.

d. Cabin altitude controller - Set 500 feet lower than field elevation.

e. Cabin pressurization rate control - Set to maximum.

f. Cabin pressurization switch - TEST (hold).

g. Left bleed air control valve switch - OPEN.

h. Cabin climb indicator - Check for descent indication within 10 to 15 seconds, then release test switch.

i. Repeat the above procedure for the right bleed air control valve.

j. Left and right bleed air valve switches - OPEN.

k. Cabin altitude indicator - Set to 1800 feet pressure altitude.

l. Rate control - Set.

PROCEDURE	TROUBLESHOOTING REFERENCE
ENGINE RUNUP (CONT)	
m. Cabin pressure dump switch - Set to PRESS position.	
*11. Generators and regulators - Check by observing volt-loadmeters for the following conditions:	
a. Positive charging rate.	
b. 27.5 to 29.0 volts.	
c. A load indication not exceeding 0.85.	
d. Turn generators on one at a time to insure that each generator comes on line.	
e. Voltmeters must read within 1 volt of each other.	
f. Load paralleling must be within 10% of loadmeter reading.	
*12. Inverter volt-frequency meters - Check voltage between 110 and 120 volts and frequency between 390 and 410 Hz.	C36,37
*13. *Rudder boost - Check as follows:	
a. Rudder boost /yaw control test switch - YAW CONTROL TEST. Check that RUDDER BOOST annunciator light (flight director annunciator panel) is illuminated.	
b. Yaw damper pushbutton switch (autopilot controller, pedestal extension) - Depress to engage yaw damper. Yaw damper should not engage.	

PROCEDURE	TROUBLESHOOTING REFERENCE

c. Rudder boost /yaw control test switch - RUDDER BOOST. Check that RUDDER BOOST annunciator light is illuminated.

d. Rudder boost /yaw control test switch - Off (center). Check that RUDDER BOOST annunciator light is extinguished.

e. Rudder boost /yaw control test switch - RUDDER BOOST.

f. Yaw damper pushbutton switch - Depress to engage yaw damper. Check that YD ENG annunciator is illuminated.

g. Left power lever - Advance. At a torque differential of approximately 60%, observe that the YD ENG annunciator light extinguishes, and that the left rudder pedal begins to move forward. Check that increasing power results in increasing rudder pedal deflection.

h. Left power lever - Slowly retard. Observe that the YD ENG annunciator light may flicker at a torque differential of approximately 50%.

i. Repeat steps g and h for the right engine.

*14. Autofeather system - Check as follows:

a. Autofeather switch - Hold to TEST (ARM lights should remain extinguished).

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP (CONT)

b, Power levers - Advance to approximately 25% torque, then move autofeather switch to test mode. Both ARM lights should illuminate.

c. Left power lever - Retard.

(1) At 14 to 20% torque, check right AUTOFEATHER ARM light extinguished.

(2) At 7 to 13% torque, check left AUTOFEATHER light extinguished (left propeller starts to feather, right AUTOFEATHER ARM light may momentarily illuminate). Retard power lever into ground tine if necessary.

d. Left power lever - Set approximately 25% torque.

e. Repeat steps b. c, and d for right engine.

f. Advance each power lever to above 89% N_1 individually. with the autofeather switch in the arm mode. ARM lights should not illuminate. With both power levers above 87 to 89% N_1, both ARM lights should illuminate.

g. Retard left power lever below 87% N_1. Both lights should extinguish

PROCEDURE	TROUBLESHOOTING REFERENCE
h. Repeat step g by retarding right power lever. with left power lever above 89% N_1.	
*15. Propeller overspeed governors - Check as follows:	F1-3
a. Propeller levers - HIGH RPM.	
b. Propeller governor test switch - Hold in TEST position.	
c. Left engine power lever - Advance until overspeed governor governs propeller (1540 to 1580 RPM). Observe temperature and torque limits.	
d. Left propeller governor test switch - Release. Propeller RPM should increase.	
e. Left engine power lever - IDLE.	
f. Repeat steps b through e for right engine.	
*16. Autoignition system - Check as follows:	
a. Power levers - Set above 25% torque.	
b. Autoignition switches (2) - ARM.	
c. Power levers - Retard.	
d. Ignition annunciator lights - illuminated (14 to 20% torque).	
*17. Primary governors - Check as follows:	F1-3
a. Power levers - Set 1500 RPM.	

PROCEDURE	TROUBLESHOOTING REFERENCE
ENGINE RUNUP (CONT)	
b. Propeller levers - Move aft to detent.	
c. Propeller RPM - Check 1150 ± 50.	
d. Propeller levers - HIGH RPM.	
*18. Propeller low pitch stop - Check one engine at a time as follows:	E5
a. Aircraft - Position crosswind.	
b. Read the corrected propeller torque in % at 1500 RPM from figure 1.	
c. Propeller lever - HIGH RPM (full forward).	
d. Power levers - Set 1500 RPM.	
e. Torquemeter - Read and record torque.	
f. Power lever - IDLE.	
g. Torque reading taken in step e must equal the corrected torque read from figure 2 in step b within ± 2%.	
h. Repeat procedure for other engine. The difference in torque readings between left and right engines should not be greater than 1%.	
*19. Ice vanes - Check as follows:	
a. Ice vane switches - RETRACT. Check that VANE EXT annunciator lights illuminate.	
b. Ice vane power select switch - STBY.	

PROCEDURE	TROUBLESHOOTING REFERENCE

c. Ice vane switches - EXTEND. Check that VANE EXT annunciator lights illuminate.

d. Ice vane power select switch - MAIN.

BEFORE TAKEOFF

1. Autofeather switch - ARM.
2. Bleed air valve switches - OPEN.
3. Ice and rain switches - As required.
4. Fuel panel - Check fuel quantity and switch positions.
5. Flight and engine instruments - Check for normal indications.
6. Cabin altitude and rate-of-climb controller - Set.
7. Annunciator panels - Check (note indications).
8. Flaps - As required.
9. Trim - Set.
10. Avionics - Set.
11. Flight controls - Check.
12. Departure briefing - Complete.

LINE UP

1. Engine anti-ice - As required.
2. Transponder - As required.
3. Engine autoignition switch - ARM.
4. Lights - As required.

PROCEDURE	TROUBLESHOOTING REFERENCE

LINE UP (CONT)

5. Brake deice system - Check as follows when required:

NOTE

Do not activate brake deice system above 15°C FAT.

a. Brake deice switch - ON.

b. Check that BRAKE DEICE ON light is illuminated. then is extinguished approximately 10 minutes after landing gear retraction.

DURING TAKEOFF

*1. Propeller tachometers - Check. During takeoff propeller tachometers should indicate 1700 RPM. If propellers are synchronized and indicator tolerances result in a difference in indicated RPM between left and right propellers. then the lower of the two values shall be 1700 RPM. The maximum difference between the readings of the indicators shall be 20 RPM. — E28

2. Engine instruments - Check the following instrument indications:

*a. Torque — E24

*b. TGT — B9,E26

*c. N_1 — E27

*d. Oil pressure — E7-9

PROCEDURE	TROUBLESHOOTING REFERENCE
*e. Oil temperature	E10

AFTER TAKEOFF

WARNING

Immediately after takeoff. the pilot flying the aircraft should avoid adjusting controls located on the aft portion of the extended pedestal to preclude inducing spatial disorientation.

1. Landing gear control switch - Up.

NOTE

Listen for unusual noises during landing gear retraction.

*2. Tail boom antenna - Check that ANT OPERATE annunciator light illuminates after landing gear has retracted.

3. Flap switch - UP.

4. Landing lights - OFF.

5. Climb power - Set.

6. Propeller synchronization switch - As required.

7. Yaw damp switch - As required.

8. Autofeather switch - As required.

9. Cabin pressurization - Check.

*10. Wings and nacelles - Check for fuel and oil leaks. E29

PROCEDURE	TROUBLESHOOTING REFERENCE
AFTER TAKEOFF (CONT)	
*11. Brake deice system - Check as follows:	
a. Brake DEICE ON annunciator light - Check extinguished within approximately 10 minutes after landing gear retraction.	
b. Brake deice switch - Turn off then on and observe that BRAKE DEICE ON light does not illuminate.	
c. Landing gear switch - DN. Observe BRAKE DEICE ON light illuminates.	
d. Brake deice switch - Off.	
e. Landing gear switch - UP.	
DURING CLIMB	
*1. Engine and flight instruments - Monitor. All instruments must give proper indication with minimum fluctuation.	B1-9,C38
*2. Engine control levers - Check for alignment.	
*3. Vertical speed indicators - Check normal operation against altimeter as follows:	B2
a. Aircraft rate of climb - Fly an indicated 1000 feet per minute.	
b. Read altimeter at beginning of timing. and time for one minute.	

PROCEDURE	TROUBLESHOOTING REFERENCE
c. Read altimeter at end of one minute. Second reading must be 1000 ± 200 feet more than first reading.	
*4. Surface deice system - Check as follows:	C42
a. Surface deice switch - AUTO. Surface boots should inflate and automatically deflate for one cycle. Wing boots should stay inflated for 6 seconds, then tail boots should stay inflated for 4 seconds.	
b. Surface deice switch, - Hold to MANUAL position. Boots should stay inflated until switch is released.	
c. Surface deice switch - Release. Check boots visually to see that they are sucked down flat after use.	
*5. Antenna deice system - Check as follows:	C42
a. Antenna deice switch - AUTO. Check that wing dipole antenna boots inflate, and automatically deflate for one cycle.	
b. Antenna deice switch - Hold to MANUAL position. Check that wing dipole antenna boots inflate and stay inflated until switch is released.	
c. Antenna deice switch - Release. Check boots visually to see that they are sucked down flat after use.	

PROCEDURE	TROUBLESHOOTING REFERENCE
*6. Propeller deice system - Check as follows:	C54
a. Propeller deice switch - Set to AUTO position.	
b. Propeller deice ammeter - Monitor for 26 to 30 amperes and for a slight needle deflection every 90 seconds.	
c. Manual deice - Hold switch to ON position. Note a 28 ampere increase in each loadmeter indication.	
*7 *Windshield anti-ice system - Check operation as follows:	
a. Pilot's windshield anti-ice switch - NORMAL, check by feel for heat.	
b. Pilot's windshield anti-ice switch - HI, check for an increased loadmeter indication, then OFF.	
c. Copilot's windshield anti-ice switch - Check by repeating above steps.	
*8. Radome anti-icing system - Check as follows:	
a. Radome anti-ice switch - ON.	
b. Loadmeters - Monitor for increase.	
c. RADOME HEAT annunciator light - Check illuminated within 5 minutes.	
d. RADOME HOT annunciator light - Check extinguished.	

PROCEDURE	TROUBLESHOOTING REFERENCE
*9. Waveguide pressurization system - Verify that the WAVE GUIDE annunciator light is illuminated when N_1 is above 80%.	
* 10. Cabin and cockpit ventilation system - Check the following items for flow of air, binding controls, and the capability of being shut off by its own control:	
a. Eye-ball cold air vents.	
b. Pilot's and copilot's air vents.	
c. Windshield defroster ducts.	
d. Main cabin air ducts.	
*11. Air conditioning and heating sysrem - Check as follows:	C48-53
a. Cabin air mode selector switch - MAN COOL or MAN HEAT.	
b. Manual temperature control switch - Hold to INCREASE position for one minute. Observe an increase in cabin temperature.	
c. Manual temperature control switch - Hold to DECREASE position for one minute. Observe a decrease in cabin temperature.	
d. Cabin air mode selector switch - AUTO.	
e. Cabin temperature control rheostat - Rotate to full INCR position. Observe an increase in cabin temperature.	

PROCEDURE	TROUBLESHOOTING REFERENCE
f. Cabin temperature control rheostat - Rotate fully counterclockwise. Observe an decrease in cabin temperature.	

NOTE

Air conditioning will come on if cabin temperature is above 60 to 65°F.

NOTE

The temperature control rheostat should be in its mid position at approximately 75°F cabin temperature.

*12. Air conditioning cold operation - Check as follows:

a. Verify that the COLD OPN annunciator light is illuminated only when the FAT is below 45°F.

b. Cabin temperature mode selector - COLD OPN. Check that air conditioner turns on in 8 to 12 seconds.

c. Verify that air conditioner operation is the same as the AUTO mode except that the air conditioner operates continuously above 61% N_1.

13. Pressurization system - Check as required (Section IV).

*14. Carbon monoxide - Check the cockpit and cabin for the presence of carbon monoxide. Maximum

PROCEDURE	TROUBLESHOOTING REFERENCE
carbon monoxide allowable is 0. 005%.	
CRUISE	
1. Power - Set.	
*2. Engine instrument indications - Check all engine instruments for normal indications.	E21-28
3. Recognition lights -As required.	
*4. Wings and nacelles - Check for fuel and oil leaks.	E29
*5. Cabin noise level - Check. There shall be no undue air noise in the cabin from around the perimeter of doors or windows. There shall be no undue noise in the cabin due to vibrating and rattling articles or oil canning of skins.	
6. Volt-loadmeters - Check.	
7. Auxiliary fuel gages - Monitor. Insure that fuel is being transferred from auxiliary tanks.	
*8. Pilot's alternate static air source - Check as follows:	
a. Maintain level flight and note airspeed and altitude.	
b. Pilot's alternate static air source switch - ALTERNATE. Airspeed indicator. altimeter, and vertical speed indicator readings should increase.	
c. Pilot's alternate static air source switch - NORMAL. Airspeed indicator, altimeter. and	

PROCEDURE	TROUBLESHOOTING REFERENCE
CRUISE (CONT)	
vertical speed indicator indications should return to their original readings.	
*9. Propeller synchrophaser - Check capturing ability of the synchrophaser by establishing a small out of synchronization condition, then turning the synchrophaser on. Synchronization should be established and held within a few seconds.	
10. Speed check at maximum cruise power - Perform as required (Section IV).	
11. Maximum power lever position check - Perform as required (Section IV).	
12. Engine acceptance check - Perform as required (Section IV).	
*13. Engine ice vanes - Check operation as follows:	
a. #1 and #2 ice vane power selector switches (2) - MAIN.	
b. #1 and #2 ice vane control switches - ON. Check	
c. #1 and #2 VANE EXTEND annunciators illuminated.	
d. Torquemeters - Monitor for approximately a 10% drop in torque with ice vanes extended.	
e. #l and #2 ice vane control switches - Retract (up).	
f. Torquemeters - Monitor for an increase in torque.	

PROCEDURE	TROUBLESHOOTING REFERENCE

g. ICE VANE CONTR MAIN circuit breakers - Pull. Check that #1 and #2 VANE FAIL annunciator lights illuminate.

h. #1 and #2 ice vane power selector switches (2) - STBY. Check that #1 and #2 VANE FAIL annunciator lights are extinguished.

i. #1 and #2 ice vane control switches - ON. Check #1 and #2 VANE EXTEND annunciators illuminated.

j. #1 and #2 ice vane control switches - Retract (up).

k. ICE VANE CONTR MAIN circuit breakers - Reset.

l. ICE VANE CONTR AUXILIARY circuit breakers - Pull. Check that #1 and #2 VANE FAIL annunciator lights illuminate.

m. #1 and #2 ice vane power selector switches (2) - MAIN. Check that #1 and #2 VANE FAIL annunciators are extinguished.

n. ICE VANE CONTR AUXILIARY circuit breakers - Reset.

14. Trim and rigging - Check as required (Section IV).

*15. Turn and bank indicators - Check as follows:

a. Bank - Establish a coordinated standard rate turn.

PROCEDURE	TROUBLESHOOTING REFERENCE

CRUISE (CONT)

b. Timing – Maintain turn for 1 minute. Heading change shall be 180 ± 15°.

c. In straight and level flight. the turn needle will be centered to within ± 1/16 inch.

d. Repeat procedure for opposite turn direction.

16. Avionics - Check in flight as required (Section IV).

LOW SPEED SYSTEMS CHECK

PREFACE TO STALL WARNING SYSTEM CHECK

Prior to conducting a MTF where the stall warning system will be checked:

The Maintenance Test Pilot (MP) and a contractor maintenance person will physically check, with a measuring tape or other approved device, the proper measurements and installation of the stall strips per the appropriate maintenance manual.

Prior to conducting a power off maneuver, the MP will consult the POWER OFF STALL SPEED TABLE (fig. 1 page 2-52.2) to determine the stall speed and stall warning horn speed range for the aircraft at its weight and configuration during the flight.

During the crew briefing prior to commencing the flight, the crew must determine and announce that they will cease aileron inputs at activation of the stall warning horn. A wings level attitude shall be maintained by careful and prudent rudder input.

WARNING

The RC-12 may not produce a clean aerodynamic "break" (i.e. In the C-12 the nose does not pitch down during a stall). The indication of the stall when the aircraft pitch attitude is held constant may be a moderate buffet, a loss in control effectiveness, full aft yoke, or any sink rate as indicated on the altimeter or VSI. Generally, 800 feet of altitude will be lost during a normal stall recovery.

Delayed recovery from a stall can result in a "deep stall" which is characterized by a level pitch attitude, flight path angle of approximately 45 degrees down, and a sink rate of up to 8500 FPM. Recovery from a "deep stall" requires a 10-15 degree nose-down pitch change to break the stall. Allow the airspeed to increase to at least 25 KIAS above the stall speed before recovery.

NOTE

In the event of an inadvertent stall, recovery can be effected by relaxing aft control force, lowering the nose below the visible horizon and adding power to reduce altitude loss. Rapid recovery is hampered by a pronounced secondary stall tendency (recurrence of buffet). Secondary stall can be avoided by increasing the airspeed 25 KIAS above the stall speed.

Stall warning horn shall sound at no more than 12, and no less than 5 knots above the stall speed IAW fig. 1 page 2-52.2.

Do not perform the low speed systems checks in turbulence conditions greater than occasional light turbulence.

*1. Stall warning system (gear and flaps up, power off) – Check as follows: **C34-35**

WARNING

Begin the maneuver at 160 KIAS at an altitude that will allow recovery to be safely completed no lower than 7500 AGL.

PROCEDURE	TROUBLESHOOTING REFERENCE

a. **GEAR** – **UP**.

b. **FLAPS** – **UP**.

c. **PROP** levers – **HIGH RPM.**

d. **CONDITION** levers – **HIGH IDLE.**

e. **POWER** levers – **IDLE**.

f. Trim aircraft to 150 KIAS (Make no further pitch trim adjustments).

WARNING

If the aircraft reaches an airspeed 5 KTS above the stall speed IAW fig. 1 page 2-52.2 with no stall horn activation, terminate the LOW SPEED SYSTEMS CHECK and have maintenance personnel adjust/repair the stall warning horn system.

g. Airspeed – Reduce at a rate NO GREATER THAN one knot/second until the stall horn ACTIVATES, but NO LOWER THAN 5 knots above the published stall speed specified in fig. 1 page 2-52.2.

* h. Airspeed – Record at onset of the stall warning horn and terminate the maneuver.

* 2. Stall warning system, (gear and flaps down, power off) – Check as follows:

WARNING

Begin the maneuver at 160 KIAS at an altitude that will allow recovery to be safely completed no lower than 7500 AGL.

NOTE

Configure the aircraft by performing the BEFORE LANDING CHECK. Allow the aircraft to slow to approximately 120 KIAS and perform the following.

a. **GEAR**– **DN**.

b. **FLAPS** – **DOWN**.

PROCEDURE TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

c. **PROP** levers – **HIGH RPM.**

d. **CONDITION** levers – **HIGH IDLE.**

e. **POWER** levers– **IDLE**.

f. Trim aircraft to 110 KIAS (Make no further pitch trim adjustments).

WARNING

If the aircraft reaches an airspeed 5 KTS above the stall speed IAW fig. 1 page 2-52.2 with no stall horn activation, terminate the LOW SPEED SYSTEMS CHECK and have maintenance personnel adjust/repair the stall warning horn system.

g. Airspeed – Reduce at a rate NO GREATER THAN one knot/second until the stall horn ACTIVATES, but NO LOWER THAN 5 knots above the published stall speed specified in fig. 1 page 2-52.2.

* h. Airspeed – Record at onset of the stall warning horn and terminate the maneuver.

3. Step deleted.

4. Step deleted.

*5. Flap operation – Check as follows: **C31,32**

a. Airspeed – reduce to 196 KIAS or below.

b. **FLAPS – APPROACH.** Check flaps for freedom and smoothness of operation and for excessive aircraft roll.

c. Airspeed – Reduce to 151 KIAS or below.

d. **FLAPS – 100%.** Check flaps for freedom and smoothness of operation and for excessive aircraft roll.

PROCEDURE **TROUBLESHOOTING REFERENCE**

NOTE

The MP is responsible for ensuring the aircraft is within required weight and balance limits IAW the appropriate maintenance manual.

RC-12K				
TRIM SPEED Gear & Flaps UP Power Idle 150 KIAS Gear & Flaps DOWN Power Idle 110 KIAS				
WEIGHT	STALL SPEEDS Vs	STALL SPEEDS Vso	WARNING HORN RANGE Vs	WARNING HORN RANGE Vso
16,000	103	78	108 – 115	83 – 90
15,500	102	77	107 – 110	82 – 89
15,000	100	76	105 – 112	81 – 88
14,500	99	75	104 – 111	80 – 87
14,000	97	74	102 – 109	79 – 86
13,500	96	72	101 – 108	77 – 84
13,000	94	71	99 – 106	76 – 83
12,500	93	70	98 – 105	75 – 82
12,000	91	69	96 – 103	74 – 81

Figure 1. Power Off Stall Speeds Table.

PROCEDURE	TROUBLESHOOTING REFERENCE

e. Flap extension and retraction time - Check as follows:

(1) Airspeed - 151 KIAS.

(2) Flaps - UP.

*(3) Flap retraction time - Check and record. Flaps should retract from full down to full up in a maximum of 9 seconds.

(4) Airspeed - 151 KIAS.

(5) Flaps - Down (100%).

*(6) Flap extension, time - Check and record. Flaps should extend from full up to full down within 13 seconds.

6. Flaps - UP.

7. Gear - UP.

*8. Autoignition - Check as follows:

a. Autoignition switches (2) - ARM.

b. Slowly retard each power lever.

c. Respective IGN ON annunciator light should illuminate at 14 to 20% torque.

d. Power - Establish cruise power with autoignition armed.

e. Right engine condition lever - Rapidly retard to IDLE CUT-OFF for 3 seconds, then return to LOW IDLE. Engine relight should occur within 3 to 5 seconds. Monitor engine accelera-

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

tion and TGT rise. If relight does not occur within limits. or acceleration or TGT do not appear normal. abort the start. Restart engine using Normal Procedures.

f. Repeat procedure for opposite engine.

*9. Propeller feathering - Check each engine as follows: F14.15

a. Airspeed - 120 KIAS.

b. Power lever (engine to be feathered) - IDLE.

c. Propeller lever (engine to be feathered) - HIGH RPM.

d. Condition lever (engine to be feathered) - IDLE CUTOFF. Allow N_1 RPM to decay below 20%.

c. Propeller lever (engine to be feathered) - FEATHER. Time to feather must not exceed IO seconds from windmilling at 1700 RPM to no rotation in the feathered position.

f. Engine cleanup.

(1) Condition lever - FUEL CUTOFF.

(2) Engine autoignition switch -OFF.

(3) Autofeather switch - OFF.

(4) Generator switch - OFF.

PROCEDURE	TROUBLESHOOTING REFERENCE
(5) Propeller synchronization switch - OFF.	
g. Engine restart.	
(1) Cabin air mode selector switch - As required.	
(2) Electrical load - Reduce to minimum.	
(3) Fire pull handle - In.	
(4) Power lever - IDLE.	
(5) Condition lever - FUEL CUTOFF.	
(6) TGT (operating engine) - 700°C or less.	
(7) Ignition and engine start switch - ON.	
(8) Condition lever - LOW IDLE.	
(9) TGT - 1000°C, 5 seconds maximum.	
(10) Ignition and engine start switch - OFF at 50% N_1.	
(11) Generator switch - RESET. then ON.	
(12) Engine cleanup - Perform if engine restart is unsuccessful.	
(13) Cabin air mode selector switch - OFF.	
(14) Autotgnition switch - ARM.	
(15) Propeller lever - Move out of feather. Propeller ta-	

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

chometer must reach 1000 RPM in 30 seconds or less.

(16) Propellers - Synchronized.

(17) Power - As required.

g. Repeat procedure for opposite engine.

*10. Propeller autofeathering system and propeller unfeathering - Check as follows: F4-15

a. Autofeather switch - ARM.

b. Airspeed - 120 KIAS.

c. Propeller levers - Set 1700 RPM.

d. Power levers - Set as required to arm autofeather system.

e. Condition lever (engine to be feathered) - IDLE CUTOFF.

*f. Record the time from fuel cut-off until propeller rotation is completely stopped (no rotation). Time to feather shall not exceed 10 seconds. (Propeller is considered to be feathered when the blades are individually visible to the human eye, but the propeller is still rotating.)

PROCEDURE	TROUBLESHOOTING REFERENCE

NOTE

For proper autofeather operation propeller must stop completely.

g. Engine cleanup.

(1) Condition lever - FUEL CUTOFF.

(2) Engine autoignition switch - OFF.

(3) Autofeather switch - OFF.

(4) Generator switch - OFF.

(5) Propeller synchronization switch - OFF.

h. Engine restart.

(1) Cabin air mode selector switch - OFF.

(2) Electrical load - Reduce to minimum.

(3) Fire pull handle - In.

(4) Power lever - IDLE.

(5) Condition lever - FUEL CUTOFF.

(6) TGT (operating engine) - 700°C or less.

(7) Ignition and engine start switch - ON.

(8) Condition lever - LOW IDLE.

(9) TGT - 1000°C, 5 seconds maximum.

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

(10) Ignition and engine start switch - OFF at 50% N_1.

(11) Generator switch - RESET. then ON.

(12) Engine cleanup - Perform if engine restart is unsuccessful.

(13) Cabin air mode selector switch - As required.

(14) Autoignition switch - ARM.

i. Propeller - Unfeather.

j. Propellers - Synchronized.

k. Power - As required.

l. Repeat procedure for other engine.

*11. Landing gear warning horn - Check as follows: C24-26

a. Power levers - Retard slowly. individually, until landing gear warning horn first sounds.

*b. Turbine tachometers - Read N_1 on first hearing landing gear warning horn. The landing gear warning horn must sound when power levers are retarded below 84 to 86% N_1 and airspeed is below 140 KIAS or when the flaps are extended beyond the approach position (40%) regardless of power lever position.

PROCEDURE	TROUBLESHOOTING REFERENCE
c. Power levers - Advance past 84 to 86% N_1. Landing gear warning horn should be armed again. With the airspeed greater than 153 KIAS and the flaps are retracted, the landing gear warning horn shall be silent regardless of power setting.	
*13. Landing gear normal operation - Check as follows:	C13-30
a. Airspeed - 178 KIAS.	
b. Landing gear control switch - DN.	
*c. Landing gear extension time - Record (7 seconds maximum).	
d. Landing gear handle lights (red) - Check illuminated while gear is in transit.	
e. Landing gear down indicator lights (3. green) - Check illuminated.	
f. Airspeed - 160 KIAS.	
g. Landing gear control switch - UP.	
*h. Landing gear retraction time - Record (8 seconds maximum).	
i. Landing gear handle lights (red) - Check illuminated while gear is in transit.	
j. Landing gear down indicator lights (3. green) - Check all extinguished.	
*l3. Emergency landing gear extension system - Check operation and condition as follows:	

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

a. Airspeed - 178 KIAS.

b. Landing gear control circuit breaker - Out (pulled).

c. Landing gear control switch - DN.

d. Landing gear alternate extension lever - Unstow.

e. Alternate landing gear extension lever - Pump.

f. Gear down indicator lights (3) - Monitor. Stop pumping lever when gear down indicator lights are illuminated or resistance is felt.

NOTE

Eighty or more strokes of the handle could be required to fully extend the landing gear.

g. Alternate extension lever - stow.

DESCENT AND LOW LEVEL CRUISE

*1. Maximum rate (Vmo) descent. If the test pilot is satisfied that the entire aircraft is functioning properly perform the maximum rate descent check as follows:

a. Power levers - IDLE.

b. Propellers - Set 1700 RPM.

c. Pressure altitude - Above 18, 000 feet.

PROCEDURE	TROUBLESHOOTING REFERENCE

d. Gear - UP.

e. Flaps - UP.

f. Airspeed - In accordance with figure 4.

WARNING

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

*g. Flight controls - Check for any indication of flutter, oscillation, vibration, or malfunction.

*h. Windows and doors - Check for wind noise indicating air leaks.

i. Level off aircraft at 10,000 feet.

*2. Elevator trim - Nose down trim stops will be set as follows:

a. Power levers - Set 100% torque. Do not exceed N_1 or TGT limits.

b. Propeller levers - Set 1700 RPM.

c. Airspeed - 140 KIAS.

d. Trim aircraft.

e. Excess nose down trim should be at least 0.9 but not exceed 1.4 trim wheel indicator units.

PROCEDURE	TROUBLESHOOTING REFERENCE

DESCENT-ARRIVAL

Perform the following checks prior to the final descent for landing.

1. Cabin pressurization - Set. Adjust cabin controller dial as required.
2. Ice and rain switches - As required.
3. Recognition lights - ON.
4. Altimeters - Set to current altimeter setting.
5. Flare/chaff dispenser arm-safe switch - SAFE.
6. Flare/chaff dispenser safety pin (electronic module) - Insert.
7. Condition levers - HIGH IDLE.
8. Crew briefing - Complete.

BEFORE LANDING

1. Propeller synchronization switch - OFF.
2. Autofeather switch - ARM.
3. Propeller levers - HIGH RPM.
4. Flap switch - APPROACH, below 196 KIAS.
5. Landing gear control switch - DN. below 178 KIAS.
6. Landing lights - As required.
7. Brake deice - As required.

PROCEDURE	TROUBLESHOOTING REFERENCE

LANDING

NOTE

Maximum design sink rate is 500 feet per minute.

1. Autopilot and yaw damp - Disengaged.
2. Gear down indicator lights (3) - Check illuminated.
3. Flaps - DOWN.

*4. Brake operation - Check during landing roll for any tendency to bleed down. drag after release. or indicate assymmetrical braking power.

*5. Propeller reversing - Check as follows: E4

a. During landing utilize maximum reverse power.

b. Check for smoothness of operation and equal thrust from engines.

*c. Turbine tachometers - Maximum reverse N_1 should be 86 to 88%. Maximum difference between engines should be 2% N_1.

*6. Oil temperature - Monitor. Ground idle limits are 10 to 110°C.

*7. Oil pressure - Monitor. Ground idle limits are 60 PSI minimum.

PROCEDURE	TROUBLESHOOTING REFERENCE

GO-AROUND

1. Power - Maximum allowable.
2. Gear - UP.
3. Flaps - UP.
4. Landing lights - OFF.
5. Climb power - Set.
6. Brake deice - OFF.

AFTER LANDING

Complete the following procedures after the aircraft has cleared the runway:

1. Propeller levers - Low RPM.
2. Ice vane control switches - ON.
3. Engine autoignition switches - OFF.
1. Ice and rain switches - OFF.
5. Flap switch - UP.
6. Transponder - STBY.

NOTE

Do not turn INS off until the after aircraft has been parked. The aircraft must remain stationary for 3 minutes after the INS has been turned off.

7. Lights - As required.
8. Mission control panel - Set.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN

CAUTION

To prevent sustained loads on rudder shock links. the aircraft should be parked with the nose gear centered.

1. Brake deice - OFF.
2. Parking brake - Set.
3. Landing/taxi lights - OFF.
4. Cabin air mode selector switch - OFF.
5. Autofeather switch - OFF.
6. Vent and aft vent blower switches - AUTO.
7. Inverter switches - OFF.

*8. Battery condition - Check as required. If BATTERY CHARGE light is illuminated during engine shutdown monitor battery, ammeter (mission control panel) for decreasing current. Battery condition is unsatisfactory, if BATTERY CHARGE light remains illuminated and charge current fails to decrease between checks.

9. Avionics master switch - OFF.
10. Propeller levers - FEATHER.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE SHUTDOWN (CONT)

CAUTION

Monitor TGT during shutdown. If sustained combustion is observed. proceed immediately to ABORT START procedure.

11. Condition levers - FUEL CUT-OFF.

WARNING

Do not turn EXTERIOR LIGHTS OFF until propeller's rotation has stopped.

12. Exterior lights - OFF.
13. Master panel lights - OFF.
14. Key lock switch - OFF.
15. Oxygen system - As required.

BEFORE LEAVING AIRCRAFT

1. Wheels - Chocked.
2. Parking brake - As required.

NOTE

Brakes should be released after chocks are in place (ramp conditions permitting).

3. Flight controls - Locked.

PROCEDURE	TROUBLESHOOTING REFERENCE
4. Standby fuel pumps - Off.	
5. Overhead floodlight - OFF.	
6. Emergency exit lock - As required.	
7. Aft cabin light - OFF.	
8. Door light - OFF.	

CAUTION

If strong winds are anticipated while the aircraft is unattended. the propellers shall be secured to prevent their windmilling with zero engine oil pressure.

*9. Walk-around inspection - Complete. Conduct a thorough walk-around inspection. checking for damage. fluid leaks. and fluid levels. Check that covers. tiedowns. restraints. and chocks are installed as required.	Ell-13

NOTE

A cold oil check is unreliable. Oil should be checked within 10 minutes after stopping engine.

*10. Aircraft forms - Complete. In addition to established requirements for reporting any system defects. unusual and excessive operation such as hard landings. etc., the flight crew will also make entries on DA Form 2408-13 to indicate when limits in the operator's manual have been exceeded.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE LEAVING AIRCRAFT (CONT)

11. Aircraft - Check secured. Lock cabin door as required.

SECTION III. TROUBLESHOOTING

General. This section contains troubleshooting information that has been referenced in Section II. This section lists possible conditions, abnormal conditions and indications and probable causes. The information is to be used only as a quick reference and may not be all-encompassing.

TROUBLESHOOTING GUIDE A - STARTING

CONDITION

PROBABLE CAUSE

A1. Both starters inoperative

a. Low battery.

b. Loose connection or open circuit between battery relay power cabinet.

A2. One starter inoperative.

a. Starter relay inoperative.

b. Poor ground at starter.

c. Open circuit.

d. Defective starting motor.

e. Defective switch.

f. Defective wiring.

g. Defective generator control unit

h. Current transformer miswired.

A3. Engine slow to start or does not start.

a. Low battery.

b. High resistance starter circuit.

c. Defective starter-generator.

d. Turbine dragging.

e. Defective generator control unit.

f. Current transformer miswired.

A 4 Engine fails to light up.

a. Improper engine starting procedure.

b. Ignition system.

(1) No power to ignition exciter.

(2) Defective wiring or components.

c. Fuel system.

(1) Debris or ice in fuel system.

(2) Air lock in fuel control unit.

(3) Engine driven primary high pressure pump failure.

A 5 Engine fails or is slow to accelerate to idle N_1 speed.

a. Improper engine starting technique or premature removal of starter from line.

b. Leaks or restrictions on fuel control unit pneumatic system.

c. Leaks in pneumatic line of propeller governor.

d. Fuel control unit contaminated with water or ice, or corroded.

A 6 Hot start or delayed light up.

a. Improper starting procedure.

b. Insufficient power from battery or ground power unit.

c. Poor connections on power input lines or starter-generator.

d. Low power to ignition exciter.

e. Defective ignition cable.

f. Defective igniters.

g. Defective ignition exciter.

h. Bleed air leaking or system in aircraft using bleed air is on.

i. Engine control linkage improperly rigged.

j. Fuel nozzle restrictions.

A7. Engine fails to or is slow to accelerate propeller to idle speed.

a. Propeller oil transfer sleeve binding.

TROUBLESHOOTING GUIDE B - INSTRUMENTS

CONDITION	PROBABLE CAUSE
B1.	**Airspeed indicator reading remains fixed.**
	a. Pitot pressure line clogged with ice or debris.
	b. Defective indicator.
B2.	**Vertical velocity indicator inaccurate or inoperative.**
	a. Static line clogged.
	b. Leak in line or instrument case or loose fittings.
	c. Defective vertical velocity indicator.
B3.	**Airspeed indicator reads incorrectly or fluctuates excessively.**
	a. Pitot tube or pressure line partially restricted or leaking.
	b. Static port or line clogged or static line leaking.
	c. Faulty airspeed indicator.
B4.	**Magnetic compass inaccurate, sluggish, or erratic.**
	a. Insufficient liquid.
	b. External magnetic interference.
	c. Defective compass.
	d. Windshield heat on.
B5.	**Turn-and-slip indicator inoperative or erratic.**
	a. Tripped turn-and-slip circuit breaker.
	b. Defective turn-and-slip instrument.
B6.	**Fuel quantity indicator fluctuates or reads low.**
	a. Defective pins in connector on harness that mates with gage.

b. Compensator immersed in water.

c. Circuit out of calibration.

d. Tank unit(s) out of circuit.

e. Defective pins in connector on fuel probes and wing harness used to connect fuel probes.

B7. Fuel quantity gage pegs down scale against stop.

a. Defective probe.

b. Defective pins on connectors on both gage and probes.

c. Nacelle probe body is making contact with metal braided hose inside of nacelle tank.

d. Defective indicator.

e. No power to fuel quantity indicator system.

B8. Fuel quantity indicator needle pegs up scale against stop.

a. Defective indicator.

B9. Turbine gas temperature indicator inoperative or indicates inaccurately.

a. Defective or out of adjustment balance resistor.

b. Defective turbine gas temperature harness.

c. Defective turbine gas temperature indicator.

TROUBLESHOOTING GUIDE C - ELECTRICAL

CONDITION	PROBABLE CAUSE
C1.	**Zero or low voltage indicated.**
	a. Circuit breaker tripped.
	b. Loose connection.
	c. Open or shorted field circuit in generator or defective armature.
	d. Brushes not contacting commutator.
	e. Brushes worn out.
	f. Dirty commutator.
	g. Defective generator control unit.
	h. Starter switch on.
C2.	**No generator output.**
	a. Improper connections.
	b. Circuit breaker tripped.
	c. Open or short circuit.
	d. Loss of residual magnetism.
	e. Defective generator control switch.
	f. Starter switch on.
	g. Generator control unit over-voltage circuit defective.
	h. Paralleling circuit open.
	i. Defective generator control unit.
	j. High resistance field circuit.
	k. Shorted field.
C3.	**Low generator output.**
	a. Generators not paralleled.
	b. Defective generator control unit.

C4. **Low voltage.**

a. Malfunctioning generator control unit.

C5. **Volt-loadmeter reads off scale in wrong direction.**

a. Generator field magnetized in wrong direction.

C6. **Volt-loadmeter does not indicate.**

a. Tripped circuit breaker.

b. Open volt-loadmeter lead.

c. Defective volt-loadmeter.

C7. **No power indicated with battery master switch ON.**

a. Battery discharged or defective.

b. Open circuit between battery and master switch.

c. Master switch defective.

d. Defective relay.

e. Keylock switch off.

C8. **Power on with master switch in OFF position.**

a. Master switch defective.

b. Relay contacts stuck.

C9. **Apparent loss of battery capacity.**

a. Cells unbalanced.

b. Electrolyte level too low.

c. Charging rate too low in aircraft.

d. Too little usage or shallow discharges.

C10. **Complete failure of battery to operate.**

a. Loose or broken lead.

b. Loose or disengaged terminals in battery.

c. Battery not charged.

d. Cell open internally.

C11. Below normal battery output.

a. Battery switch left ON.

b. Generator control unit set too low.

c. Internal connection links loose.

d. External connector burned or pitted.

e. Defective or reversed cells.

f. Cell case current leakage.

C12. External power fails to energize aircraft.

a. Defective or incorrectly polarized external power source.

b. Defective external power receptacle.

c. Defective external power relay.

d. Loose or wrong connection in external power circuit.

e. Defective external power overvoltage monitor.

f. APU voltage too high.

g. Defective switch.

h. Circuit breaker tripped.

C13. Landing gear will not retract or extend.

a. Landing gear relay circuit breaker tripped.

b. Landing gear power circuit breaker tripped.

c. Landing gear power safety control circuit breaker tripped.

d. Landing gear power sense circuit breaker tripped.

e. Landing gear safety power circuit breaker tripped.

f. Faulty power pack motor.

g. Faulty power relay.

h. Faulty remote-controlled circuit breaker (RCCB).

i. Defective landing gear control switch.

j. Defective wiring.

C14. Landing gear fails to retract.

a. Safety switch not closing.

b. Pressure switch not closing.

c. Gear selector valve stuck.

d. Circuit is open between the selector valve and the power relay.

e. Time delay circuit opening prematurely.

f. Hand pump handle improperly stowed.

g. Service valve in up position.

h. Defective landing gear control switch.

i. Defective wiring.

C15 Landing gear fails to extend.

a. Service valve switches faulty.

b. Landing gear selector valve stuck in up position.

c. Control switch not providing power to the extend side of selector valve.

d. Defective limit switch.

e. Defective landing gear control switch.

C16. Landing gear pump motor continues to run after the gear is retracted, causing the circuit breaker to trip.

a. Pressure switch not opening on high pressure.

b. Low accumulator charge.

c. Excessive fluid leakage past the piston seals in the actuators.

d. Defective valve in the power pack.

C17. Landing gear pump motor continues to run after the gear are extended, causing the circuit breaker to trip.

a. Downlock switches are not opening.

b. Power relay points stuck.

c. Defective limit switch.

C18. Landing gear pump motor continues to run when the gear is extended or retracted, causing the circuit breaker to trip.

a. Weak power pack motor.

b. Low voltage to the motor.

c. Low fluid level.

d. Blockage in the hydraulic system.

C19. Landing gear pump motor operating longer than 14 seconds in both the extention and retraction modes. The 2-ampere circuit breaker does not trip.

a. Low voltage.

C20. Landing gear pump motor operating longer than 14 seconds in the retract mode, but the 2-ampere circuit breaker does not trip.

a. Faulty time delay PCB and pressure switch.

C21. Landing gear pump motor operating longer than 14 seconds in the extended mode, but the 2 ampere circuit breaker does not trip.

a. Downlock switches failing to open and/or the time delay PCB is faulty.

C22. Landing gear LOW FLUID LEVEL light not functioning.

a. Defective lamp.

b. Defective fluid indicator circuit.

C23. Landing gear circuit breaker trips.

a. Shorted circuit.

C24. Landing gear warning horn inoperative when landing gear control switch is in the up position and weight of aircraft is on struts, but operates when a power lever is closed and the gear is retracted.

a. Poor ground at landing gear control switch.

b. Defective wiring between landing gear control switch and landing gear safety switch.

C25. Landing gear warning horn inoperative when power lever is closed and landing gear is up.

a. Defective or out of adjustment power lever switch.

b. Defective wiring between power lever switches and pedestal terminal board. and between landing gear control switch and stall/landing gear warning horn module.

c. Defective "Q" switch.

C26. Landing gear warning horn fails to shut off when landing gear is extended.

a. Defective or out of adjustment down-lock switches.

C27. Landing gear down position indicator lights are illuminated with landing gear retracted.

a. Defective or out of adjustment down lock switch.

b. Wrong connection in light test circuit.

c. Ground between light and down lock switch.

C28. Landing gear down position indicator light inoperative.

a. Defective or out of adjustment down lock switch.

C29. Landing gear handle light is illuminated with gear up and locked.

a. Defective or out of adjustment up-lock switch.

C30. Landing gear handle light inoperative.

a. Defective or out of adjustment up-lock or down-lock switch.

b. Defective landing gear control switch.

C31. Flaps fail to extend or retract.

a. Tripped circuit breaker.

b. Defective flap motor.

c. Defective flap control switch.

d. Defective mechanical component in actuator system.

e. Defective wiring.

C32. Flap position indicator inoperative.

a. Tripped circuit breaker.

b. Defective position indicator.

c. Defective position transmitter.

d. Defective wiring.

C33. Pitot tube heater fails to operate.

a. Tripped circuit breaker.

b. Defective heater.

c. Defective wiring.

d. Defective switch.

C34. Stall warning system inoperative.

a. Defective stall warning transducer.

b. Defective stall warning computer.

c. Defective wiring.

d. Defective stall/landing gear warning module.

e. Defective speaker.

C35. Stall warning horn sounds continuously.

a. Defective stall warning transducer.

b. Defective stall warning test system.

c. Defective wiring.

d. Defective stall warning computer.

C36. Both inverters inoperative.

a. Defective wiring in inverer system.

C37. One inverter inoperative.

a. Tripped inverter circuit breaker (on DC power distribution panel beneath floor).

b. Loose or corroded ground connection.

c. Defective wiring to inverter.

C38. Battery charge annunciator light inoperative.

a. Defective light bulb.

b. Connections on battery shunt loose or corroded.

c. Defective battery charge monitor module.

C39. One portion of interior lighting or lighting control system inoperative.

a. Defective light circuit board or wheat lights.

b. Defective components in overhead control panel.

c. Defective power supply.

C40. Fuel crossfeed valve inoperative or FUEL PRESS annunciator light remains illuminated.

a. Defective standby fuel pump.

b. Defective crossfeed valve.

C41. Standby fuel pump inoperative.

a. Defective standby pump.

b. Defective switch in fuel management panel.

C42. Pneumatic surface or antenna deice system inoperative.

a. Defective surface deice time delay module.

b. Defective deice distributor valve.

c. Defective plumbing.

d. Defective boot.

C43. Right and left FIRE PULL warning lights do not illuminate in test position of fire protection test switch.

a. System is failing the test.

b. Tripped tire detector circuit breaker.

c. Defective fire protection test switch.

d. Defective wiring.

C44. Engine fire detection system wholly or partially inoperative.

a. Defective sensing tube.

b. Defective fire detector.

c. Defective tire protection test switch.

C45. Fire detector circuit breaker trips.

a. Short circuit in wiring or components.

C46. Left FIRE PULL warning light illuminates in test position bot right FIRE PULL warning light does not.

a. Defective right fire detector.

b. Defective wiring between fire warning power circuit breaker and right fire detector.

C47. Right FIRE PULL warning light illuminates in test position but left FIRE PULL warning light does not.

a. Defective left fire detector.

b. Defective wiring between fire warning power circuit breaker and left fire detector.

C48. Ventilation blower will not run.

a. Tripped vent blower circuit breaker.

b. Defective motor brushes.

c. Defective wiring.

d. Defective motor.

e. Defective switch.

C49. Ventilation blower draws excessive current.

a. Misaligned or preloaded bearings.

b. Defective bearings.

C50. Ventilation blower runs at reduced speed.

a. Brushes not seated properly.

C51. Ventilation blower draws excessive current and runs at high speed.

a. Shorted turns in field windings.

C52. Ventilation blower draws excessive current and speed surges.

a. Shorted turns in armature.

C53. Ventilation blower has excessive vibration.

a. Armature out of balance.

b. Squirrel cage fan damaged.

c. Squirrel cage fan out of balance.

d. Defective bearings.

C54. Propeller deice inoperative.

a. Circuit breaker tripped.

b. Propeller deice switch defective.

c. Ammeter defective.

d. Defective propeller deice timer.

TROUBLESHOOTING GUIDE D - CAUTION PANEL

CONDITION	PROBABLE CAUSE
D1.	**Placard light (annunciator panel) will not illuminate when press-to-test button is pressed.**
	a. Defective placard light.
	b. Defective lamps.
D2.	**Master warning or master caution annunciator light will not illuminate for any red or yellow faults.**
	a. Defective fault warning light.
	b. Defective fault detection module.
	c. Defective annunciator control module.
D3.	**Depressing the press-to-test switch has no effect on fault warning system operation.**
	a. Defective switch.
	b. Defective circuit breaker.
	c. Defective wiring.
D4.	**Dim control does not function properly.**
	a. Defective rheostat switch.
	b. Defective annunciator control module.

TROUBLESHOOTING GUIDE E - POWER PLANT

CONDITION	PROBABLE CAUSE
E1.	**LOW IDLE speed is either high or low.**
	a. LOW IDLE speed improperly adjusted.
E2.	**HIGH IDLE speed is either high or low.**
	a. HIGH IDLE speed improperly adjusted.
E3.	**Low or high torque is observed during torque check.**
	a. Barrel adjustable stop is improperly adjusted.
E4.	**Reverse torque, N_1, and propeller RPM is too high or low.**
	a. Reverse adjusting screw is improperly adjusted.
E5.	**Newly rigged engine accelerates faster or slower than opposite engine.**
	a. Engine rigging, components, or engine is mismatched.
E6.	**Power levers are not aligned.**
	a. Fuel control rod improperly adjusted.
E7.	**High engine oil pressure.**
	a. efective oil pressure indicating system.
	b. Defective pressure relief valve.
E8.	**Low engine oil pressure.**
	a. Insufficient oil.
	b. Defective oil pressure indicating system.
	c. Dirty oil filter.
	d. Leak in oil lines or oil cooler.
	e. Defective pressure relief valve.

f. Excessive hot air leakage through faulty heat shielding.

E9. Fluctuating engine oil pressure.

a. Insufficient or excess oil.

b. Defective oil pressure indicating system

c. Dirty oil filter.

d. Defective pressure relief valve.

E10. High oil temperature.

a. Insufficient oil supply.

b. Defective oil temperature indicating system.

c. Excessive idling in feather.

d. Restriction in oil cooler.

E11. Oil leak from compressor inlet.

a. Defective preformed packing and plastic ring on oil filter housing.

b. Defective preformed packings on accessory gearbox.

E12. Excessive oil discharge from overboard breather.

a. Excess oil in tank.

b. Defective preformed packing and plastic ring on oil filter.

c. Excessive back pressure in scavenge system due to restrictions in oil scavenge tubes. pump screen or oil-to-fuel heater tubes.

E13. Excessive engine oil consumption.

a. Excess oil in tank.

b. Leak or restriction in pressure scavenge oil tubes.

c. Defective preformed packing and plastic ring on oil filter housing.

d. Leakage in oil to fuel heat exchanger.

e. Defective centrifugal breather carbon seal.

f. Defective air seals.

E14. Failure of engine to decelerate.

a. Fuel control unit.

b. Disconnected or improperly adjusted linkage.

E15. Gas generator overspeed.

a. Defective turbine tachometer system.

b. Sheared or worn fuel control unit splined coupling or drive spline.

c. Defective fuel control unit.

E16. Gas generator uncontrolled acceleration.

a. Sheared or worn fuel control unit splined coupling or drive spline.

b. Defective fuel control unit.

E17. Surge during acceleration.

a. Defective compressor bleed valve.

b. Defective fuel control unit.

c. Compressor damaged.

E18. Slow to accelerate.

a. Possible leak or restriction in Pg. air bleed tube or P3 air delivery tube.

b. P3 air filter needs replacing.

c. Improper acceleration adjustment on fuel control unit.

d. Propeller governor out of adjustment.

e. Defective fuel control unit.

f. Defective propeller governor.

E19. Flame out.

a. Fuel supply contaminated with ice. water. or debris.

b. Engine driven high pressure fuel pump.

c. Fuel control unit contaminated or corroded.

d. Manifold adapter or fuel nozzles restricted.

E20. Low power output.

a. Defective indicating system.

b. Operating procedures incorrect.

c. Control linkages incorrectly adjusted or disconnected.

d. Propeller governor defective.

e. Leaks or restrictions in fuel control unit pneumatic system.

f. Fuel nozzles restricted.

E21. High fuel flow at altitude.

a. Defective indicating system.

b. Defective compressor bleed valve.

E22. Maximum operating TGT has been exceeded.

a. Faulty instrumentation. thermocouples, or wiring.

b. Excessive accessory power being pulled due to failure or overload.

c. Torquemeter system reading low.

E23. TGT limited (turbine temperature is at maximum limit before target torque is reached).

a. Defective instruments, thermocouple. or wiring.

b. Improper operating procedure.

c. Dirty compressor.

d. Excessive accessory power being pulled due to failure or overload.

e. Defective compressor bleed valve.

f. Damaged compressor.

g. Air leaks in engine flanges or fittings.

h. Hot section distress.

i. Torquemeter system reading low.

E24. Fluctuating torque indication.

a. Faulty instrumentation system.

b. Defective power turbine governor.

c. Engine driven high pressure pump shaft seal leakage.

d. Defective or out of adjustment propeller overspeed governor.

e. Defective propeller primary governor.

f. Sticking beta mechanism.

E25. Fluctuating fuel flow.

a. Faulty instrumentation system.

b. Defective power turbine governor.

c. Engine driven high-pressure fuel pump shaft seal leaking.

d. Defective propeller overspeed governor.

e. Sticking beta mechanism.

E26. Fluctuating TGT.

a. Faulty instrumention system.

b. Defective power turbine governor.

c. Defective engine driven high pressure fuel pump shaft seal.

d. Defective or out of adjustment propeller overspeed governor.

e. Defective propeller primary governor.

f. Sticking beta mechanism.

E27. Fluctuating gas generator speed.

a. Faulty instrumentation system.

b. Defective power turbine governor.

c. Defective engine driven primary high pressure fuel pump shaft seal.

d. Defective or out of adjustment propeller overspeed governor.

c. Defective propeller primary governor.

f. Sticking beta mechanism.

E28. Fluctuating torque and propeller RPM.

a. Defective or out of adjustment propeller overspeed governor.

b. Defective propeller primary governor.

c. Sticking beta mechanism.

E29. Fuel leaking overboard.

a. Fuel cap not seated.

b. Filler cap or preformed packing defective.

c. Fuel transfer module defective.

d. Fuel level transmitter defective.

TROUBLESHOOTING GUIDE F - PROPELLERS

CONDITION	PROBABLE CAUSE
F1.	**Propeller governor system partially or completely inoperative.**
	a. Defective propeller governor test switch.
F2.	**Propeller governor test system inoperative.**
	a. Tripped propeller governor test circuit breaker.
	b. Defective wiring.
	c. Defective switch.
	d. Defective propeller governor reset solenoid.
F3.	**Propeller governor test system inoperative on one engine.**
	a. Defective propeller governor system test switch.
	b. Defective propeller governor reset solenoid.
F4.	**Propeller autofeather system inoperative (propeller autofeather switch in ARM or TEST position).**
	a. Tripped circuit breaker.
	b. Defective arming light out relay or feathering relay.
	c. Defective arc suppression diode on relays or feather dump valve.
	d. Defective ground blocking diode.
F5.	**Autofeather circuit breaker trips (autofeather switch in ARM or TEST position).**
	a. Defective ARM-TEST switch.
	b. Defective wiring.
F6.	**One autofeather arm light illuminates when power setting is less than 90 percent N_1 (AUTOFEATHER switch in ARM position).**

a. Defective or out of adjustment power switch.

F7. Neither autofeather arm light illuminates when power levers are advanced (AUTOFEATHER switch in ARM position).

a. Defective autofeather switch.

F8. One arm light does not illuminate when power levers are advanced (AUTOFEATHER switch in ARM position).

a. Defective or out of adjustment power switch.

b. Defective No. 1 (12 PSI) torque pressure switch.

F9. Both arm lights remain illuminated when one power lever is retarded (AUTOFEATHER switch in ARM position).

a. Defective or out of adjustment power switch.

F10. Propeller does not start to feather after engine torque falls below 7% (AUTOFEATHER switch in ARM position).

a. Defective No. 2 (6.5 PSI) torque pressure switch on retarded engine.

b. Defective autofeather dump valve.

F11. One arm light does not illuminate when power levers are advanced to 90 percent N_1 (AUTOFEATHER ARM-TEST switch in TEST position).

a. Defective No. 1 (12 PSI) torque pressure switch.

F12. Both arm lights extinguish when one power lever is retarded (engine torque 7 to 12% on retarded engine, AUTOFEATHER ARM-TEST switch in TEST position).

a. Defective No. 2 (6.5 PSI) torque pressure switch on retarded engine.

F13. One arm light remains illuminated after torque of one engine falls below 7% on retarded engine, AUTOFEATHER ARM-TEST switch in TEST position).

a. Defective No. 2 (6.5 PSI) torque pressure switch on retarded engine.

b. Defective autofeather dump valve.

F14. Propeller slow to feather.

a. Preformed packing leak at transfer tube or transfer housing.

b. Defective propeller governor.

F15. Propeller slow to unfeather.

a. Defective propeller governor.

TROUBLESHOOTING GUIDE G - HYDRAULIC

CONDITION	PROBABLE CAUSE
G1.	**Solid pedal, no brakes.**
	a. Brake linings worn beyond allowable limits.
G2.	**Spongy brakes.**
	a. Air in brake hydraulic system.
	b. Low hydraulic fluid.
G3.	**Unable to hold brake pressure.**
	a. Leak in brake hydraulic system.
	b. Brake cylinder seal leaking.
G4.	**Brake pedals bottom, no brakes.**
	a. Broken or leaking hydraulic lines.
	b. Brake cylinder seal failure.
G5.	**Parking brake will not hold.**
	a. Air in brake hydraulic system.
	b. Defective parking brake valve.
	c. Parking brake control out of adjustment.
G6.	**Brakes grab.**
	a. Stones or foreign matter locking brake disc.
	b. Warped or bent disc.
G7.	**Brakes drag.**
	a. Packing nut or threaded bushing, as applicable, too loose.
G8.	**Brakes weak.**
	a. Packing nut or threaded bushing, as applicable, too tight.

TROUBLESHOOTING GUIDE H - FLIGHT CONTROLS

CONDITION

PROBABLE CAUSE

For complete troubleshooting of autopilot system, refer to Sperry manual P/N 15-1146-25.

TROUBLESHOOTING GUIDE I - NOT APPLICABLE

TROUBLESHOOTING GUIDE J - VIBRATIONS

CONDITION	PROBABLE CAUSE
J1.	**Engine vibration.**
	a. Propeller damaged or blade angle slipped.
	b. Loose engine mounting bracket bolts.
	c. Compressor damaged.
	d. Turbine damaged.

TROUBLESHOOTING GUIDE K - COMMUNICATION/NAVIGATION EQUIPMENT

K1. Interphone system: No audio signals heard in headset.

a. No power to audio system.

b. Defective microphone, control wheel microphone switch, or foot microphone switch.

c. Defective headset-microphone cord or jack.

d. Defective microphone jack.

e. Defective audio control panel.

K2. Interphone system: Audio signals can be heard at other headset stations when transmitter selector switches at audio control panels are at different positions and receiver monitor switches are pulled out.

a. Defective audio control panel.

b. Defective wiring.

K3. UHF VOL control has no effect on receiver noise or incoming signal.

a. Defective UHF command set.

K4. UHF channeling tone not heard.

a. Defective UHF command set.

K5. UHF squelch switch has no effect on receiver noise.

a. Defective UHF command set.

b. Defective static wicks.

K6. UHF guard receiver noise not audible.

a. Defective UHF command set.

K7. Cannot establish UHF two-way communications.

a. Defective audio distribution channels.

b. Defective antenna or antenna cabling.

K8. Cannot establish VHF two-way communications.

a. Defective audio distribution channels.

b. Defective antenna or cabling.

K9. VHF volume control does not affect received audio level.

a. Defective VHF control panel.

b. Defective antenna or antenna cabling.

K10. HF transmitted or received signal or sidetone not clear.

a. Defective HF receiver-transmitter.

b. Defective antenna cabling.

c. Defective HF control panel.

d. Defective audio control panel.

K11. Course deviation indicator NAV flag remain in view with receiver operating.

a. No reliable navigation signal on frequency selected.

b. Defective VOR receiver.

c. Defective VOR control panel.

d. Defective antenna or cabling.

e. Defective NAV switching relays.

f. Defective pilot's or copilot's VOR switch on instrument panel.

g. Defective course deviation indicator.

K12. No VOR audio tone heard in headset.

a. Defective VOR receiver.

b. Defective VOR control panel.

c. Defective audio control panel.

K13. Marker beacon indicator light does not illuminate.

a. Defective marker beacon indicator light.

b. No power to receiver.

c. Defective antenna or cabling.

d. Defective marker beacon receiver.

K14. Marker beacon signals not heard in headset.

a. Defective audio control panel.

b. Defective marker beacon volume control or sensitivity switch on pedestal extension.

K15. Glideslope off flags remain in view when glideslope receiver is operating.

a. Glideslope portion of VOR receiver defective.

b. Defective glideslope antenna or cabling.

c. Defective VOR control panel.

K16. Glideslope flag on one course deviation indicator remains in view when glideslope receiver is operating.

a. Defective pilot's or copilot's NAV select switch on instrument panel.

b. Defective course deviation indicator switching relay.

c. Defective course deviation indicator.

K17. Glideslope indicator on course deviation indicators do not deflect properly.

a. Defective glideslope portion of VOR receiver.

K18. Glideslope indicator on one course deviation indicator does not deflect properly.

a. Defective course deviation indicator.

b. Defective course deviation indicator switching relay.

K19. ADF radio set inoperative.

a. No power to ADF radio set.

K20. No ADF audio heard in headsets.

a. Defective ADF receiver.

b. Defective ADF control panel.

c. Defective ADF antenna.

K21 Radio magnetic indicator does not indicate magnetic bearing to station with single or double needle switch set to ADF.

a. Defective ADF receiver.

b. Defective RMI.

c. Defective ADF antenna.

d. Defective ADF-VOR switch on RMI.

e. Defective ADF control panel.

K22. ADF single needle pointer does not return to station bearing.

a. Defective RMI.

K23. Quality of ADF reception is poor.

a. Defective ADF control panel.

b. Defective audio control panel.

c. Defective ADF receiver.

d. Defective antenna.

K24. Heading on course deviation indicator does not agree with magnetic compass heading of aircraft (corrected for compass deviation).

a. Defective gyro compass set.

b. Incorrect compass deviation card.

K25. Copilot's radio magnetic indicator heading does not agree with pilot's horizontal situation indicator heading within two degrees.

a. Defective radio magnetic indicator.

b. Defective horizontal situation indicator.

K26. Pilot's radio magnetic indicator heading does not agree with copilot's horizontal situation indicator heading within two degrees.

a. Defective radio magnetic indicator.

b. Defective horizontal situation indicator.

K27. VOR receiver inoperative.

a. No power to equipment.

b. Defective VOR control panel.

c. Defective VOR receiver.

K28. With VOR receiver operating, course deviation bars on course deviation indicators and radio magnetic indicator needles do not deflect.

a. Defective VOR receiver.

b. Defective VOR control panel.

c. Defective relays.

d. Defective NAV select switch.

K29. With VOR receiver operating, course deviation bars on course deviation indicators do not deflect (radio magnetic indicator needles operate properly).

a. Defective NAV select switch on instrument panel.

b. Defective course deviation indicator switching relay.

K30. Radar inoperative.

a. System circuit breaker tripped.

b. Defective radar control-indicator.

c. Defective radar receiver-transmitter.

d. Defective antenna.

e. Defective wiring.

K31. Radar antenna does not scan.

a. No power to radar antenna.

b. Defective radar antenna.

K32. No display on radar control indicator.

a. Defective radar control-indicator.

b. Defective radar receiver-transmitter.

c. Defective radar antenna.

d. Defective wiring.

K33. Wavy, chopped, or missing range circles or indicator.

a. Defective radar control-indicator.

b. Defective radar receiver-transmitter.

K34. Improper display on radar control-indicator (track line bent folded or does not begin at proper position).

a. Defective radar receiver-transmitter.

b. Defective radar control-indicator.

K35. No targets on radar control-indicator or targets do not move with TILT control.

a. Defective radar control-indicator.

b. Defective radar receiver-transmitter.

c. Defective radar antenna.

K36. Radar gain control has no effect on display (ground mapping mode only).

a. Defective radar control-indicator.

K37. Radar TILT control inoperative.

a. Defective radar control indicator.

K38. Radar BRT control inoperative.

a. Defective radar control-indicator.

K39. Radar range does not vary when RANGE switch is changed to various positions.

a. Defective radar control-indicator.

K40. Transponder cannot be interrogated or provides unsatisfactory response.

a. Mode C not set or defective.

b. Encoding altimeter defective.

c. Defective transponder.

d. Defective antenna.

e. Defective coax.

f. Defective wiring.

SECTION IV. SPECIAL PROCEDURES

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

*A. PRESSURIZATION SYSTEM

1. Before takeoff:

   a. Cabin pressurization controller - Set for a 5000 foot cabin altitude.

   b. Cabin pressurization rate knob - Set to the 1 to 3 o'clock position.

   c. Bleed air valve switches (2) - OPEN.

   d. Cabin pressurization switch - PRESS.

2. After takeoff - Initiate a climb to 10,000 to 12. 000 feet pressure altitude.

3. Cabin rate-of-climb indicator - Monitor for a smooth transition from an unpressurized to a pressurized cabin.

4. Cabin rate of climb knob - Set to minimum. Monitor the cabin rate of climb for a rate of less than 200 feet per minute.

5. Cabin rate of climb knob - Set 1 to 3 o'clock position. Monitor the cabin rate of climb for a rate of 350 to 650 feet per minute.

6. Cabin rate of climb knob - Set to maximum. Monitor the cabin rate of climb for a rate of 1500 to 2500 feet per minute.

7. Cabin altimeter - Check that the cabin altimeter needle stabilizes at 4600 to 5400 feet while the cabin differential pressure needle continues to increase.

8. Cabin pressurization controller - Set to 10,000 feet.

9. Cabin pressurization switch - Dump, when cabin altitude approaches aircraft altitude.

10. Continue climbing and ensure that between 12, 000 and 12,500 feet the ALT WARN annunciator light illuminates.

11. Cabin pressurization switch - PRESS.

12. Cabin pressurization controller - Set to 0 feet.

13. Continue climbing to between 15,000 and 16, 000 feet. As the cabin descends to 0 feet. insure that the ALT WARN annunciator extinguishes prior to 9,000 feet cabin altitude.

14. Cabin rate of climb knob - Set to minimum. Monitor the cabin rate of climb for a rate of less than 200 feet per minute.

15. Cabin rate of climb knob - Set 1 to 3 o'clock position. Monitor the cabin rate of climb for a rate of 350 to 650 feet per minute.

16. Cabin rate of climb knob - Set to maximum. Monitor the cabin rate of climb for a rate of 1500 to 2500 feet per minute.

17. Cabin altimeter - Check that the cabin altimeter needle stabilizes and remains at -250 to + 250 feet until the maximum differential pressure of 6.5 ± .1 PSI is reached. At this point (approximately 15,300 feet pressure altitude), cabin altitude should increase and differential pressure should remain constant.

18. With the cabin at maximum differential pressure. place both bleed air valve switches to ENVIR OFF. As the cabin diffential pressure decreases from approximately 6.1 to 5.7 PSI, the cabin rate of climb shall not exceed 2200 feet per minute.

19. Bleed air valve switches - OPEN and reestablish maximum differential pressure.

20. Left bleed air valve switch - ENVIR OFF.

21. Slowly retard the right power lever to flight idle and determine the minimum N_1 required to maintain cabin pressure. Cabin pressurization should be maintained down to flight idle N_1.

22. Left bleed air valve switch - OPEN.

23. Right bleed air valve switch - ENVIR OFF.

24. Slowly retard the left power lever to flight idle and determine the minimum N1 required to maintain cabin pressure. Cabin pressurization should be maintained down to flight idle N1.
25. Right bleed air valve switch - OPEN.
26. Cabin pressurization controller - Set to 500 feet above field elevation.

***B. TRIM AND RIGGING.**

Check as follows:

1. In smooth air, at cruise power, the aircraft Will fly hands off straight and level with the ailerons symmetrically aligned at the trailing edge and the aileron adjustable tab set to zero.

***C. MAXIMUM POWER LEVER POSITION CHECK.**

Engines shall be able to operate within N1 or TGT limits at maximum power lever position, and be off the torque limit at 1700 RPM. Check maximum power lever position as follows:

NOTE

The only requirement of the maximum power lever position check is to verify that it is possible to obtain maximum allowable gas generator RPM (N1) prior to reaching the forward stop on the power levers. If during the test, the TGT limit, torque limit or N1 limit is reached prior to reaching the forward stop on the power levers, the check is completed.

1. Altitude - 25,000 feet pressure altitude.
2. Propeller levers - Set 1700 RPM.
3. Ice vanes - Retracted.
4. Bleed air valve switches – OPEN.
5. Airspeed - As required.
6. Power levers - Full forward (do not exceed TGT and/or N1 limits). Maximum N1 is 104%. Maximum TGT is 840°C.

*D. SPEED CHECK AT MAXIMUM CRUISE POWER.

NOTE

A new or rebuilt engine operated at the torque value presented in the engine acceptance table will show a TGT margin below the maximum cruise limit for the torque value presented in the table. With ice vanes retracted, cruise torque settings shown on the engine acceptance table should be obtained without exceeding TGT limits.

Speed-power runs shall be made in smooth air to determine consistency with performance figures. Torque settings, fuel flow, and airspeed to be achieved will be determined by reference to maximum cruise speed/engine acceptance chart (figure 4).

1. Record the following:
   - *a. Engine serial number
   - *b. Engine hours since new
   - *c. Engine hours since overhaul
2. Airspeed - Refer to table.
3. Altitude - Refer to table.
4. FAT - Refer to table.
5. Power setting - Refer to table.
6. Propeller RPM - 1500 RPM.
7. Ice vanes - Retracted.
8. Aircraft weight - Refer to chart.
9. Allow conditions to stabilize for one minute then record the following for each engine being tested:
   - *a. Airspeed
   - *b. Pressure altitude

c. *Free air temperature

d. *Propeller RPM

e. *Torque

f.*N_1

g. *TGT

NOTE

For engines that exceed 810°C TGT, engine acceptance at maximum cruise power, must be conducted.

*E. ENGINE ACCEPTANCE AT MAXIMUM CONTINUOUS POWER.

1. Record the following:

   *a. Engine serial number.

   *b. Engine hours since new.

   *c. Engine hours since overhaul.

2. Altitude - Establish level flight at 16,000 feet pressure altitude.

   a. Propeller levers - Set 1700 RPM.

3. Adjust the opposite engine to maintain 160 HAS.

4. Free air temperature - Record.

5. Set engine torque as specified by the engine acceptance table for the recorded indicated free air temperature. from the maximum cruise speed/ engine acceptance chart (figure 4).

6. Allow conditions to stabilize for one minute then record the following for each engine or being tested.

   *a. Airspeed

   *b. Pressure altitude

   *c. Free air temperature

d. Propeller RPM

*e. Torque

*f. N_1

*g TGT (must not exceed 830°c).

7. Repeat for opposite engine.

*f. **ENGINE ACCEPTANCE AT MAXIMUM CRUISE POWER.**

NOTE

The engine acceptance at maximum cruise power check needs to be performed only if the TGT observed during the engine acceptance check at maximum continuous power exceeds 830°C.

1. Record the following:

   *a. Engine serial number.

   *b. Engine hours since new.

   *c. Engine hours since overhaul.

   d. Altitude - Establish level flight at 25,000 feet pressure altitude.

2. Propeller levers - Set 1500 RPM.

3. Adjust the opposite engine to maintain 160 KIAS.

4. Free air temperature - Record.

5. Set engine torque as specified by the engine acceptance table for the recorded indicated free air temperature from the column fabled maximum cruise speed/engine acceptance chart (figure 4).

6. Allow conditions to stabilize for one minute then record the following for each engine or being tested.

   *a. Airspeed

   *b. Pressure altitude

*c. Free air temperature

d. Propeller RPM

*e. Torque

*f. N_1

*g. TGT (must not exceed 810°C)

7. Repeat for opposite engine.

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS.

*1. Autopilot - Check as follows:

Observe that all channels operate positively and smoothly with no oscillation of any flight control.

a. Trim aircraft for straight and level flight.

b. Turn control - Place in center (detent) position.

c. Engage switch - Set to ENG.

d. Check autopilot heading preselection as follows:

(1) Autopilot heading selector (on course deviation indicator) - Set test heading.

(2) Heading select switch-indicator (autopilot mode selector panel) - Press on.

(3) Aircraft should automatically turn and roll out on preselected heading.

e. Check altitude control and selection as follows:

(1) Pitch thumbwheel (autopilot pitch-turn panel) - Move UP and DN while observing that aircraft and pitch trim indicator respond properly.

f. Check autopilot VOR/ILS operation as follows:

(1) VOR receiver - Set.

(2) NAV switch (autopilot mode selector panel) - Press on.

PROCEDURE	TROUBLESHOOTING REFERENCE
(3) When the aircraft is within 10 degrees of the selected radial it should begin a gradual interception of the radial or glideslope signal.	
g. Check autopilot altitude hold function as follows:	
(1) Fly aircraft to test altitude.	
(2) Altitude hold (ALT) switch-indicator (autopilot mode selector panel) - Press on.	
(3) Aircraft should maintain the altitude being flown at the time the ALT hold switch was pressed.	
h. Check autopilot indicated airspeed hold function as follows:	
(1) Fly aircraft to test airspeed.	
(2) Airspeed hold (ALT) switch-indicator (autopilot mode selector panel) - Press on.	
(3) Aircraft should maintain airspeed that was being flown at the time IAS hold switch was pressed.	
i. Check roll command function of autopilot as follows:	
(1) Turn control knob (autopilot pitch-turn control	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

panel) - Turn to L and R and verify that autopilot turns aircraft left or right respectively.

*2. Slaved compass systems - Check that systems agree with known magnetic headings within ±2° and within 3° of each other.

*3. Inertial Navigation System Flight Test - Perform as follows:

Satisfactory performance shall be demonstrated by flying over three checkpoints whose latitude and longitude are known. and comparing them with the inertial present position readouts. The aircraft shall establish a low altitude. compatible with aircraft safety and applicable laws and codes of flight, which will allow accurate sighting of ground landmarks. An altitude of 1000 feet over waypoints and 10,000 feet or more when between waypoints is recommended whenever possible.

a. Inertial navigation system - Set up, align, and operate in accordance with TM 55-1510-222-10.

b. TACAN update - Check as follows:

(1) Key 4 - Depress.

(2) INSERT/ADVANCE key - Depress. Key will dim.

(3) Right display - Check. Display should read I--XX4. indicating that the INS is in the TACAN update mode.

PROCEDURE	TROUBLESHOOTING REFERENCE
(4) Data selector (while in flight) - L/L WYPT or UTM WYPT.	
(5) Keys 7 and 9 - Depress simultaneously. The number of the TACAN station being used for navigation shall flash on and off.	
(6) FROM-TO display - Monitor station selection. Only the number of stations eligible for mixing will be displayed. A “0” indicates that none of the 9 stations are eligible for update.	

NOTE

Mixing will not take place if TACAN station data is loaded in error or if the ratio of the distance from the station to the aircraft altitude is less than 2 to 1.

(7) INS TACAN range display - Monitor. The display shall indicate the range to the station used for update. If no station is being used for update. the display will read all dashes.	
(8) Data selector - Set to DIS/TIME.	
(9) Keys 7 and 9 - Depress simultaneously. Compare distance to TACAN sta-	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

tion shown in the left-hand display with the distance shown on the INS TACAN range display.

(10) Mission control panel - Check that INS UPDATE annunciator light is illuminated.

(11) Data selector - Return INS to normal by setting to any position except WYPT or DIS/TIME.

c. Ground track angle and ground speed - Check as follows:

(1) Data selector - TK/(GS.

(2) Left-hand display Read correct ground track angle to the nearest tenth of a degree. Compare with course deviation Indicator.

(3) Right-hand display - Read correct ground speed to the nearest knot. Compare with airspeed Indicator.

d. Heading and drift angle - Check as follows:

(1) Data selector - HDG/DA.

(2) Left-hand display - Read true aircraft heading to the nearest tenth of a degree. Compare with

PROCEDURE	TROUBLESHOOTING REFERENCE

course deviation indicator.

(3) Right-hand display - Read aircraft drift angle to the nearest degree.

(4) Keys 3 and 9 - Depress simultaneously and hold.

(5) Left-hand display - Read magnetic heading to the nearest tenth of a degree. Compare with course deviation indicator. (Drift angle will continue to be displayed in the right-hand display.)

(6) Keys 3 and 9 - Release. Left-hand display will revert to displaying true heading.

e. Cross track distance and track angle error - Check as follows:

(1) Data selector - XTK/TKE.

(2) Left-hand display - Read cross track distance to the nearest nautical mile.

(3) Right-hand display - Read track angle error to the nearest degree.

f. Latitude and longitude position - Check as follows:

(1) Data selector - L/L POS.

(2) Displays - Read present position latitude in the

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

left-hand display and present position longitude in the right-hand display. Both display indications are to a tenth of a minute.

(3) HOLD key - Depress. Key will illuminate. Latitude and longtitude displays will freeze at the values which were present when the HOLD key was depressed.

NOTE

While the HOLD key is illuminated. TACAN. GPS, and data link updates are inhibited.

g. Latitude and longitude inertial position - Check as follows:

(1) Data selector - L/L WYPT (HOLD should still be illuminated).

(3) Left-hand and right-hand displays - Read latitude and longitude of present position to a tenth of a degree. Compare with values noted in latitude and longitude position check above.

(3) INSERT/ADVANCE key - Depress.

PROCEDURE	TROUBLESHOOTING REFERENCE
(4) Left-hand and right-hand displays - Read arc-seconds related to present inertial position to the nearest a tenth of a second.	
(5) HOLD key - Depress to return to INS normal operation.	
h. Magnetic variation - Check as follows:	
(1) Keys 3 and 9 - Depress simultaneously.	
(3) Right-hand display - Read magnetic variation to a tenth of an arc-minute. Compare with local values.	
NOTE While operating in the NAV mode, magnetic variation is computed when aircraft roll is less than 9° and the magnetic heading input is valid (absence of error code 17).	
(3) DATA/SELCTOR - Momentarily set to any position except L/L WYPT to return to normal INS display mode.	
i. Distance and Time to Next Waypoint - Check as follows:	
(1) Data selector - DIS/TIME.	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

(3) Left-hand display - Read distance to next waypoint to the nearest nautical mile. Compare with TACAN readout.

(3) Right-hand display - Read time to reach next waypoint at present ground speed to the nearest tenth of a minute. Compare with TACAN readout when tuned to a VORTAC station located at the next waypoint.

j. Distance to any TACAN station - Check as follows:

(1) Data selector - DIS/TIME.

(2) Keys 7 and 9 - Depress simultaneously.

(3) FROM-TO display - Read flashing number of TACAN station being used for navigation.

(4) Left-hand display - Read distance to the TACAN station to the nearest nautical mile.

(5) Right-hand display - Read time to next waypoint.

(6) Left-hand display - Monitor (station number is selected every 30 seconds) and compare with the INS TACAN range display.

PROCEDURE	TROUBLESHOOTING REFERENCE
k. Wind speed and direction - Check as follows:	
(1) Data selector - WIND.	
(2) Left-hand display - Read wind direction to the nearest degree.	
(3) Right-hand display - Read wind speed to the nearest knot.	
1. Desired track angle and system status - Check as follows:	
(1) Data selector - DSRTK/ STS.	
(2) Left-hand display - Read desired track angle to the nearest degree. Compare with course deviation indicator.	
(3) Right hand display - Read numbers indicating system status,	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

NOTE

The first digit from the left indicates " 1" for NAV mode. The second and third digits will be blank unless a malfunction code is indicated. The fourth digit is used for stored heading and shall be blank. The fifth digit is decremented at certain time intervals when using TACAN update. This provides an indication of the relative quality of position updating obtained. The sixth digit indicates operating mode and will read “4” to indicate TACAN updating.

(4) If malfunction codes occur, press and release the TEST switch repeatedly. recording all malfunction codes until the second and third digits again indicate an action or code. or go blank. Refer to TM 55-1510-222-10 for code definitions.

(5) WARN lamp - Check dim.

m. UTM Position - Check as follows:

(1) Data selector - UTM POS.

(2) Left-hand display - Read northing in kilometers.

(3) Right-hand display - Read zone. then easting in kilometers.

PROCEDURE	TROUBLESHOOTING REFERENCE
(4) HOLD key - Depress and check illuminated. Coordinates in data display shall freeze at values present when Hold key was pressed.	

NOTE

While HOLD key is illuminated, TACAN, GPS. and data link updates are inhibited.

n. UTM Inertial Position - Check as follows:

(1) Data selector - UTM WYPT (check HOLD key illuminated).

(2) Left-hand display - Read not-thing in kilometers.

(3) Right-hand display - Read zone and easting'in kilometers.

(4) Compare with values from UTM Position procedure.

(5) INSERT/ADVANCE - Depress.

(6) Left-hand display - Read extra precision nor-thing values to nearest meter.

(7) Right-hand display - Read zone and extra precision easting values to the nearest meter.

(8) HOLD key - Depress to return the INS to normal

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

operation. HOLD key will dim.

o. Leg switching - Check as follows:

(1) INS - Set up for manual flyover when approaching waypoint.

(2) ALERT indicator - Monitor. (The ALERT monitor will illuminate approximately two minutes before the waypoint is reached.)

(3) Data selector - L/L POS (when approaching waypoint).

(4) HOLD key - Depress when closest to the waypoint.

(5) Present position readout - Record.

(6) Error distance (if any) - Visually estimate between the location at which the HOLD button was pressed and the location of the waypoint.

Compare the frozen INS display of present position with the coordinates of the waypoint, taking into account the visually observed error distance. This position error shall not exceed 1200 feet.

PROCEDURE	TROUBLESHOOTING REFERENCE
(8) HOLD button - Depress to restore the display to normal.	
p. Automatic leg switching - Check as follows:	
(1) ROLL LIM key - 25° (dim) for the first waypoint.	
(2) ROLL LIM key - 10° (lighted) for second waypoint.	
(3) Check that the aircraft changes course smoothly.	
q. Attitude mode - Check as follows:	
(1) Mode selector - ATT after passing the starting point and observing the present position.	
(2) Check that INS attitude signals continue to be available by monitoring instruments.	
(3) Check that the instruments can operate from other navigation signals not coming from the INS.	
*4. Audio control panel and interphone system - Check each unit as follows:	
a. Interphone functional check:	
(1) Receiver selector switches - OFF.	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

(2) ICS switch - NORM.

(3) Transmitter selector switches on pilot's and co-pilot's audio control pane1 - INTPH. This will allow the pilot to talk to the co-pilot by pressing a microphone switch and speaking into microphone or visa-versa from copilot's position.

(4) Microphone switches - Actuate one at a time and speak into appropriate microphone. Side tone should be heard and speech should be heard in other headset,

(5) ICS switch - HOT MIC. Crew should be able to converse on intercom without depressing microphone switches.

(6) Volume control - Check for function.

b. Receiver and transmitter facilities - Check as follows:

(1) Receiver volume controls - Turn all fully counter-clockwise.

(2) Receiver switches (audio control panel) - Push on one at a time and turn clockwise to increase volume and increase volume

PROCEDURE	TROUBLESHOOTING REFERENCE
on appropriate receiver, listening for either radio reception or background noise.	
c. Cycle propeller deice switch from OFF to AUTO and return to OFF.	
d. Cycle electric standby fuel pumps.	
(1) Pull each receiver switch (on audio control panel) out to the off position and each receiver volume control fully counterclockwise.	
(2) Transmitter selector switches (pilot's and copilot's audio control panels) - INTPH.	
(3) Audio control panel volume control (pilot's) - Turn fully clockwise. Listen for excessive noise.	
(4) Repeat for other audio control panel.	
e. Receiver/transmitter selectors - Check as follows:	
f. Transmit and receive on each radio using all microphone switches one at a time.	
g. Repeat entire procedure for each audio control panel.	
*5. UHF radio set - Check as follows:	K3-7
a. Altitude - 1200 feet above ground level (AGL).	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

b. Transmitter selector switch - #3 or #5.

c. Function selector switch (UHF command set) - BOTH.

d. Frequency selector switches - Select required test frequencies.

e. Mode selector - As required.

f. Volume control - As required.

g. Squelch switch - As required.

h. Fly aircraft to a point 35 nautical miles away from test station.

i. Communicate with test station when 20 miles away and again at 3.5 miles.

j. **At** 35 nautical miles maintain communication with test station each 10° while flying a 360° flat turn (not to exceed 5° bank). Communication should be uniformly loud and clear through these tests.

k. Repeat procedure for frequencies in low, middle, and high ranges.

*6. VHF radio set - Check as follows: K 8 - 9

a. Altitude - 1000 feet AGL.

b. Transmitter selector switch (audio control panel) - #1 or #2.

PROCEDURE	TROUBLESHOOTING REFERENCE
c. Off-volume control - Turn clockwise, set volume as required.	
d. Frequency selector - Set desired frequency.	
e. Fly aircraft to a point 40 nautical miles away from test station.	
f. At 40 nautical miles. maintain communication with test station each 10° while flying a 360° flat turn (not to exceed 5° bank). Communication should be uniformly loud and clear through these tests.	
g. Repeat procedure for frequencies in low, middle. and high ranges.	
*7. HF radio set - Check as follows.	K10
a. Transmitter selector switch (audio control panel) - #4.	
b. Mode selector (HF control panel) - Set desired operating mode.	
c. Microphone switch - Press momentarily and wait for antenna coupler to tune. A 1000 Hz tone will be heard in the headphones until tuning is complete. Tuning time should not exceed 30 seconds.	
d. Establish communications with a ground station at least 150 miles distant on at least three frequencies (one each	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

from the lower, middle. and upper frequency ranges). Establish two-way communications on AM and, when possible, on USB. Obtain signal quality reports from the other station and note received signal quality.

NOTE

The intelligibility of SSB voice operations becomes degraded when the receiver and transmitter differ in frequency by a small amount (approximately 50 Hz). The voice pitch will sound either too high or too low. The cause may be either the receiver or transmitter.

e. Frequency accuracy - Check as follows:

(1) Station WWV - Select the frequency that provides the best signal. The station broadcasts on 2. 5000. 5.0000, 15.0000. 20.0000, and 75.0000 MHz. The higher the frequency selected, the more accurate the frequency check will be.

PROCEDURE	TROUBLESHOOTING REFERENCE

NOTE

Do not key transmitter when set to WWV.

(2) Mode selector - USB.

(3) Listen to the time tick, tone, or voice announcements. The tone preferable.

*8. ADF radio set - Check as follows: K19-26

a. Mode selector switch - ANT. Tuning meter and frequency indicator should be illuminated. Allow sufficient time for warm-up.

b. Range switch - Set to 190 to 400 kHz range.

c. Tune control - Tune in a station and peak the tuning meter.

d. Frequency dial - Note reading under hairline.

c. BFO switch - BFO.

f. Tune control - Adjust for zero beat. The frequency dial should read the same as in step d.

g. BFO switch - OFF.

h. Tune in a low frequency station on each of the other bands (400 to 850 and 850 to 1750 kHz) to insure that band switching is taking place.

PROCEDURE	TROUBLESHOOTING REFERENCE
G. AVIONICS FLIGHT CHECKS (CONT)	
i. Retune to a low frequency station of known location.	
j. Mode selector switch - ADF. The RMI azimuth card should coincide with the aircraft magnetic heading and the bearing pointer should indicate the correct magnetic bearing to station.	
k. Distance range (ADF) - Check as follows:	
(1) Mode selector switch - ADF.	
(2) Tune control - Tune stations to determine operating range of direction tinder. End of effective operating range may be considered to be reached when the RMI bearing needle fails to return to within three degrees of starting bearing when loop is slewed first clockwise and then counterclockwise.	
*9. Marker beacon/glideslope receiver - Check as follows:	K13-18
a. Marker beacon volume control (pedestal extension) - Rotate rotate full clockwise.	
b. NAV A control (pilot's audio control panel) - Push on and turn clockwise to adjust vol-	

PROCEDURE	TROUBLESHOOTING REFERENCE
ume. Clear audio signals should be available.	
c. Marker beacon sensitivity switch (pedestal extension) - As required.	
d. Frequency selectors (VOR control panel) - Select localizer frequency.	
e. Course indicator switches (instrument panel) - VOR.	
f. Glideslope indicator (course deviation indicators) - Read glideslope indications.	
g. Fly an ILS approach monitoring localizer and glideslope indicators.	
h. Fly the approach monitoring localizer and glideslope indicators, and marker beacon indicator lights and audio tone for proper function.	
i. In horizontal flight over the ground station cone of silence marker, at 10,000 feet above ground level, a position marker beacon indication should be received for a distance of not less than one mile.	
j. In horizontal flight over the ground station at any altitude, the duration in miles of marker indication, when approaching a point directly over the ground station, shall not be more than 50 percent greater than the duration in miles of	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

marker beacon indication when leaving the point directly over the ground station, and visa-versa.

*10. VOR receiver - Check as follows: K11-12,27-29

a. NAV A control (audio control panel) - Depress on and rotate clockwise to set volume.

b. Off/volume control (VOR control panel) - Rotate clockwise to turn set on. and set volume as required.

C. Frequency selectors - Set test frequency.

d. Course indicator switches (instrument panel) - VOR.

e. Fly directly toward a VOR station of known direction and near enough to provide a reliable signal.

f. Rotate course card on course deviation indicators until direction to station is beneath course index. The VOR/localizer needle should be nearly centered and the to/from indicator should read to. The red glideslope warning flag should be visible but the VOR/localizer warning flag should be concealed.

g. Rotate course card until direction to station is beneath

PROCEDURE	TROUBLESHOOTING REFERENCE

reciprocal course index. The VOR/localizer crosspointer should be centered and the to/from indicator should read from.

h. Rotate the course card until the direction to the station is directly below the course index again and the to/from indicator reads to.

i. Fly a 90° right turn such that the flight path is at a 90° angle to the direction to the station. The VOR/localizer needle should deflect noticeably to the left after one or two miles of flight (assuming the station is 25 to 50 miles from the aircraft).

j. VOR range test: Achieve adequate usable reception at 45 miles at 1,250 feet above station antenna altitude.

k. VOR ground-track accuracy test: Fly aircraft over a predetermined ground check point. The maximum error shall be ±3%.

*11. TACAN - Check as follows:

a. NAV B control (audio control panel) - Depress on and rotate clockwise to set volume.

b. Power switch (TACAN control panel) - ON.

c. Frequency selectors (TACAN control panel) - Set test frequency.

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

d. Volume control (TACAN control panel) - As required.

e. Course indicator switches (instrument panel) - TACAN.

f. Fly directly toward a TACAN station of known direction and near enough to provide a reliable signal.

g. Rotate course card on course deviation indicators until direction to station is beneath course index. The course deviation indicator needle should be nearly centered and the to/from indicator should read to. The red glideslope warning flag should be visible but the NAV warning flag should be concealed.

h. Rotate course card until direction to station is beneath reciprocal course index. The course deviation indicator needle should be centered and the to/from indicator should read from.

i. Rotate the course card until the direction to the station is directly below the course index again and the to/from indicator reads to.

j. Fly a 90° right turn such that the flight path is at a 90° angle to the direction to the station. The course deviation indica-

PROCEDURE	TROUBLESHOOTING REFERENCE
tor needle should deflect noticeably to the left after one or two miles of flight (assuming the station is 25 to 50 miles from the aircraft).	
k. TACAN range test: Achieve adequate usable reception at 45 miles at 1,250 feet above station antenna altitude.	
l.. TACAN ground-track accuracy test: Fly aircraft over a predetermined ground check point. The maximum error shall be ±3%.	
*m. TACAN distance measuring equipment - Check against known distances (on the ground if possible) using known checkpoints. TACAN should indicate known distances to within ±0.5 miles or ±3% of range. whichever is greater.	
*12. Transponder set - Check as follows:	K40
a. Master control - STBY (allow 2 minute warm up).	
b. Master control - NORM.	
c. Mode switches - Set test mode.	
d. Code selectors - Set test code.	
e. Fly aircraft within line of sight of interrogating stations.	
f. Contact the facility by radio and request that the aircraft	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

be interrogated and that the reply be checked for satisfactory response.

*13. Encoding altimeter - Check as follows:

a. Mode C switch (transponder control panel) - ON.

b. Contact ground radar facility and request them to give you their altitude readout. Ground facility altitude readout must agree with aircraft altitude within ±200 feet.

*14 Radar set - Check while airborne as follows: K30-39

a. Turn on procedure: Function switch - TEST (information will appear after time delay period).

b. Initial adjustments:

(1) BRT control - As required.

(2) MODE switches - As required.

(3) RANGE switches - 80.

(4) 120/60° degree button - 120°.

(5) TILT control - Move up or down to observe targets above or below aircraft. Echo display will change in shape and location only. Weather targets will

PROCEDURE	TROUBLESHOOTING REFERENCE
not change shape or location. Ground targets will not change shape or location. Ground targets are selected as a function of tilt.	
c. Test procedure: Observe screen for proper display. Test display consists of two green. two yellow. and a red band on a 120° scan. The word TEST will be displayed in upper right corner. Operating mode selected by MODE switches (either MAP, WX, or WXA) has been displayed in lower left corner. If WXA has been selected. red band in the test pattern will flash on and off. Range will be displayed in upper right corner beneath TEST and appropriate range mark distances will appear along right edge of the screen. Complete test patterns may be seen only on 80 mile range or higher. Flying level at an altitude of 8,000 to 10,000 feet AGL will allow mapping of ground targets to a range of approximately 100 miles.	
d. Antenna stabilization check:	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

NOTE

The pitch and roll output levels from the vertical gyro are governed by the 115 volt. 400 Hz excitation and. the linearity of the gyro. plus the ability of the gyro to follow the motion of the aircraft. The accuracy contributed by the antenna is its ability to respond to the gyro outputs. As a result of these factors. the stabilization system accuracy can vary up to ±10% of the pitch or roll angle of the aircraft.

(1) Fly to an altitude above 10,000 feet AGL.

(3) MODE switches - WX.

(3) RANGE switches - 120 or 60.

(4) STAB OFF switch - Push ON.

(5) While flying level (0” pitch. 0° roil). adjust TILT control to obtain a video pattern throughout the upper range marks. Note TILT control setting. If the inner ring of video is not parallel to the range mark. the error is caused by mechanical displacement of the antenna about the roll axis of the aircraft. Use Use TILT control to determine exact error. Correct on ground.

PROCEDURE	TROUBLESHOOTING REFERENCE
if necessary, before further in-flight calibration.	
(6) Push off the STAB OFF button to restore stabilization,	
(7) Pattern observed in step (5) should not change. If the pattern shifts either left or right around the second range marks. ground check leveling of the gyro and accuracy of the horizon indicator. Use TILT control to find exact error.	
(8) Roll the aircraft 20° right. For perfect stabilization. the terrain band should be displayed throughout the third range marks.	
(9) If the terrain band shifts to the right around the second range marks. increase tilt angle using TILT control until pattern is displayed throughout the third range marks. Note new position of TILT control. It should not be more than two degrees above that noted in step (5).	
(10) If the terrain band shifts (in step 8) to the left around the second range marks, decrease tilt angle using TILT control until	

PROCEDURE	TROUBLESHOOTING REFERENCE

G. AVIONICS FLIGHT CHECKS (CONT)

pattern is displayed throughout the third range marks. Note new position of TILT control. It should not be more than two degrees below that noted in step (5).

(11) If the differences between steps (10) and (5) or steps (9) and (5) are greater than two degrees. recalibrate roll stabilization circuitry to the gyro using the following procedure:

(a) Reset the TILT control under the flight conditions of step (5) with stab on. Then roll the aircraft 20° right.

(b) If the pattern shifts to the right around the second range mark. slowly adjust the ROLL TRIM potentiometer until the terrain band is displayed throughout the third range marks. Usually a clockwise adjustment is required.

(c) If the pattern shifts to the left around the second range mark. slowly adjust the ROLL TRIM potenti-

PROCEDURE	TROUBLESHOOTING REFERENCE
ometer until the terrain band is displayed throughout the third range marks. Usually a counterclockwise adjustment is required.	
(d) If the pattern shifts toward the center of the second and third range marks, there is no roll stabilization.	
(12) Ground mapping operating procedure: MODE switch - MAP.	
(13) Standbv procedure: function switch - STBY.	
(14) Shutdown procedure: Function switch - OFF.	

SECTION V. CHARTS AND FORMS

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

RC-l2K MTF LIST OF CHARTS

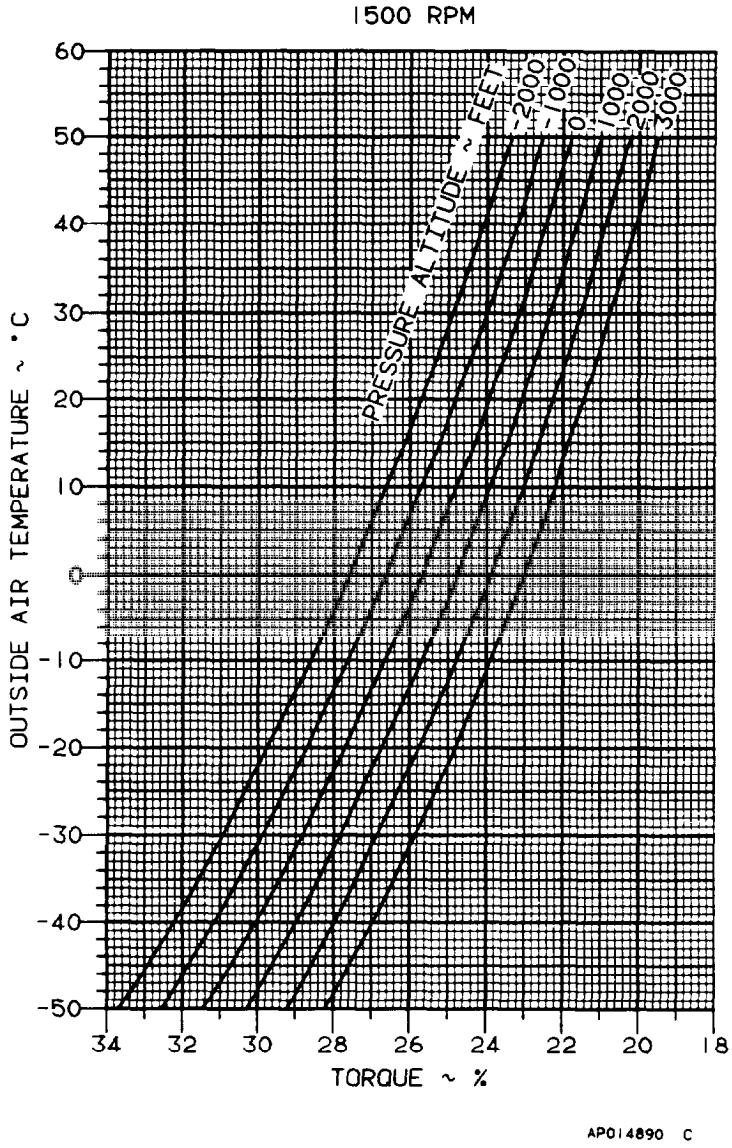

Figure 1. Propeller Low Pitch Stop (Sheet 1 of 3)

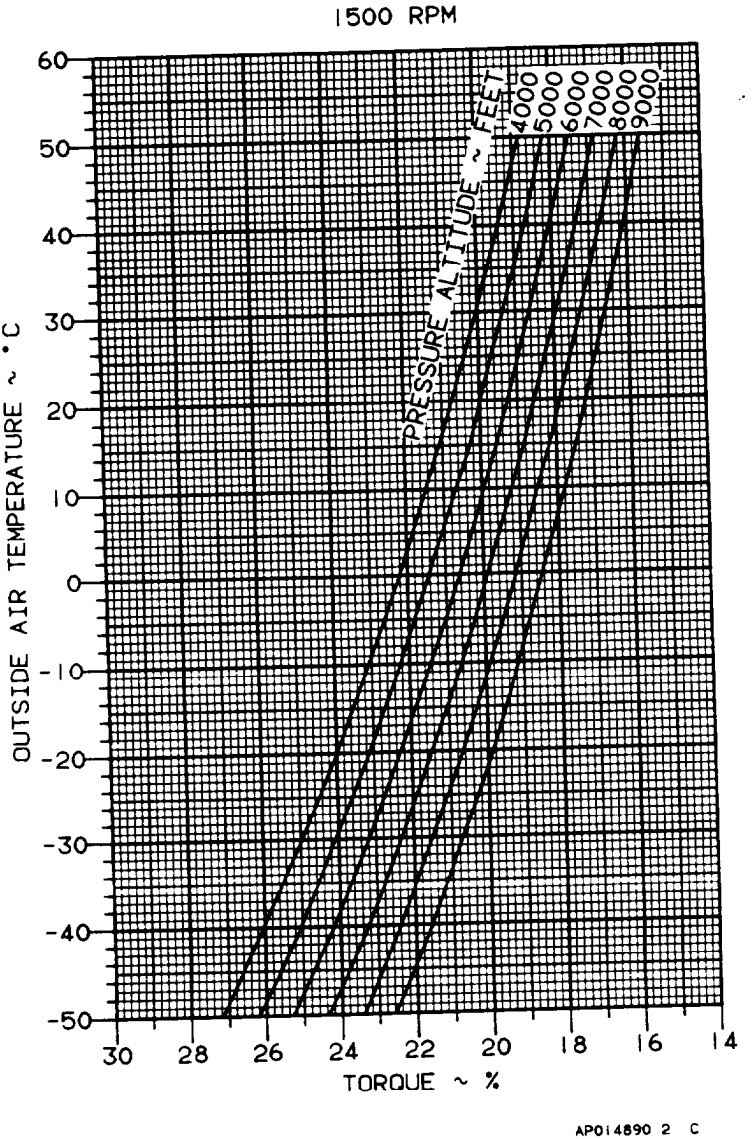

Figure 1. Propeller Low Pitch Stop (Sheet 2 of 3)

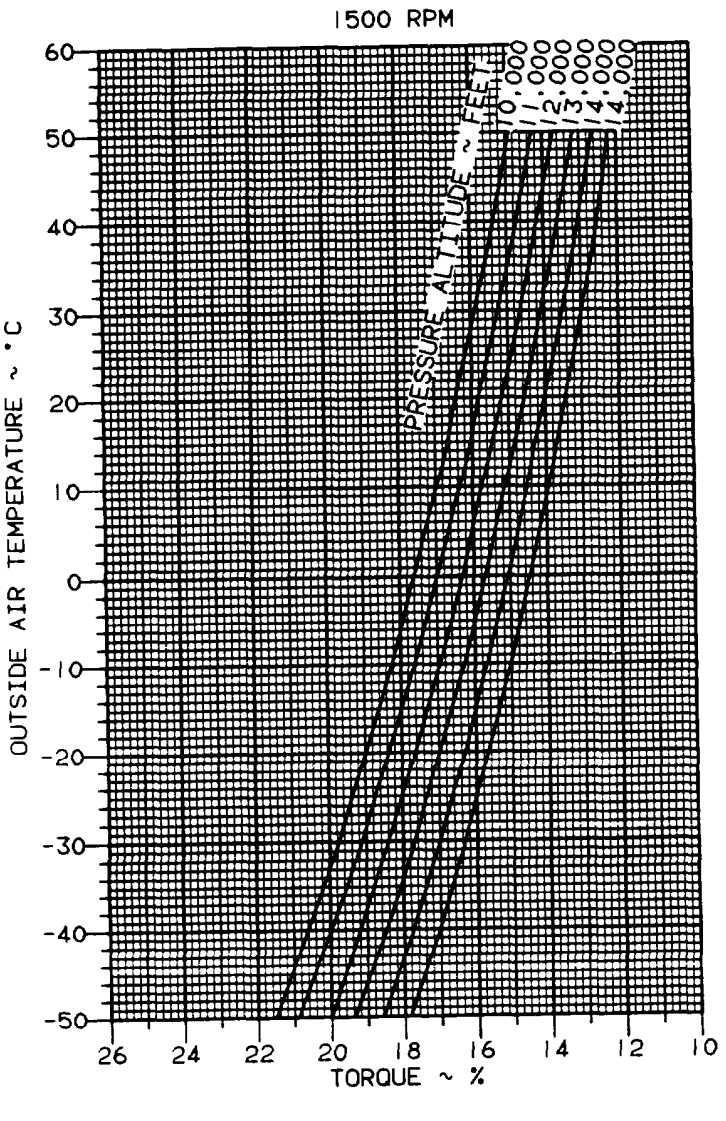

Figure 1. Propeller Low Pitch Stop (Sheet 3 of 3)

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Figure 2. Stall Speeds

PRESSURE ALTITUDE	KIAS
18,000	216
17,000	221
16,000	225
15,000	235
14,000	243
13,000 and below	245

Figure 3. Airspeeds For Vmo Dive.

PT6A-67 MODEL RC-12K				
MAX CRUISE SPEED AND POWER 25,000 FT - 1500 RPM				
IOAT °C	TORQUE %	FUEL pph	KIAS	ITT °C
-40	82	436	183	778
-38	81	431	182	780
-36	80	426	180	782
-34	79	421	179	784
-32	78	416	177	786
-30	77	411	175	788
-28	75	405	174	791
-26	74	399	172	793
-24	73	393	170	795
-22	72	387	168	797
-20	70	377	165	799
-18	68	371	163	801
-16	67	365	160	803
-14	66	358	158	805
-12	64	352	156	807
-10	63	345	153	809
-8	62	339	151	**
-6	60	332	148	**
-4	58	323	144	**
-2	57	316	141	**
0	55	310	138	**
2	53	303	134	**
4	52	296	130	**
6	49	286	121	**
8	----	-----	---	---
10	----	----	---	---
12	---	-------	---	---
14	---	-----	---	---
16	-------	----	---	--
18	---	---	--	---
** NO TESTING ALLOWED ABOVE 810 C ITT				
BT01648 RC-12K				

Figure 4.Maximum Cruise Speed/Engine Acceptance

RC-12K MAINTENANCE TEST FLIGHT CHECK SHEET

PURPOSE OF MTF **FAT** **DATE**

PILOT **UNIT**

SYMBOLS: √ = SATISFACTORY, X = DEFICIENCY

PRIOR TO MTF	DURING TAXIING
1. Forms and records	1. Brakes
2. Weight and balance	2. Flight instrument
3. Flight readiness inspection	3. Nosewheel steering
4. Lights	4. Magenetic compass
5. Standby pumps and firewall valves.	ENGINE RUNUP
6. Fuel quantity indicators.	1. Parking brake
7. Pitot tubes (2), stall warnings vane,	2. Low idle speed
heated fuel vents (2), TAS	3. Propeller feathering
temperature probe.	4. Engine acceleration to high idle
8. Flaps	5. High idle speed
9. Seat belts	6. Brake deice
10. Emergency equipment	7. N_1 speed switch
11. Parachutes	8. Pneumatic pressure
12. Placards and markings	9. Pressurization
13. Trim tabs	10. Generators and regulators
14. Flight controls	11. Inverters
INTERIOR CHECK	12. Rudder boost
1. Cabin/cargo doors	13. Autofeather
2. Emergency exit	14. Overspeed governors
3. Mission cooling ducts	15. Autoignition
BEFORE STARTING ENGINES	16. Primary governors
1. Parking brake	17. Low pitch stop
2. Oxygen system	18. Ice vanes
3. Magnetic compass	DURING TAKEOFF
4. Free air temperature gauge	1. Propeller tachometers
5. Pilot's flight instruments	L____RPM, R____RPM
6. Engine instruments	2. Torque L____%, R____%
7. Copilot's flight instruments	3. TGT L____°c, R___°c
8. DC power	4. N_1 L____%, R____%
9. Annunciator panels	5. Oil pressure L___PSI R___PSI
10. Stall and gear warnings	6. Oil temperature
11. Hydraulic fluid level sensor	L____°C, R____°C
12. Fire protection	AFTER TAKEOFF
BEFORE TAXING	1. tail boom antenna
1. AC/DC power	2. Wings and nacelles
2. Automatic flight control system	3. Brake deice
3. Electric elevator trim	DURING CLIMB

5. Maintenance Test Flight Checksheet (Sheet 1 of 3)

1. Engine an flight instruments
2. Engine control levers
3. Vertical speed indicators
4. Surface deice
5. Antenna deicve
6. Propeller deice
7. Windshield anti-ice
8. Radome anti-ice
9. Waveguide pressurization
10. Cabin and cockpit ventilation
11. Air conditioning and heating
12. Air conditioning cold operation
13. Carbon monoxide

CRUISE

1. ENGINE INSTRUMENT INDICATIONS
2. Wings AND NACELLES
3. Cabin noise level
4. Pilot's alternative static air source
5. Propeller synchrophaser
6. Ice vanes
7. Turn and bank indicators

LOW SPEED SYSTEMS

1. stall speed, stall warnings, and stall characteristics (clean, power off), ___KIAS at warnings, ____KIAS at stall, roll ___°L or R.
2. Stall speed, stall warnings, and stall characteristics (clean, power on), ___KIAS at warning, ___KIAS at stall, roll ___°L or R.
3. Stall speed, stall warning, and stall characteristics(gera and flaps down power off), ___KIAS AT warnings, ___KIAS at stall, roll ____°L or R.
4. Sttall speed, stall warnings, and stall characteristics (gear and flaps down, power on), _____KIAS at warnings, ___KIAS at stall, roll ____°L or R.
5. Flap operation
   a. Flap retraction time ___ seconds
   b. Flap extension time ____ seconds
7. Autoignition
8. Propeller feathering
9. Propeller autofeathering and unfeathering, time from fuel cutoff to rotation stop L____seconds, R____seconds,
10. Landing gear warnings horn, N_1 on first hearing norn ____%
11. Landing gear extension time
    a. Landing gear extension time ____seconds
    b. Landing gear retraction time ___seconds
12. Emergency landing gear extension

DESCENT AND LOW LEVEL CRUISE

1. maximum rate (Vmo) descent:
   a. Flight controls
   b. Windows and doors
2. Excess nose down trim

LANDING

1. Brake Operation
2. Propeller reversing, L___%N_1 R___%N_1
3..Oil temperature, L___°C R____°C
4. Oil pressure, L___PSI, R___PSI

ENGINE SHUTDOWN

1. Battery condition

BEFORE LEAVING AIRCRAFT

1. Battery condition
2. Aircraft forms

SPECIAL PROCEDURES

1. Pressurization

Figure 7. Maintenance Test Flight Checksheet (Sheet 2 of 3)

2. Trim and rigging	6. Engine acceptance at maximum cruise power
3. Maximum power lever position	a. Engine serial number
4. Speed check at maximum cruise power	L , R
a. Engine serial number	b. Engine hours since new
L_____, R_____	L- , R
b. Engine hours since new	c. Engine hours since overhaul
c. Engine hours since overhaul	d. Airspeed - K I A S
d. Airspeed -KIAS	e. Pressure altitude - feet
e. Pressure altitude - feet	f. Free air temperature -°C
f. Free air temperature -°C	g. Propeller RPM
g. Propeller RPM -	h. Torque L___%, R___%
h. Torque L___%, R___%	i. N_1 L R ,
i. N_1 L__%, R____%	j. TGT L____, R -
j. TGT L___ °C, R_____°C	7. Autopilot flight check
5. Engine acceptance at maximum continuous power	8. Slaved compass
a. Engine serial number	9. Inertial navigation system
L _ _ _ , R _ _ _ _	10. Audio control panel and interphone
b. Engine hours since new	11. UHF
L___,R____	12. VHF
c. Engine hour since new	13. HF
L___, R___	14. ADF
d. Airspeed____KIAS	15. Marker beacon/glideslope
e. Pressure altitude ____feet	16. VOR
f. Free air temperature ____°C	17. TACAN
g. Propeller RPM _____	18. TACAN distance measuring equipment
h. Torque L____%, R____%	19. Transponder
i. N_1 L____%, R____%	20. Encoding altimeter
j. TGT L___°C, R___°C	21. Radar
REMARKS	

Figure 7. Maintenance Test Flight Checksheet (Sheet 3 of 3)

☆ U.S. G.P.O. 1991 554-122/21145

By Order of the Secretary of the Army:

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Chief of Staff

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