MAINTENANCE TEST FLIGHT MANUAL

ARMY MODEL RC-12D

"Approved for public release, distribution is 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 (PREFLIGHT). The flight readiness inspection is prescribed in TM 55-1510-219-10 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.

URGENT

TM 55-1510-219-MTF
C1

CHANGE
NO. 1

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

MAINTENANCE TEST FLIGHT MANUAL

ARMY MODEL
RC-12D
AIRCRAFT

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

TM 55-1510-219-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
2-47 through 2-50	2-47 through 2-50
4-3 and 4-4	4-3 and 4-4
5-3 and 5-4	5-3 and 5-4

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:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
06330

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 310812, requirements for TM 55-1520-219-MTF.

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 DESTROY SUPERSEDED PAGES.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:

Page No.	*Change No.
Title	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-12D 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-12D aircraft and in no way supersedes any information contained in TM 55-1510-219-10 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 55-1510-219-10.

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 ensure that deficiencies or shortcomings that may have developed as a result of the maintenance test flight are detected.

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

f. Asterisked Checks. An asterisk (*) prior to a check requires that the Test Flight Check Sheet be an-

notated with a specific reading. Also a check mark (✓) 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-12D 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 12,720 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 55-1510-219-10 - Performed.	
4. Special preflight checks:	
a. Keylock switch - On.	
b. Battery switch - On.	C6-11

PROCEDURE	TROUBLESHOOTING REFERENCE

PRIOR TO MAINTENANCE TEST FLIGHT (CONT)

*c. Interior, exterior, and annunciator lights - Check. C41

*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. C43

(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.	C42
(12) Crossfeed valve switch -OFF.	
*e. Fuel quantity indicators - Check as follows:	B6-9
(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 (2) - 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. C35

(7) Right pitot tube - Check by feel for heat, condition, and free of obstructions. C35

(8) TAS temperature probe - Check by feel for heat, and condition.

(9) Right wing heated fuel vent - Check by feel for heat, and condition.

(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 fire extinguishers and first-aid kits have current inspection dates.

(O)*k. Parachutes - Check secure and for current inspection and repack 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. 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.)

(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.

i. Battery switch - OFF.

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 panel - Check. C41

PROCEDURE	TROUBLESHOOTING REFERENCE

a. Light dimming controls - As required.

b. Cabin temperature mode selector switch - OFF.

c. Ice and rain switches - Off and RETRACT.

d. Exterior light switches - As required.

e. Master panel lights switch - As required.

f. Inverter switches - OFF.

g. Avionics master power switch -OFF.

h. Environmental switches - As required.

i. Autofeather switch - OFF.

j. #1 Engine start switches - OFF.

k. Master switch - OFF.

l. #2 engine start switches - OFF.

7. Fuel panel switches - Check.

a. Standby fuel pump switches -OFF.

b. Auxiliary transfer override switches - AUTO.

c. Crossfeed switch - OFF.

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

9. Clock and map lights - OFF.

10. Clocks - Wind and set.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE STARTING ENGINES (CONT)

11. Pedestal controls - Set as follows:

CAUTION

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

a. Power levers - IDLE. E3

b. Propeller levers - HIGH RPM.

c. Condition levers - FUEL CUT-OFF.

d. Flap lever - UP.

e. Friction locks - Check and set.

12. Pedestal extension switches - Set as follows:

a. Flare/chaff dispenser control -SAFE.

b. Avionics - As required.

c. Rudder boost switch - ON.

13. Gear alternate extension and ratchet handles - Stowed.

*14. Free air temperature gauge - Check condition. Note current reading.

15. Pilots' instrument panel - Check and set.

a. Course indicator switch - As required.

b. RMI switch - As required.

c. Microphone switch - As required

d. Gyro switch - SLAVE.

*c. Flight instruments - Check instrument for protective glass and warning flags (10).

f. APR-39 and APR-44 - OFF.

g. Radar - OFF.

h. Propeller synchronization switch - OFF.

*i. Engine instruments - Check for protective glass, range markings, placards, and static readings.

16. Copilots' instrument panel - Check and set.

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 instrument for protective glass and warning flags (5).

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

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE STARTING ENGINES (CONT)

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. Ice vane handles (#1 and #2) -In.

f. Audio control panel - As required.

18. 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.

19. DC GPU - As required. C12

20. DC external power advisory annunciator light - Check for appropriate indication.

21. Battery switch - ON.

*22. DC power - Check, 24 VDC minimum for battery start, and 28 VDC maximum for GPU start.

PROCEDURE	TROUBLESHOOTING REFERENCE
23. AC external power - Connect as required. Check that the EXT ACPWR ON annunciator light on the mission control panel is illuminated if AC external power is being used.	
*24. Annunciator panels - Test as follows:	D1-4
a. Check illumination of the MASTER CAUTION, MASTER WARNING, #1 FUEL PRESS, #2 FUEL PRESS, L BL AIR FAIL, R BL AIR FAIL, INST AC warning lights, #1 DC GEN, #2 DC GEN, #1 INVERTER, #2 INVERTER, #1 NO FUEL XFR, #2 NO FUEL XFR, and CABIN DOOR (if open), caution/advisory lights.	
b. Annunciator test switch - Press and hold. Check that all lights in both annunciator panels, FIRE PULL handle lights, marker beacon lights, MASTER CAUTION, and MASTER WARNING lights are illuminated. Release switch and check that all lights except those in step (a) are extinguished.	
c. Master caution and master warning lights - Press and release. Both lights should extinguish.	
*25. Stall and gear warning system - Check as follows:	C18,36, 37

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE STARTING ENGINES (CONT)

a. Stall and landing gear warning test switch - Lift to STALL WARN TEST position. Check for warning horn tone and visually check for stall warning vane movement.

b. Stall and landing gear warning horn test switch - Set to LDG GEAR WARN TEST position. Check for warning horn tone and that the red LDG GEAR CONTR handle warning lights (2) illuminate.

*26. Fire protection system - Check as follows: C45-49

a. Fire detector test switch - Rotate switch counterclockwise to check three DETR positions. FIRE PULL handles should illuminate in each position. MASTER WARNING must be reset in each position.

b. Fire detector test switch - Rotate switch counterclockwise to check two EXTGH positions. SQUIB OK light, associated EXTGH DISCH caution light and MASTER CAUTION LIGHT should illuminate in each position.

FIRST ENGINE START (BATTERY START)

1. Exterior light switches - As required.

PROCEDURE	TROUBLESHOOTING REFERENCE

2. Strobe beacon lights switch - Off.

NOTE

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

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

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

PROCEDURE	TROUBLESHOOTING REFERENCE

FIRST ENGINE START (BATTERY START) (CONT)

CAUTION

MoN1tor 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 52% minimum).

7. Oil pressure - Check (60 PSI minimum). E4-6

8. Condition lever - HIGH IDLE. Monitor TGT as the condition lever is advanced. E1

9. Ignition and engine start switch -OFF, after TGT stabilized.

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

PROCEDURE	TROUBLESHOOTING REFERENCE
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 52% minimum).	
5. Oil pressure - Check (60 PSI minimum).	E4-6
6. Ignition and engine start switch -OFF after TGT stabilized.	
7. 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).	
8. Inverter switches - ON, check INVERTER lights extinguished.	
9. Second engine generator switch -RESET, then ON.	
10. Strobe beacon lights switch - DAY or NIGHT as required.	
11. Condition levers - As required.	

ABORT START

1. Condition lever - FUEL CUTOFF.
2. Ignition and engine start switch -STARTER ONLY.
3. TGT - MoN1tor for drop in temperature.
4. Ignition and engine start switch -OFF.

PROCEDURE **TROUBLESHOOTING REFERENCE**

ENGINE CLEARING

1. Condition lever - FUEL CUTOFF.

2. Ignition and engine start switch -OFF (1 minute minimum).

CAUTION

Do not exceed starter limitation of 30 seconds on and 5 minutes off for two starting attempts and engine clearing procedure. Allow 30 minutes off before additional starter operation.

3. Ignition and engine start switch -STARTER ONLY (15 seconds minimum, 30 seconds maximum).

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 has been placed into the NAV mode or OFF as required.

2. Exterior light switches - As required.

3. Strobe beacon lights switch - Off.

4. Propeller - Clear.

5. Ignition and engine start switch - ON. Propeller should begin to rotate and

associated IGN ON light should illuminate. Associated FUEL PRESS light should extinguish.

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

7. TGT and N1 - Monitor (TGT 1000°C maximum, N_1 52% minimum).

8. Oil pressure - Check (60 PSI minimum). E4-6

9. Condition lever - HIGH IDLE. Monitor TGT as the condition lever is advanced. E1

10. Ignition and engine start switch -OFF after TGT stabilized.

11. GPU disconnect - As required.

CAUTION

Do not turn on generators with GPU connected.

12. Generator switch (GPU disconnected) - RESET, then ON.

SECOND ENGINE START (GPU CONNECTED)

1. Propeller - Clear.

2. Ignition and engine start switch -ON. Propeller should start to rotate and associated IGN ON light should illuminate. Associated

PROCEDURE	TROUBLESHOOTING REFERENCE

SECOND ENGINE START (GPU CONNECTED) (CONT)

FUEL PRESS light should extinguish.

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 52% minimum).

5. Oil pressure - Check (60 PSI minimum). E4-6

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

7. Propeller levers - FEATHER.

8. AC and DC GPU's - Disconnect. Check aircraft EXTERNAL POWER annunciator light and mission panel EXT AC PWR ON and EXT DC PWR ON annunciator lights extinguished.

9. Propeller levers - HIGH RPM. E1

10. Inverter switches - ON, check INVERTER lights OFF. C38,39

11. Generator switches - RESET, then ON.

12. Strobe beacon lights switch - DAY or NIGHT as required.

13. Condition levers - As required.

BEFORE TAXIING

1. Cabin temperature mode selector switch - Set.

PROCEDURE	TROUBLESHOOTING REFERENCE

NOTE

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

CAUTION

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

CAUTION

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

CAUTION

Do not operate the weather radar or data link systems in an area where the nearest effective surface is 50 feet or less from the antenna reflector may damage receiver crystals.

2. Avionics - As required.

3. Mission panel - Set and check as required.

*4. Electric elevator trim and autopilot/flight director operation -Check as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAXIING (CONT)

a. Pilot's and copilot's PITCH TRIM switches - Press to NOSE UP and NOSE DN positions, singularly and in pairs. Check that trim wheel moves in proper direction and operates only when trim switches are pressed in pairs. Any deviation requires that electric elevator trim be turned off and flight conducted using manual trim.

b. DISC TRIM switch - Press to second detent and verify that electric trim disconnects and ELEV TRIM annunciator light (in pedestal) extinguishes.

c. Flight director (FDI) and Radio Magnetic Indicator (RMI) warning flags - Check masked.

NOTE

Since the pressure of airflow that normally opposes movement of control surfaces is absent during preflight check, it is possible to get a hard over control surface deflection if an autopilot command is allowed to remain active for any appreciable length of time. Move turn knob and pitch thumbwheel only enough to check operation, then return them to the center position.

d. Autopilot mode selector panel Select HDG mode.

e. Horizontal Situation Indicator (HSI) - Set heading marker under lubber line.

f. Autopilot - Engage. Check that controls are stiff and that AP ENG, HDG, and AIL HI TORQUE annunciator lights illuminate.

g. AIL HI TORQUE test switch -TEST. Check that AIL HI TORQUE light extinguishes.

h. HSI heading marker - Move 10° left and right and verify that flight director and control wheels respond in the appropriate direction.

i. Autopilot/yaw damp disengage switch (control wheels) - Press to first detent and verify that autopilot disengages (AP DISC annunciator illuminates) and that flight controls are free.

j. Autopilot - Engage.

k. Autopilot pitch-turn control (pedestal extension) - Command 5° trim UP and verify that manual trim wheel moves nose up and AP trim light indicates UP trim.

l. Pitch trim switch (control wheels) - Command nose down and verify that autopilot disengages and AP TRIM FAIL and MASTER WARNING annunciator lights illuminate.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAXIING (CONT)

NOTE

The AP TRIM FAIL annunciator will extinguish by pressing the AP/YD disconnect button on the control wheel to the second detent.

m. Repeat steps (i) thru (l) above using opposite commands.

n. Autopilot - Engage.

o. HSI heading marker - Move to command a bank on flight director indicator.

p. GO-AROUND switch - Press and verify that GA annunciator light illuminates, autopilot disengages, and that flight director indicator commands a wings level 7° nose-up attitude.

q. TEST switch (pilot's flight director indicator) - Press and verify that attitude display indicates an additional 10° pitch up and 20° right roll, and GYRO flag is visible.

*5. Autopilot trim fail system - Check as follows:

a. Autopilot - Engage. Command DN on AP pitch wheel and hold TRIM TEST switch when elevator trim wheel starts to rotate.

b. Verify that autopilot disengages and AP TRIM FAIL and MAS-

PROCEDURE	TROUBLESHOOTING REFERENCE

TER WARNING lights illuminate within 10 seconds. Repeat steps (a) and (b) using opposite commands.

6. Avionics - Check and set as required.

7. Flaps - Check.

8. Altimeters - Set and check (must be within ±50 feet of runway altitude when set to tower furN1shed altimeter setting).

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

PROCEDURE	TROUBLESHOOTING REFERENCE

DURING TAXIING (CONT)

brakes. Note any indication of nosewheel vibration or shimmy during takeoff or landing.

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

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 52 to 55% N_1. E1

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

a. Condition lever - LO 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.

PROCEDURE	TROUBLESHOOTING REFERENCE

e. Repeat procedure for right propeller.

*5. Engine acceleration - Check as follows: E2,12

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

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. E11

*6. Engine high idle speed - Check 70 to 73% N_1. E1

*7. Brake deice system - Check as follows:

a. Power - Set 70% N_1.

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

c. Right bleed air valve switch -OPEN.

d. Brake deice switch - Turn on and observe that the BRAKE DEICE ON light is illuminated.

e. Pneumatic pressure gage -Check for a momentary pressure decrease.

f. Repeat procedure for opposite bleed air valve.

*8. N_1 speed switch (air conditioning) - Check as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP (CONT)

a. Right engine condition lever -LO IDLE.

b. Cabin temperature mode selector switch - MANUAL COOL.

c. Right engine condition lever -Advance to increase N_1 to 57 to 63%. AIR COND N_1 LOW light should extinguish.

d. Air conditioning compressor should turn on 8 to 12 seconds after light extinguishes, as indicated by sustained increase in TGT on right engine.

*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. Condition levers - HIGH IDLE.

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

c. Pneumatic pressure gage - Check. Pressure should drop to zero.

d. 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.

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

f. Cabin pressurization rate control - Set to maximum.

g. Cabin pressurization switch -TEST (hold).

h. Left bleed air control valve switch - OPEN.

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP (CONT)

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

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

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

l. Cabin altitude indicator - Set to planned cruise altitude plus 500 feet (if this setting does not result in a CABIN ALT indication of at least 500 feet over takeoff field pressure altitude, adjust as required).

m. Rate control - Set.

n. Cabin pressure dump switch -Set to PRESS position.

*11. Generators and regulators - Check by observing volt-loadmeters for the following conditions: C1-C6

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.

PROCEDURE	TROUBLESHOOTING REFERENCE

f. Load paralleling must be within 1 increment on the loadmeter scale.

*12. Inverter volt-frequency meters - Check voltage between 110 and 120 volts and frequency between 390 and 410 Hz. C38,39

*13. Autofeather system - Check as follows: F4-18

a. Condition levers - LOW IDLE.

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

c. Power levers - Advance to approximately 22% torque, then move autofeather switch to test mode. Both ARM lights should illuminate.

d. Left power lever - Retard.

(1) At 16 to 21% torque, check right AUTOFEATHER light extinguished.

(2) At 9 to 14% torque, check left AUTOFEATHER light extinguished (left propeller starts to feather).

e. Left power lever - Set approximately 22% torque.

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

g. Advance each power lever to above 85 to 90% N_1 individual ally, with the autofeather switch in the arm mode. ARM

PROCEDURE	TROUBLESHOOTING REFERENCE

ENGINE RUNUP (CONT)

lights should not illuminate. With both power levers above 85 to 90% N_1, both ARM lights should illuminate.

h. Retard left power lever below 85% N_1. Both lights should extinguish.

i. Repeat step h by retarding right power lever, with left power lever above 85 to 90% N_1.

* 14. Propeller overspeed governors - Check as follows: F2,3

a. Propeller levers - HIGH RPM.

b. Left propeller governor test switch - Hold in TEST position.

c. Left engine power lever - Advance until overspeed governor governs propeller (1830 to 1910 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.

*15. Rudder boost - Check as follows:

a. Rudder boost switch - ON.

b. Left engine power lever -IDLE.

PROCEDURE	TROUBLESHOOTING REFERENCE

c. Condition levers - LO IDLE.

d. Right engine power lever - Advance until rudder boost moves right rudder pedal in. The rudder boost system should activate within the values of N_1 and free air temperature specified in figure 1.

e. Rudder boost switch - OFF. System should deactivate, releasing rudder pressure.

f. Repeat above procedure for opposite engine.

*16. Auto-ignition system - Check as follows:

a. Power levers - Set above 22% torque.

b. Auto-ignition switches (2) -ARM.

c. Power levers - Retard.

d. Ignition annunciator lights - Illuminated (16 to 21% torque).

*17. Primary governors - Check as follows: F2,3

a. Power levers - Set 1800 RPM.

b. Propeller levers - Move aft to detent.

c. Propeller RPM - Check 1600 to 1640.

d. Propeller levers - HIGH RPM.

*18. Propeller low pitch stop - Check one engine at a time as follows:

ENGINE RUNUP (CONT)

a. Aircraft - Position crosswind.

b. Read the corrected propeller torque in % at 1800 RPM from figure 2.

c. Propeller lever - HIGH RPM (full forward).

d. Power levers - Set 1800 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. Power levers - Set 1800 RPM.

b. Ice vane switches to EXTEND. Verify torque drop, and illumination of ICE VANE EXT light.

c. Ice vane switches - RETRACT. Verify return to original torque, and ICE VANE light extinguished.

20. Power levers - IDLE.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE TAKEOFF

1. Propeller synchronization switch -OFF.
2. Autofeather switch - ARM.
3. Bleed air valve switches - OPEN.
4. Ice and rain switches - As required.
5. Beacons - As required (day or night).
6. Fuel control panel - Check fuel quantity and switch positions.
7. Flight and engine instruments -Check for normal indications.
8. Cabin controller - Set.
9. Annunciator panels - Check (note indications).
10. Propeller levers - HIGH RPM.
11. Friction locks - Set.
12. Flaps - As required.
13. Trim - Set.
14. Avionics - Set.
15. Flight controls - Check.
16. Departure briefing - Complete.

LINE UP

1. Transponder - As required.
2. Engine auto-ignition switch - ARM.
3. Condition levers - LOW IDLE.
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 2000 RPM. If propellers are synchroN1zed and indicator tolerances result in a difference in indicated RPM between left and right propellers, then the lower of the two values shall be 2000 RPM. The maximum difference between the readings of the indicators shall be 20 RPM.	E21
2. Engine instruments - Check the following instrument indications:	E12-17
*a. Torque	E21
*b. TGT	B10,E19, 20,21,23
*c. N_1	E23

PROCEDURE	TROUBLESHOOTING REFERENCE
*d. Oil pressure	E5,6
*e. Oil temperature	E7

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. Flap switch - UP.
3. Landing lights - Off.
4. Climb power - Set.
5. Propeller synchronization switch -As required.
6. Yaw damp switch - As required.
7. Autofeather switch - As required.
8. Cabin pressurization - Check.

*9. Wings and nacelles - Check for fuel and oil leaks.

*10. Brake deice system - Check as follows:

PROCEDURE	TROUBLESHOOTING REFERENCE

AFTER TAKEOFF (CONT)

a. BRAKE DEICE ON annunciator light - Check extinguished within approximately 8 to 12 minutes of 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,C40

*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.

c. Read altimeter at end of one minute. Second reading must

PROCEDURE	TROUBLESHOOTING REFERENCE
be 1000 ±200 feet more than first reading.	
*4. Surface deicing system - Check as follows:	C44
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 deicer switch - Hold to MANUAL position. Boots should stay inflated until switch is released.	
c. Surface deicer switch - Release. Check boots visually to see that they are sucked down flat after use.	
*5. Antenna deice system - Check as follows:	C44
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.	
*6. Data link radome anti-ice - Check as follows.	

PROCEDURE	TROUBLESHOOTING REFERENCE

DURING CLIMB (CONT)

a. Radome anti-ice switch - ON.

b. Load meter - Check for increased indication.

c. Check that RADOME HEAT annunciator light illuminates within 5 minutes, and that RADOME HOT light does not illuminate.

*7. Waveguide pressurization - Check that WAVE GUIDE annunciator light is illuminated whenever N_1 is above 80%.

*8. Propeller deice system - Check as follows: C56

a. Propeller deice switch - Set to AUTO position.

b. Propeller deicer ammeter -Monitor for 14 to 18 amperes and for a slight needle deflection every 30 seconds.

c. Manual deice - Hold switch to OUTER position. Note a .05 increase in each loadmeter indication. Move and hold switch to INNER position and note a .05 increase in each loadmeter indication.

*9. 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 in-

creased loadmeter indication, then OFF.

c. Copilot's windshield anti-ice switch - Check by repeating above steps.

*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 system - Check as follows: C50-55

a. Cabin temperature 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 temperature mode selector switch - AUTO.

e. Cabin temperature control rheostat - Rotate to full 1NCR

PROCEDURE	TROUBLESHOOTING REFERENCE

DURING CLIMB (CONT)

position. Observe an increase in cabin temperature.

NOTE

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

*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 63% 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 carbon monoxide allowable is 0.005%.

CRUISE

1. Power - Set.

PROCEDURE	TROUBLESHOOTING REFERENCE
*2. Engine instrument indications - Check all engine instruments for normal indications.	E18,22
3. Recognition lights - As required.	
*4. Wings and nacelles - Check for fuel and oil leaks.	E24
*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. En- sure 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. Air-speed indicator, altimeter, and vertical speed indicator indications should return to their original readings.	
*9. Propeller synchrophaser - Check capturing ability of the synchrophaser by establishing a small out	

CRUISE (CONT)

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:

CAUTION

After the ice vanes have been manually extended, they may be mechanically retracted only. Do not attempt electrical retraction as damage to the electric actuator will result. The linkage in the nacelle area must be reset on the ground prior to operation of the electric system.

a. #1 and #2 ice vane switches (2) - EXTEND.

b. #1 and #2 ice vane extended annunciator lights (2, green) -Check illuminated.

c. Torquemeters - Monitor for a 7 to 16% drop in torque with ice vanes extended.

d. #1 and #2 ice vane switches -RETRACT.

e. Torquemeters - Monitor for an increase in torque.

f. #1 and #2 ice vane annunciator lights (green) - Check extinguished.

g. Ice vane control circuit breakers (2) - Pull.

h. Airspeed - 160 KIAS.

i. #1 and #2 ice vane switches -EXTEND.

j. #1 and #2 vane fail annunciator lights (yellow) - Check illuminated within 10 to 18 seconds after ice vane switch actuation.

k. Manual engine ice vane controls - Pull to extend. Pulling force required to extend the ice vanes should not be excessive.

l. #1 and #2 vane fail annunciator lights (yellow) - Check extinguished.

m. #I and #2 ice vane extended annunciator lights (green) - Check illuminated.

n. #1 and #2 ice vane switches -RETRACT.

o. #1 and #2 vane fail annunciator lights (yellow) - Check illuminated within 10 to 18 seconds after ice vane switch actuation.

PROCEDURE	TROUBLESHOOTING REFERENCE

CRUISE (CONT)

p. Manual engine ice vane controls - Push in to retract.

q. #1 and #2 ice vane extended annunciator lights (green) and #1 and #2 vane fail annunciator lights (yellow) - Check extinguished.

r. After landing - Have extension mechanism reset to the electric mode, and reset ice vane circuit breakers.

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

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

a. Power - Set to obtain 160 KIAS.

b. Bank - Establish a coordinated standard rate turn.

c. Timing - Maintain turn for 1 minute. Heading change shall be 180±10°.

d. Repeat procedure for opposite turn direction.

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

17. Autopilot - Check as required (Section IV).

PROCEDURE **TROUBLESHOOTING REFERENCE**

LOW SPEED SYSTEMS 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 2-48.3) 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 C-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.

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

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 2-48.3.

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: **C36,37**

WARNING

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

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 2-48.3 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 2-48.3.

* 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**.

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).

PROCEDURE **TROUBLESHOOTING REFERENCE**

LOW SPEED SYSTEMS CHECK (CONT)

WARNING

If the aircraft reaches an airspeed 5 KTS above the stall speed IAW fig. 1 page 2-48.3 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 2-48.3.

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

3. Step deleted.

4. Step deleted.

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-12D				
TRIM SPEED Gear & Flaps UP Power Idle 150 KIAS Gear & Flaps DOWN Power Idle 110 KIAS				
WEIGHT	STALL SPEEDS		WARNING HORN RANGE	
	Vs	Vso	Vs	Vso
14,000	102	77	107 – 114	82 – 89
13,500	100	75	105 – 112	80 – 87
13,000	99	74	104 – 111	79 – 86
12,500	97	73	102 – 110	78 – 85
12,000	96	72	101 – 108	77 – 84
11,500	95	71	100 – 107	76 – 83
11,000	93	70	98 – 105	75 – 82
10,500	90	68	95 – 102	73 – 80
10,000	88	66	93 – 100	71 – 78

Figure 1. Stall Speed

d. Step deleted.

e. Step deleted.

f. Step deleted.

g. Step deleted.

h. Step deleted.

* 5. Flap operation - Check as follows: **C33,34**

a. Airspeed - Reduce to 202 KIAS or below.

b. Flaps - APPROACH. Check flaps for freedom and smoothness of operation and for excessive aircraft roll.

c. Airspeed - Reduce to 157 KIAS or below.

d. Flaps - 100%. Check flaps for freedom and smoothness of operation and for excessive aircraft roll.

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

(1) Airspeed - 157 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 - 157 KIAS.

LOW SPEED SYSTEMS CHECK (CONT)

(5) Flaps - Down (100%).

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

*6. Minimum elevator trim - Check as follows:

a. Power- Idle.

b. Gear - DN.

c. Flaps - Down (100%).

d. Propeller levers - HIGH RPM.

e. Elevator trim control wheel -Set full nose-up trim.

*f. Record airspeed (must be between 89 and 92 KIAS).

7. Flaps - UP.

8. Gear- UP.

*9. Auto-ignition - Check as follows:

a. Auto-ignition switches (2) -ARM.

b. Slowly retard each power lever.

c. Respective IGN ON annunciator light should illuminate at 16 to 21% torque.

d. Power - Establish cruise power with auto-ignition armed.

e. Right engine condition lever -Rapidly retard to IDLE CUT-OFF for 3 seconds, then return

PROCEDURE	TROUBLESHOOTING REFERENCE
to LO IDLE. Engine relight should occur within 3 to 5 seconds. Monitor engine acceleration 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.	
*10. 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) - Set 2000 RPM.	
d. Condition lever (engine to be feathered) - IDLE CUTOFF.	
e. Propeller lever (engine to be feathered) - FEATHER. Time to feather must not exceed 10 seconds from windmilling at 2000 RPM to no rotation in the feathered position.	
f. Engine cleanup.	
(1) Condition lever - FUEL CUTOFF.	
(2) Engine auto-ignition switch- OFF.	
(3) Autofeather switch - OFF.	
(4) Generator switch - OFF.	

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

(5) Propeller synchronization switch - OFF.

g. Engine restart.

(1) Cabin temperature 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 temperature mode selector switch - OFF.

(14) Autoignition switch -ARM.

PROCEDURE	TROUBLESHOOTING REFERENCE
(15) Propeller lever - Move out of feather. Propeller tachometer must reach 1000 RPM in 30 seconds or less.	
(16) Propellers - Synchronized.	
(17) Power - As required.	
h. Repeat procedure for opposite engine.	
*11. Propeller autofeathering system and propeller unfeathering - Check as follows:	F14,15
a. Climb power - Set (N_1 above 92%).	
b. Autofeather switch - ARM.	
c. Airspeed - 103 KIAS.	
d. Propeller levers - Set 2000 RPM.	
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). Autofeather time is a function of oil temperature as shown in figure 4. (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

LOW SPEED SYSTEMS CHECK (CONT)

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 temperature 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.

PROCEDURE	TROUBLESHOOTING REFERENCE
(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 temperature mode selector switch - As required.	
(14) Autoignition switch ARM.	
(15) Propeller - Unfeather.	
(16) Propellers - Synchronized.	
(17) Power - As required.	
i. Repeat procedure for other engine.	
* 12. Landing gear warning horn - Check as follows:	C18-20
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 79 to 81% N_1 and airspeed is below 140 KIAS or when the flaps are extended beyond the approach position (40%) re-	

PROCEDURE	TROUBLESHOOTING REFERENCE

LOW SPEED SYSTEMS CHECK (CONT)

gardless of power lever position.

c. Power levers - Advance past 79 to 81% N_1. Landing gear warning horn should be armed again.

*13. Landing gear normal operation - Check as follows: C13-17, C21-32

a. Airspeed - 184 KIAS.

b. Landing gear control switch - DN.

*c. Landing gear extension time - Record (6 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 - 166 KIAS.

g. Landing gear control switch -UP.

*h. Landing gear retraction time -Record (7 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 ex- tinguished.

*14. Emergency landing gear extension system - Check operation and condition as follows:

a. Airspeed - 130 KIAS.

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

c. Landing gear control switch -DN.

d. Landing gear alternate engage handle - Lift and turn clock-wise to the stop (one quarter turn).

e. Alternate landing gear extension handle - Pump. The lever actuates a double-acting ratchet and requires little effort to operate. About 70 complete strokes of the lever will be required to lower and lock the gear.

f. Gear down indicator lights (3) - Monitor. Stop pumping ratchet when gear down indicator lights are illuminated.

CAUTION

As full extension is approached, proceed cautiously, and stop when the green lights come on, or resistance is felt in the handle. Further movement of the handle could damage the driving mechanism and impair subsequent retraction.

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

PROCEDURE	TROUBLESHOOTING REFERENCE

DESCENT AND LOW LEVEL CRUISE (CONT)

rate descent check as follows:

a. Power - 50 to 60% torque.

b. Propellers - Set 1900 RPM.

c. Pressure altitude - Above 18,000 feet.

d. Gear - UP.

e. Flaps - UP.

f. Airspeed - In accordance with figure 5.

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 2000 RPM.

PROCEDURE	TROUBLESHOOTING REFERENCE

c. Airspeed - 240 KIAS.

d. Trim aircraft.

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

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. RecogN1tion lights - ON.

4. Altimeters - Set to current altimeter setting.

5. Crew briefing - Complete.

BEFORE LANDING

1. Propeller synchronization switch -OFF.

2. Autofeather switch - ARM.

3. Propeller levers - As required.

NOTE

During ILS approach, propellers should be set at 1900 RPM to prevent ILS and glide-slope needle interference.

4. Flap switch - APPROACH, below 202 KIAS.

5. Landing gear control switch - DN, below 184 KIAS.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE LANDING (CONT)

6. Landing lights switch - As required.

7. Brake deice - As required.

LANDING

NOTE

Maximum design sink rate below 13,500 pounds gross weight is 600 feet per minute. The maximum design sink rate above 13, 500 pounds gross weight is 500 feet per minute.

1. Autopilot and yaw damp - Disengaged.

2. Gear down indicator lights (3) -Check illuminated.

3. Propeller levers - HIGH RPM.

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

*5. Propeller reversing - Check as follows: E2-3

   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 82 to 88%. Maximum difference

between engines should be 2% N_1.

*6. Oil temperature - Monitor. Ground idle limits are 10 to 99°C.

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

GO-AROUND

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

AFTER LANDING

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

1. Condition levers - As required.
2. Engine autoignition switches -OFF.
3. Ice and rain switches - OFF.
4. Flap switch - UP.
5. Avionics - As required.

PROCEDURE **TROUBLESHOOTING REFERENCE**

AFTER LANDING (CONT)

NOTE

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

6. Lights - As required.

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. Overhead floodlight - As required.
5. Cabin temperature mode selector switch - OFF.
6. Autofeather switch - OFF.
7. Vent and aft vent blower switches- AUTO.
8. Inverter switches - OFF.

*9. Battery condition - Check as required. If BATTERY CHARGE light is illuminated during engine shutdown, monitor battery

ammeter (mission control panel), for decreasing current.

10. Avionics master switch - OFF.

11. TGT - Check. TGT must be 660°C or below for one minute prior to shutdown.

12. Propeller levers - FEATHER.

CAUTION

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

13. Condition levers - FUEL CUT-OFF.

WARNING

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

14. Exterior lights - OFF.

15. Master panel lights - OFF.

16. Key lock switch - OFF.

17. Oxygen system - As required.

BEFORE LEAVING AIRCRAFT

1. Wheels - Chocked.

2. Parking brake - As required.

PROCEDURE	TROUBLESHOOTING REFERENCE

BEFORE LEAVING AIRCRAFT (CONT)

NOTE

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

3. Flight controls - Locked.

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 air-craft 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.	E8-10,24

PROCEDURE	TROUBLESHOOTING REFERENCE

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.

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 checklist. 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. Battery relay inoperative.

b. Low battery.

c. Loose connection or open circuit between battery and power cabinet.

A2. One starter inoperative.

a. Starter relay inoperative.

b. Poor ground at starter.

c. Open circuit.

d. Defective starting motor.

e. Switch defective.

f. Defective generator control panel.

g. Circuit breaker tripped.

A3. Engine slow to start or does not start.

a. Low battery.

b. High resistance in starter circuit.

c. Defective starter-generator.

d. Defective generator control panel.

A4. Excessive starting RPM.

a. Accessory gearbox input shaft coupling not engaged.

b. Accessory gear drives, bearings, or compressor rear hub splines are defective.

A5. 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.

(4) Flow divider and dump valve system failure.

A6. Engine fails or is slow to accelerate to idle N_1 speed.

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

b. Leaks in pneumatic line of propeller governor.

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

d. Flow divider and dump valve malfunction.

A7. 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. Dump valve section closed.

i. Engine control linkage improperly rigged.

j. Fuel nozzle restrictions.

TROUBLESHOOTING GUIDE B - INSTRUMENTS

CONDITION
PROBABLE CAUSE

B1. Airspeed indicator reading remains fixed.

a. Pitot pressure line clogged with ice or debris.

b. Defective airspeed 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. Windshield heat on.

b. Insufficient liquid.

c. External magnetic interference.

d. Defective compass.

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 gauge.

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 gauge pegs down scale against stop.

a. Defective probe.

b. No power.

c. Defective indicator.

d. Defective pins on connectors on both gauge and probes.

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

f. One or more tank units out of circuit (when fuel level low).

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

a. Indicator defective.

b. Indicator out of calibration.

c. Faulty tank unit.

d. Water in fuel.

e. Faulty wiring.

B9. Fuel quantity sluggish.

a. Defective connector.

b. Defective wiring.

c. Defective tank unit.

d. Dirty fuel tanks.

e. Contaminated fuel.

f. Defective indicator.

B10. 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. Low indicated voltage.

a. Engine speed too low.

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 panel.

C2. No generator output.

a. Improper connections.

b. Circuit breaker tripped.

c. Open circuit.

d. Defective generator control switch.

e. Starter switch on.

f. Generator over-voltage circuit defective.

g. Defective generator control panel.

h. High resistance field circuit.

i. Shorted field.

C3. Low generator output.

a. Generators not paralleled.

C4. Low voltage.

a. Malfunctioning voltage regulator.

C6. Volt-loadmeter does not indicate.

a. Tripped circuit breaker.

b. Open volt-loadmeter lead.

c. Ground fault circuit tripped.

d. Shortened power wires.

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 failed closed.

C9. Apparent loss of battery capacity.

a. Electrolyte level too low.

b. Charging rate too low in aircraft.

c. 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. Voltage regulator 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. Battery switch in OFF position.

b. Keylock switch off.

c. Battery power too low.

d. Defective or incorrectly polarized external power source.

e. Defective external power receptacle.

f. Defective external power relay.

g. Defective external power overvoltage monitor.

h. Loose or wrong connection in external power circuit.

C13. Landing gear will not retract or extend.

a. Circuit breaker tripped in control or motor circuit.

b. Loose motor ground connection.

c. Open circuit.

d. Defective motor.

e. Defective landing gear control switch.

C14. Landing gear will extend but will not retract.

a. Open circuit between landing gear switch and control relay.

b. Up solenoid of control relay inoperative.

c. Open circuit between control relay and up winding in motor.

d. Defective up limit switch.

C15. Landing gear will retract but will not extend.

a. Open circuit.

b. Down limit switch inoperative.

c. Open circuit between control relay and down winding of motor.

C16. Landing gear circuit breaker trips.

a. Grounded control circuit.

b. Grounded motor circuit.

c. Mechanical defect in gear causing overload.

C17. Landing gear operation noisy.

a. Loose chain.

b. Broken gear door linkage.

c. Worn actuator bearings.

C18. Landing gear warning horn inoperative.

a. Horn circuit breaker tripped.

b. Open or grounded circuit.

c. Throttle switch defective or out of adjustment.

d. Main or nose gear down lock warning switch defective or out of adjustment.

e. Defective warning horn module.

C19. 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. Defective landing gear control switch.

b. Defective wiring to landing gear control switch.

C20. Landing gear warning horn inoperative when power lever is closed and landing gear is up.

a. Circuit breaker tripped.

b. Defective or out of adjustment power lever switch.

c. Defective wiring between power lever switches and pedestal terminal board, and between landing gear control switch and horn relay.

C21. All landing gear position indicators and switches inoperative.

a. Landing gear circuit breaker tripped.

b. Open circuit between circuit breaker and indicators.

C22. One landing gear position indicator inoperative.

a. Defective indicator.

b. Open circuit.

c. Defective indicator switch.

C23. Landing gear warning horn fails to shut off when landing gear is extended.

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

C24. 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.

C25. Landing gear down position indicator light inoperative.

a. Defective or out of adjustment down lock switch.

b. Defective indicator light.

C26. Landing gear handle light is illuminated with gear up and locked.

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

C27. Landing gear handle light inoperative.

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

b. Defective landing gear control switch.

C28. Landing gear motor fails to shut off when gear is retracted.

a. Up limit switch out of adjustment.

b. Defective up limit switch.

C29. Landing gear fails to retract.

a. Safety switch not closing.

b. Up limit switch stuck.

C30. Landing gear fails to retract completely but gear handle light goes out.

a. Up limit switch operates early.

C31. Positive down locks do not fully engage.

a. Down limit switch opens early.

C32. Landing gear motor fails to shut off when gear extended.

a. Down limit switch out of adjustment.

b. Defective down limit switch.

C33. 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.

C34. Flap position indicator inoperative.

a. Tripped circuit breaker.

b. Defective position indicator.

c. Defective position transmitter.

d. Defective wiring.

C35. Pitot tube heater fails to operate.

a. Tripped circuit breaker.

b. Defective heater.

c. Defective wiring.

C36. Stall warning system inoperative.

a. Defective lift transducer.

b. Defective stall warning horn.

c. Faulty lift computer.

d. Faulty stall/landing gear warning horn printed circuit board assembly.

C37. Stall warning horn sounds continuously.

a. Defective lift transducer.

b. Defective stall warning test system.

c. Defective wiring.

C38. Both inverters inoperative.

a. Defective wiring in inverter system.

C39. One inverter inoperative.

a. Tripped inverter circuit breaker (on DC power distribution panel beneath floor not accessible to flight crew under normal conditions).

b. Defective circuit breaker.

c. Defective inverter.

d. Loose or corroded ground connection.

e. Defective wiring to inverter.

C40. Battery charge annunciator light inoperative.

a. Defective light bulb.

b. Connections on battery monitor shunt loose or corroded.

c. Defective battery monitor module assembly.

C41. One portion of interior lighting or lighting control system inoperative.

a. Defective light circuit board or instrument lights.

b. Defective components in overhead control panel.

c. Defective wiring.

d. Defective power supply.

C42. Fuel crossfeed valve inoperative or FUEL PRESS annunciator light remains illuminated.

a. Defective standby fuel pump.

b. Defective crossfeed valve.

C43. Standby fuel pump inoperative.

a. Defective standby pump circuit breaker.

b. Defective switch in fuel management panel.

c. Defective wiring.

C44. Pneumatic surface or antenna deice system inoperative.

a. Defective surface deice module.

b. Defective deice distributor valve.

c. Defective plumbing.

d. Defective boot.

C45. Right and left FIRE PULL warning lights do not illuminate in any test position of fire protection test switch.

a. Tripped fire detector circuit breaker.

b. Defective fire protection test switch.

c. Defective wiring.

C46. Engine fire detection system wholly or partially inoperative.

a. Defective fire detector.

b. Defective fire protection test switch.

C47. Fire detector circuit breaker trips.

a. Short circuit in wiring or components.

C48. Left FIRE PULL warning light illuminates in all test positions but right FIRE PULL warning light does not.

a. Defective right fire detection control amplifier.

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

C49. Right FIRE PULL warning light illuminates in all test position but left FIRE PULL warning light does not.

a. Defective left fire detection control amplifier.

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

C50. Ventilation blower will not run.

a. Tripped vent blower circuit breaker.

b. Defective motor brushes.

c. Defective wiring.

d. Defective motor.

e. Defective switch.

C51. Ventilation blower draws excessive current.

a. Misaligned or preloaded bearings.

b. Defective bearings.

C52. Ventilation blower runs at reduced speed.

a. Brushes not seated properly.

C53. Ventilation blower draws excessive current and runs at high speed.

a. Shorted turns in field windings.

C54. Ventilation blower draws excessive current and speed surges.

a. Shorted turns in armature.

C55. Ventilation blower has excessive vibration.

a. Armature out of balance.

b. Impeller fan damaged.

c. Impeller fan out of balance.

C56. Propeller deicer inoperative.

a. Circuit breaker tripped.

b. Propeller deice switch defective.

c. Propeller deice timer defective.

d. Defective wiring.

TROUBLESHOOTING GUIDE D - ANNUNCIATOR PANEL

CONDITION

PROBABLE CAUSE

D1. Annunciator light (annunciator panel) will not illuminate when press-to-test switch is pressed.

a. Defective placard light.

b. Defective annunciator fault detector module.

c. Defective wiring.

D2. Master warning or master caution light will not illuminate for any red or yellow faults.

a. Defective master warning light.

b. Defective fault detection module.

c. Defective annunciator control module.

D3. Depressing the annunciator press-to-test switch has no effect on fault warning system operation.

a. Defective switch.

b. Defective wiring.

c. Defective circuit breaker.

D4. Dim control does not function properly.

a. Defective switch.

b. Defective wiring.

c. Defective annunciator control module.

TROUBLESHOOTING GUIDE E - POWER PLANT

CONDITION

PROBABLE CAUSE

E1. Idle speed is incorrect.

a. Incorrect control linkage assembly.

b. Propeller governor malfunction.

c. Fuel control unit pneumatic system not operating properly.

d. Idle speed setting on fuel control unit incorrect.

e. Fuel control unit malfunction.

E2. Rapid acceleration of one engine over the other.

a. Px metering orifice not on fuel control unit elbow.

b. Fuel control unit acceleration dome out of adjustment.

c. Compressor bleed valve not operating.

d. Fuel control unit failure.

e. Engine rigging, components, or engine are mismatched.

E3. Power levers are not aligned.

a. Fuel control rod improperly adjusted.

E4. High engine oil pressure.

a. Defective oil pressure indicating system.

b. Defective pressure relief valve.

E5. 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.

E6. Fluctuating engine oil pressure.

a. Insufficient or excess oil.

b. Defective oil pressure indicating system

c. Dirty oil filter.

d. Defective pressure relief valve.

E7. High oil temperature.

a. Insufficient oil level.

b. Defective oil temperature indicating system.

c. Excessive idling in feather.

d. Restriction or malfunction in oil cooler.

e. Bypass diverter valve on oil to fuel heater malfunction.

f. Heat shield failure.

E8. Oil leak from compressor inlet.

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

b. Defective preformed packings on accessory gearbox.

E9. 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.

d. Defective or cocked centrifugal breather carbon seal.

E10. 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 or cocked centrifugal breather carbon seal.

f. Defective air seals.

g. Preformed packing on accessory gearbox defective.

E11. Failure of engine to decelerate.

a. Fuel control unit malfunction.

b. Disconnected or improperly adjusted linkage.

E12. 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.

d. Fuel control unit contamination and/or corrosion.

E13. Gas generator uncontrolled acceleration.

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

b. Defective fuel control unit.

c. Fuel control unit contamination and/or corrosion.

E14. Surge during acceleration.

a. Defective compressor bleed valve.

b. Defective fuel control unit.

c. Compressor damaged.

E15. Slow to accelerate.

a. Possible leak or restriction in Py 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.

E16. 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.

e. Air lock on engine.

f. Fuel vent system defective.

E17. 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.

g. Contaminated fuel control unit.

h. Fuel control unit maximum speed setting out of adjustment.

E18. High fuel flow at altitude.

a. Defective indicating system.

b. Defective compressor bleed valve.

c. Air leaks at engine flanges.

E19. Maximum operating TGT has been exceeded.

a. Faulty indicating system.

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

c. Torque meter system indicator faulty.

d. Air inlet and compressor contamination build-up.

E20. TGT limited (turbine temperature is at maximum limit before target torque is reached).

a. Defective instruments.

b. Improper operating procedure.

c. Dirty compressor.

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

e. Defective compressor bleed valve.

f. Torque meter system reading low.

g. Bleed air leaks.

h. High and low pressure bleed valve operation.

E21. 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.

E22. Fluctuating fuel flow.

a. Faulty instrumentation system.

b. Worn fuel control unit/fuel pump coupling.

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

d. Fuel control unit drive spline damage.

e. Sticking beta mechanism.

E23. Fluctuating TGT, gas generator speed, and fuel flow.

a. Faulty instrumentation system.

b. Fuel pump preformed packing or shaft seal leakage.

c. Fuel control unit or fuel pump failure.

d. Worn fuel control unit/fuel pump coupling.

e. Worn fuel control unit drive spline.

f. Sticking beta mechanism.

E24. Fuel leakage at fuel control unit vent.

a. Leakage at fuel pump shaft seal.

b. Leakage at preformed packing.

TROUBLESHOOTING GUIDE F - PROPELLERS

CONDITION

PROBABLE CAUSE

F1. Incorrect propeller RPM.

a. FORWARD

(1) Maximum stop on propeller governor out of adjustment.

b. REVERSE

(1) Airbleed link (reset arm) rigging out of adjustment.

(2) Propeller governor defective.

F2. Propeller governor test system inoperative.

a. Tripped propeller governor test circuit breaker.

b. Defective wiring.

F3. Propeller governor test system inoperative on one engine.

a. Defective propeller governor system test switch.

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.

c. Defective components.

F6. One autofeather arm light illuminates when power setting is less than 90 percent NI (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.

b. Defective torque pressure switch.

F10. Propeller does not start to feather after engine torque falls below 9-14 percent (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 9 to 14 percent 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 9-14 percent of the 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 or unfeather.

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

b. Defective propeller governor.

c. Malfunction or incorrect rigging of control linkage.

d. High block friction or excessive friction in pitch changing mechanism.

F15. Propeller fails to unfeather.

a. Malfunction or incorrect rigging of control linkage.

b. Defective governor.

c. Excessive leakage at engine transfer bearing.

d. High blade turning friction or excessive friction in pitch changing mechanism.

F16. Propeller goes to high pitch or feather uncommanded.

a. Lack of oil pressure to propeller.

b. Beta valve malfunction (only during ground operation).

F17. Propeller goes to full low pitch (high R PM).

a. Sticking governor pilot valve.

b. Propeller control malfunction.

F18. Propeller surges.

a. Air in the propeller hydraulic system.

b. Defective propeller governor.

c. High friction in propeller.

TROUBLESHOOTING GUIDE G - HYDRAULIC

CONDITION

PROBABLE CAUSE

G1. Solid pedal, no brakes.

a. Brake linings worn beyond allowable limits.

G2. Spongy brakes.

b. Air in brake hydraulic system.

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.

G6. Brakes grab.

a. Stones or foreign matter locking brake disc.

b. Warped or bent brake 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 - FLIGHTCONTROLS

For complete troubleshooting of autopilot system, refer to Collins manual P/N 523-0764802.

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. e. Cracked or deformed propeller spinner.

TROUBLESHOOTING GUIDE K - COMMUNICATION/NAVIGATION EQUIPMENT

CONDITION

PROBABLE CAUSE

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

a. No power to audio system.

b. Defective microphone or 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.

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 (pilot's indicator) or VOR LOC flag (copilot's indicator) 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.

K12. Either pilot's or copilot's course deviation indicator NAV flag (pilot's indicator) or VOR LOC flag (copilot's indicator) remain in view with receiver operating.

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

b. Defective course indicator switching relays.

c. Defective course deviation indicator.

K13. No VOR audio tone heard in headset.

a. Defective VOR receiver.

b. Defective VOR control panel.

c. Defective audio control panel.

K14. 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.

K15. Marker beacon signals not heard in headset.

a. Defective audio control panel.

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

K16. 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.

K17. Glideslope off flag on one course deviation indicator remains in view when glideslope receiver is operating.

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

b. Defective course deviation indicator switching relay.

c. Defective course deviation indicator.

K18. Glideslope indicator on course deviation indicators do not deflect properly.

a. Defective glideslope portion of VOR receiver.

K19. Glideslope indicator on one course deviation indicator does not deflect properly.

a. Defective course deviation indicator.

b. Defective course deviation indicator switching relay.

K20. ADF radio set inoperative.

a. No power to ADF radio set.

b. Defective ADF receiver.

c. Defective ADF control unit.

K21. No ADF audio heard in headsets and tuning meter does not deflect.

a. Defective ADF receiver.

b. Defective ADF control panel.

c. Defective ADF sense antenna.

d. No power to ADF radio set.

K22. 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 fixed-loop antenna.

d. Defective ADF-VOR switch on RMI.

e. Defective ADF control panel.

K23. ADF single needle pointer does not return to station bearing.

a. Defective RMI.

K24. Quality of ADF reception is poor.

a. Defective ADF control panel.

b. Defective audio control panel.

c. Defective ADF receiver.

K25. Heading on course deviation indicator does not agree with magnetic compass heading of aircraft (corrected for compass deviation).

a. Defective gyroscopic compass set.

b. Incorrect compass deviation card.

c. Compass switch not in SLAVE position.

K26. 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.

K27. 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.

K28. VOR receiver inoperative.

a. No power to equipment.

b. Defective VOR control panel.

c. Defective VOR receiver.

K29. 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 NAV relay.

K30. With VOR receiver operating, course deviation bars on course deviation indicators do not deflect (radio magnetic indicator needles operate properly).

a. Defective VOR switch on instrument panel.

b. Defective course deviation indicator switching relay.

K31. Radar inoperative.

a. System circuit breaker tripped.

b. Defective radar control-indicator.

c. Defective radar receiver-transmitter.

K32. Radar antenna does not scan.

a. No power to radar antenna.

b. Defective radar antenna.

K33. No display on radar control-indicator.

a. Defective radar control-indicator.

b. Defective radar receiver-transmitter.

c. Defective radar antenna.

K34. Wavy, chopped or missing range circles or indicator.

a. Defective radar control-indicator.

b. Defective radar receiver-transmitter.

K35. 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.

K36. 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.

K37. Radar gain control has no effect on display (gain control

a. Defective radar control-indicator.

K38. Radar TILT control inoperative.

a. Defective radar control-indicator.

K39. Radar BRT control inoperative.

a. Defective radar control-indicator.

K40. Radar range does not vary when RANGE switch is changed to various positions.

a. Defective radar control-indicator.

K41. Transponder cannot be interrogated or provides unsatisfactory response.

a. Mode C not set or defective.

b. Defective transponder.

c. Defective antenna.

d. Defective wiring.

e. Defective encoding altimeter.

SECTION IV. SPECIAL PROCEDURES

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

*A. PRESSURIZATION SYSTEM.

Check as follows:

1. Bleed air valve switches (2) - OPEN.
2. After takeoff- Establish a climb.
3. Cabin altimeter After takeoff the cabin altimeter needle should stabilize at selected altitude ± 250 feet and the cabin differential pressure needle should continue climbing. The cabin altimeter needle should remain at selected altitude until the maximum pressure differential of 6. 0±.1 is reached. At this point (approximately 16, 600 feet pressure altitude) the cabin altitude should increase while the differential pressure remains constant.
4. Cabin pressurization leak rate - Check within limits as follows:

   a. Level off aircraft when pressure differential reaches 6.0±1.

   b. Bleed air valve switches (2) - ENVIRO OFF.

   c. Cabin rate-of-climb indicator Read and record cabin rate of climb. Cabin rate of climb (cabin pressurization leak rate) should not exceed 2200 feet per minute.

5. Bleed air valve switches (2) - OPEN. Reestablish 6.0±.1 PSI cabin pressure differential.
6. Left bleed air valve switch - ENVIRO OFF.
7. Slowly retard the right power lever and record the minimum N_1 speed that the right engine must be operated at to maintain the cabin pressure differential at 6.0±.1. N_1 should not exceed 85%, and the minimum desirable N1 is 80%.
8. Left bleed air valve switch - OPEN.

9. Right bleed air valve switch - ENVIRO OFF.
10. Slowly retard the left power lever and record the minimum N_1 speed that the left engine must be operated at to maintain the cabin pressure differential at 6.0±.1. N_1 should not exceed 85%, and the minimum desirable N_1 is 80%.
11. Right bleed air valve switch - OPEN.
12. Cabin altitude controller - Set to 10,000 feet pressure altitude.
13. Cabin pressurization rate knob - Set to maximum.
14. Cabin rate of climb indicator - Read and record. Cabin rate of descent should be between 1500 and 2500 feet per minute.
15. Cabin pressurization rate knob - Set to mid-range.
16. Cabin rate of climb indicator - Read and record cabin rate of descent. Cabin rate of descent should be between 350 and 650 feet per minute.
17. Cabin pressurization rate knob - Set to minimum.
18. Cabin rate of climb indicator - Read and record cabin rate of descent. Cabin rate of descent should be between 50 and 300 feet per minute.
19. Cabin altitude controller - Set.
20. Cabin rate of climb indicator Read and record cabin rate of descent. Cabin rate of descent should be between 50 and 350 feet per minute.
21. Cabin pressurization rate knob - Set to maximum.
22. Cabin rate of climb indicator - Read and record cabin rate of descent. Cabin rate of descent should be between 1500 and 2500 feet per minute.
23. Cabin pressurization rate knob - Set to mid-range

24. Cabin rate of climb indicator Read and record cabin rate of descent. Cabin rate of descent should be between 350 and 650 feet per minute.

25. Cabin altitude controller - Set to 10,000 feet.

26. Cabin pressurization rate control - Set to a comfortable rate of climb.

27. Cabin altitude indicator Read and record altitude. Altitude should reach 9750 to 10,250 feet pressure altitude.

28. Aircraft altitude - 10,000 feet.

29. Cabin pressurization dump switch - DUMP.

30. Aircraft altitude - Increase toward 12,500 feet pressure altitude.

31. Cabin altitude warning annunciator light - Check that it illuminates between 12,000 and 12,500 feet pressure altitude.

32. Cabin pressurization dump switch - PRESS.

33. Cabin altitude controller - Set to field elevation.

34. Descend toward field altitude.

35. Cabin altitude indicator- Check that cabin altitude attains and remains at field elevation +250 feet until the altitude set in the cabin altitude controller is reached by the aircraft.

***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 values at maximum power lever position without exceeding limits, and be off the torque limit at 2000

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 (N_1) with the power levers in the full forward position. If during the test the TGT temperature limit or N_1 limit is obtained prior to reaching maximum N1, the check is completed.

1. Altitude - 25,000 feet pressure altitude.
2. Propeller levers - Set 2000 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 N_1 limits). Maximum N_1 is 101.5%. Maximum TGT is 750°C.

***D. SPEED CHECK AT MAXIMUM CRUISE POWER.**

NOTE

A new or rebuilt engine operated at the torque value presented in the cruise power charts will show a TGT margin below the maximum cruise limit for the torque value presented in the charts. With ice vanes retracted, cruise torque settings shown on the cruise power charts 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 6). Cruise torque must be attainable without exceeding the 730°C TGT limit to be acceptable. Indicated fuel flow must be within ± 10 and -25 pounds per hour of chart value. Pilot's and copilot's airspeed indicators will agree within ±4 KIAS.

1. Record the following:
   a. *Engine serial number
   b. *Engine hours since new
   c. *Engine hours since overhaul
2. Airspeed - Refer to chart.
3. Altitude - Refer to chart.
4. Power setting - Refer to chart.
5. Propeller levers - Refer to chart.
6. Ice vanes - Retracted.
7. 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 (must not exceed 730°C)

NOTE

For engines that exceed 730°C TGT, engine acceptance at maximum cruise power, must be conducted.

8. Repeat for opposite engine.

***E. 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 speed check at maximum cruise power exceeds 730°C.

1. Record the following:
   a. *Engine serial number.
   b. *Engine hours since new.
   c. *Engine hours since overhaul.
2. Altitude - Establish level flight at 25,000 feet pressure altitude.
3. Propeller levers - Set 1900 RPM.
4. Adjust the opposite engine to maintain 175 KIAS.
5. Free air temperature - Record.
6. Set engine torque as specified by the maximum cruise speed/engine acceptance chart (figure 6) for the recorded indicated free air temperature, on the engine to be tested.
7. 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

8. Repeat for opposite engine.

PROCEDURE REFERENCE	TROUBLESHOOTING

F. AVIONICS FLIGHT CHECKS.

*1. Autopilot flight check - Perform 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 - 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.

PROCEDURE REFERENCE **TROUBLESHOOTING**

f. Check autopilot VOR/ILS operation as follows:

(1) Vor receiver - Set.

(2) NAV switch (autopilot mode selector panel) ON.

(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 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 air-speed hold function as follows:

(1) Fly aircraft to test air-speed.

(2) Airspeed hold switch-indicator (autopilot mode selector panel) Depress on.

(3) Aircraft should maintain airspeed that was being

PROCEDURE REFERENCE **TROUBLESHOOTING**

F. AVIONICS FLIGHT CHECKS (CONT)

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 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 55-1510-219-10.

b. TACAN update - Check as follows:

(1) Key 4 - Depress.

PROCEDURE TROUBLESHOOTING REFERENCE

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

(3) Right display Check. Display should read 1-XX4, indicating that the INS is in the TACAN update mode.

(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

F. AVIONICS FLIGHT CHECKS (CONT)

display will read all dashes.

(8) Data selector - Set to DIS/TIME.

(9) Keys 7 and 9 Depress simultaneously. Compare distance to TACAN station shown in the lefthand display with the distance shown on the INS TACAN range display.

(10) Mission control panel Check that TACAN 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.

PROCEDURE TROUBLESHOOTING REFERENCE

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 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.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

f. Latitude and longitude position - Check as follows:

(1) Data selector - L/L POS.

(2) Displays - Read present position latitude in the 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 longitude displays will freeze at the values which were present when the HOLD key was depressed.

NOTE

While the HOLD key is illuminated, TA-CAN and data link updates are prohibited.

g. Latitude and longitude inertial position - Check as follows: Data selector - L/L WYPT (HOLD key should still be illuminated).

(1) 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.

(2) INSERT/ADVANCE key - Depress.

(3) Left-hand and right-hand displays - Read arc-seconds related to present inertial position to the nearest a tenth of a second.

(4) HOLD key - Depress to return to INS normal operation.

h. Magnetic variation - Check as follows:

(5) Keys 3 and 9 - Depress simultaneously.

(6) 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).

(7) 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:

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

(1) Data selector - DIS/TIME.

(2) Left-hand display - Read distance to next waypoint to the nearest nautical mile. Compare with TA-CAN 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 TA-CAN 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 15 seconds) and compare with the INS TACAN range display.

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.

l. Desired Track Angle and System Status - Check as fdlows:

(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

F. 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 55-1510-219-10 for code definitions.

(5) WARN lamp - Check dim.

l. 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.

(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 and data link updates are inhibited.

m. UTM Inertial Position - Check as follows:

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

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

F. AVIONICS FLIGHT CHECKS (CONT)

operation. HOLD key will dim.

n. 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.

(7) 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.

(8) HOLD button - Depress to restore the display to normal.

o. 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.

p. 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.

6. *Audio control panel and interphone system - Check each unit as follows: K1,2

a. Interphone functional check:

(1) Receiver selector switches - OFF.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

(2) ICS switch - NORM.

(3) Transmitter selector switches on pilot's and copilot's audio control panel - INTPH. This will allow the pilot to talk to the copilot 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 counterclockwise.

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

on appropriate receiver, listening for either radio reception or background noise.

(a) Cycle propeller deice switch from OFF to AUTO and return to OFF.

(b) Cycle electric standby fuel pumps.

(3) Pull each receiver switch (on audio control panel) out to the off position and each receiver volume control fully counterclockwise.

(4) Transmitter selector switches (pilot's and copilot's audio control panels) - INTPH.

(5) Audio control panel volume control (pilot's) - Turn fully clockwise. Listen for excessive noise.

(6) Repeat for other audio control panel.

c. Receiver/transmitter selectors - Check as follows:

(1) Transmit and receive on each radio using all microphone switches one at a time.

(2) Repeat entire procedure for each audio control panel.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

*7. UHF radio set - Check as follows: K3-7

a. Altitude - 1200 feet above ground level (AGL).

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 35 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.

*8. VHF radio set - Check as follows: K8,9

a. Altitude - 1000 feet AGL.

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

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.

*9. 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.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

d. Establish communications with a ground station at least 150 miles distant on at least three frequencies (one each 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 25.0000 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 is preferable.

*10. ADF radio set - Check as follows: K20-27

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.

e. 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

F. 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. Loop control - R, fast speed position (full deflection) of the loop control. Rotate RMI bearing pointer 90° right and then 90° left of the ADF bearing. At both the right and left displaced bearing indication points, reset the loop switch to center. The bearing pointer should return to the original bearing indication at a rate of not less than 25 degrees per second.

l. Mode selector switch - LOOP.

m. Loop control - R, slow speed position (half deflection) of the loop control. Rotate the bearing pointer 360° left. Two distinct null positions, 180° from each other should be encountered.

n. Stop the bearing pointer on the null that points away from the station.

o. Mode selector switch - ADF. The bearing pointer should

rotate 180° and again indicate the magnetic bearing to station.

p. Distance range (ADF) - Check as follows:

(1) Mode selector switch - ADF.

(2) Tune control - Tune stations to determine operating range of direction finder. 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.

* 11. Marker beacon/glideslope receiver - Check as follows: K14-19

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 volume. Clear audio signals should be available.

c. Marker beacon sensitivity switch (pedestal extension) - As required.

d. Frequency selectors (VOR control panel) - Select localizer frequency.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

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

*12. VOR receiver - Check as follows: K11-13,28-30

PROCEDURE TROUBLESHOOTING REFERENCE

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

b. Off/volume control (VOR control panel) - Rotate clock-wise 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 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

F. AVIONICS FLIGHT CHECKS (CONT)

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%.

*13. 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.

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 indicator 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

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

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 ±5% of range, whichever is greater.

*14. Transponder set - Check as follows: K41

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

*15. Encoding altimeter - Check as follows:

PROCEDURE TROUBLESHOOTING REFERENCE

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.

*16. Radar set - Check while airborne as follows: K31-40

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 not change shape or location. Ground targets will not change shape or location. Ground targets are selected as a function of tilt.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

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 will allow mapping of ground targets to a range of approximately 100 miles.

d. Antenna stabilization check:

PROCEDURE TROUBLESHOOTING REFERENCE

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.

(2) MODE switches - WX.

(3) RANGE switches - 120 or 60.

(4) STAB OFF switch - Push ON.

(5) While flying level (0° pitch, 0° roll), 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 TILT control to determine exact error. Correct on ground, if necessary, before further inflight calibration.

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

(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 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 potentiometer until the terrain band is displayed throughout the third

PROCEDURE TROUBLESHOOTING REFERENCE

F. AVIONICS FLIGHT CHECKS (CONT)

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) Standby 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-12D LIST OF CHARTS

FREE AIR TEMPERATURE	ENGINE SPEED (% N_1) MINIMUM	MAXIMUM
More than 35°C	93	96
10° to 35°C	90	95
Less than 10°C	87	92

The rudder boost should actuate within the values of N_1 speed and free air temperature shown above.

Figure 1. Rudder Boost Actuation Factors

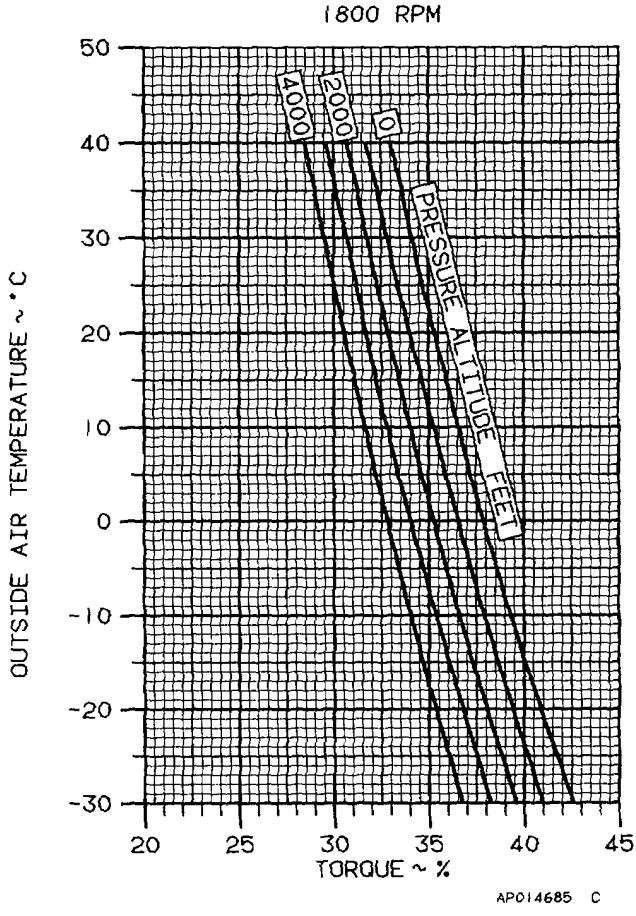

Figure 2. Propeller Low Pitch Stop

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Figure 3. Stall Speeds

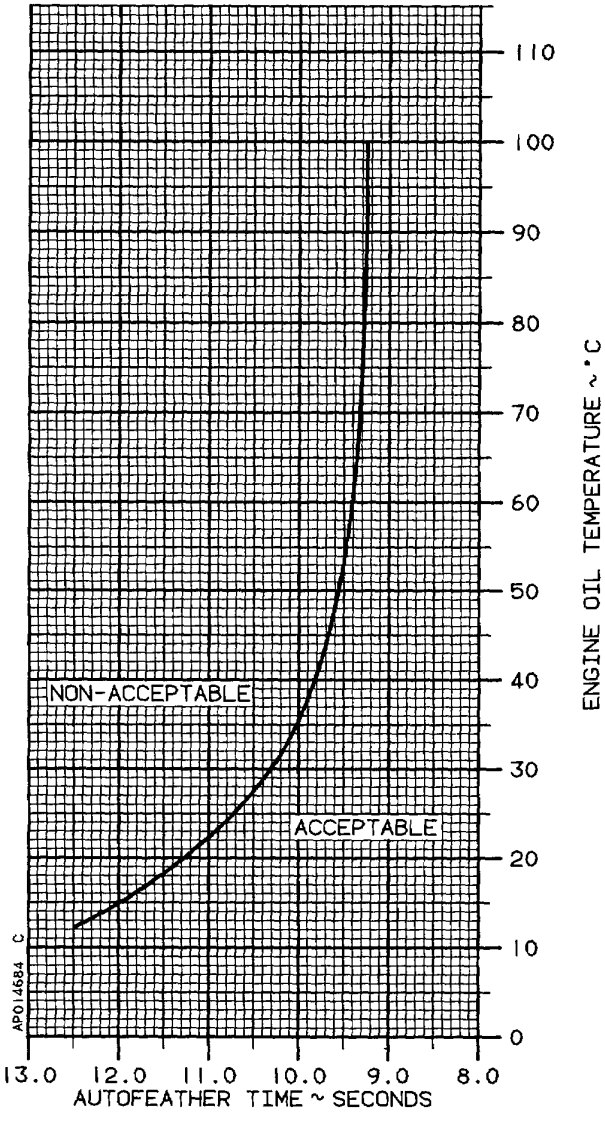

Figure 4. Autofeather Time

PRESSURE ALTITUDE	KIAS
18,000	221
17,000	226
16,000	230
15,000	235
14,000	239
13,000 and below	245

Figure 5. Airspeeds For Vmo Dive

MAX CRUISE SPEED - 1900 RPM
WEIGHT = 12,843 LBS

PRESSURE ALTITUDE FEET	IOAT DEG C	TORQUE PER ENG PERCENT	FUEL FLOW PER ENG LB/HR	IAS KNOTS
25,000	-60	68.5	314	169
	-58	67.8	312	168
	-56	67.2	310	167
	-54	66.6	308	166
	-52	66.0	305	165
	-50	65.4	303	163
	-48	64.8	301	162
	-46	64.2	299	161
	-44	63.5	297	160
	-42	62.9	295	158
	-40	62.3	293	157
	-38	61.4	290	156
	-36	60.6	287	154
	-34	59.7	283	152
	-32	58.8	280	151
	-30	58.0	277	149
	-28	57.1	274	148
	-26	56.3	271	146
	-24	55.5	268	144
	-22	54.6	265	142
	-20	53.8	262	141
	-18	53.0	259	139
	-16	52.2	256	137
	-13	50.5	251	134
	-11	49.7	248	132
	-9	48.7	245	130
	-7	47.6	242	128
	-5	46.7	238	125
	-3	45.7	235	123
	-1	44.7	232	120
	1	43.9	229	117
BT01647 RC-12D				

Figure 6. Maximum Cruise Speed / Engine Acceptance

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

PATRICIA P. HICKERSON
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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters - 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3280.8 feet

Weights

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

Liquid Measure

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

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