TM 1-1510-223-10

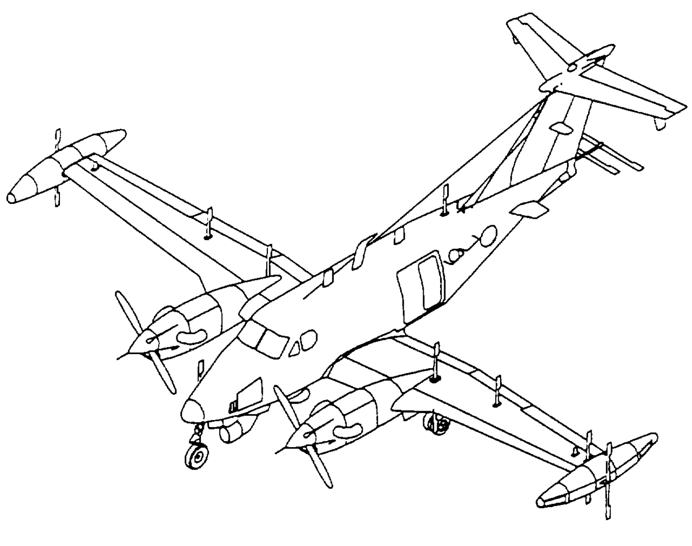
TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

ARMY RC-12N AIRCRAFT

NSN 1510-01-361-5016



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29 APRIL 1994

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NO. 3

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OPERATOR'S MANUAL
FOR
ARMY RC-12N AIRCRAFT

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2-1 through 2-4	2-1 through 2-4
2-21 through 2-24	2-21 through 2-24
2-27 and 2-28	2-27 and 2-28
2-35 through 2-38	2-35 through 2-38
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3-39 through 3-44	3-39 through 3-44
3-47 through 3-50	3-47 through 3-50
3-57 through 3-60	3-57 through 3-60
3-69 through 3-72	3-69 through 3-72
3-75 and 3-76	3-75 and 3-76
————	3-76.1/(3-76.2 blank)
3-77 and 3-78	3-77 and 3-78
3-81 and 3-82	3-81 and 3-82
4-1 and 4-2	4-1 and 4-2
4-9 through 4-60	4-9 through 4-12
4-61/(4-62 blank)	————
5-1 and 5-2	5-1 and 5-2
5-5 through 5-8	5-5 through 5-8
5-10.1 and 5-10.2	5-10.1 and 5-10.2
5-13 through 5-16	5-13 through 5-16
6-1 and 6-2	6-1 and 6-2
6-5 through 6-8	6-5 through 6-8

Remove pages	Insert pages
7-7 and 7-8	7-7 and 7-8
8-1 through 8-28	8-1 through 8-28
————	8-28.1/(8-28.2 blank)
8-35 and 8-36	8-35 and 8-36
9-1 through 9-10	9-1 through 9-10
B-3 through B-6	B-3 through B-6
Index-3 through Index-6	Index-3 through Index-6

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Chief of Staff

JOEL B. HUDSON
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FOR
ARMY RC-12N AIRCRAFT

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Remove pages	Insert pages
----------	A/(B blank)
1-1 and 1-2	1-1 and 1-2
5-10.1 and 5-10.2	5-10.1 and 5-10.2
7-1 through 7-148	7-1 through 7-236
----------	7-237/(7-238 blank)
Index-1 through Index-12	Index-1 through Index-12
----------	Index-13/(Index-14 blank)

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URGENT

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C1

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FOR
ARMY RC-12N AIRCRAFT

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Remove pages	**Insert pages**
i and ii	i and ii
———	5-10.1 and 5-10.2
5-11 and 5-12	(5-11 blank)/5-12
8-31 through 6-34	6-31 through 6-34
———	8-35 and 6-36
Index-l through Index-12	Index-l through Index-12

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WARNING PAGE

Personnel performing operations, procedures, and practices which are included or implied in this technical manual shall observe the following warnings. Disregard of these warnings and precautionary information can cause serious injury or loss of life.

NOISE LEVEL

Sound pressure levels in this aircraft during some operating conditions exceed the Surgeon General's hearing conservation criteria, as defined in TB MED 501. Hearing protection devices, such as the aviator helmet or ear plugs shall be worn by all personnel in and around the aircraft during its operation.

STARTING ENGINES

Operating procedures or practices defined in this Technical Manual must be followed correctly. Failure to do so may result in personal injury or loss of life.

Exposure to exhaust gases shall be avoided since exhaust gases are an irritant to eyes, skin, and respiratory system.

HIGH VOLTAGE

High voltage is a potential hazard around AC inverters, ignition exciter units, and strobe beacons.

USE OF FIRE EXTINGUISHERS IN CONFINED AREAS

Monobroinotrifluonromcthane (CF_3Br) is very volatile, but is not easily detected by its odor. Although non toxic, it must be considered to be about the same as other refrigerants and carbon dioxide, causing danger to personnel primarily by reduction of oxygen available for proper breathing. During operation of the fire extinguisher, ventilate personnel areas with fresh air. The liquid shall not be allowed to come into contact with the skin, as it may cause frostbite or low temperature burns because of its very low boiling point.

VERTIGO

The strobe beacon lights should be turned off during flight through clouds to prevent sensations of vertigo, as a result of reflections of the light on the clouds.

CARBON MONOXIDE

When smoke, suspected carbon monoxide fumes, or symptoms of lack of oxygen (hypoxia) exist, all personnel shall immediately don oxygen masks, and activate the oxygen system.

FUEL AND OIL HANDLING

Turbine fuels and lubricating oils contain additives which arc poisonous and readily absorbed through the skin. Do not allow them to remain on skin.

SERVICING AIRCRAFT

When conditions permit, the aircraft shall be positioned so that the wind will carry fuel vapors away from all possible sources of ignition. The fueling unit shall maintain a distance of 20 feet between unit and filler point. A minimum of 10 feet shall be maintained between fueling unit and aircraft.

Prior to refueling, the hose nozzle static ground wire shall be attached to the grounding lugs that are located adjacent to filler openings.

SERVICING BATTERY

Improper service of the nickel-cadmium battery is dangerous and may result in both bodily injury and equipment damage. The battery shall be serviced in accordance with applicable manuals by qualified personnel only.

Corrosive battery electrolyte (potassium hydroxide). Wear rubber gloves, apron, and face shield when handling batteries. If potassium hydroxide is spilled on clothing, or other material, wash immediately with clean water. If spilled on personnel, immediately start flushing the affected area with clean water. Continue washing until medical assistance arrives.

JET BLAST

Occasionally, during starting, excess fuel accumulation in the combustion chamber causes flames to be blown from the exhausts. This area shall be clear of personnel and flammable materials.

RADIOACTIVE MATERIAL

Instruments contained in this aircraft may contain radioactive material C(B 55-1510-314-25). These items present no radiation hazard to personnel unless seal has been broken due to aging or has accidentally been broken. If seal is suspected to have been broken, notify Radioactive Protective Officer.

RF BURNS

Do not stand near the antennas when they are transmitting.

OPERATION OF AIRCRAFT ON GROUND

At all times during a towing operation, be sure there is an authorized person in the cockpit to operate the brakes.

Personnel should take every precaution against slipping or falling. Make sure guard rails are installed when using maintenance stands.

Engines shall be started and operated only by authorized personnel. Reference AR 95-1.

Ensure that landing gear control handle is in the DN position.

LIST OF EFFECTIVE PAGES

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

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands.

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Original . . . 0 . . . 29 April 1994
Change . . . 1 . . . 09 June 1998
Change . . 2 . . . 30 March 1999
Change . . 3 . . . 01 January 2001

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 604, CONSISTING OF THE FOLLOWING:

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B blank	3
i – ii	1
1-1 – 1-2	3
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2-68 – 2-73	0
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8-36	1
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9-11 – 9-15	0
9-16 blank	0
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A–2 blank	0
B-1 – B-2	0
B-3	3
B-4	0
B-5	3
B-6 – B-10	0
Index-1 – Index-2	2
Index-3	3
Index-4 – Index-5	2
Index-6	3
Index-7 – Index-13	2
Index-14 blank	2

*Zero in this column indicates an original page.

TECHNICAL MANUAL

No. 1-1510-223-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 29 April 1994

Operator's Manual
ARMY MODEL RC-12N

REPORTING OR ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of any way to improve the procedures, please let use know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-LS-LP, Redstone Arsenal, AL 35898-5230. A reply will be furnished directly to you. You may also send in your comments electronically to our E-mail address at <Is-lp@redstone.army.mil>, or by fax at (205) 842-6546 or DSN 788-6546. Instructions for sending an Electronic DA Form 2028 may be found at the back of this manual immediately preceding the hard copy DA Forms 2028.

TABLE OF CONTENTS

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

CHAPTER 1

INTRODUCTION

1-1. GENERAL.

These instructions are for use by the operator(s). They apply to the RC-12N aircraft.

1-2. WARNINGS, CAUTIONS, AND NOTES.

Warnings, cautions, and notes are used to emphasize important and critical instructions. Explanatory examples are as follows:

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, could result in damage to or destruction of equipment.

NOTE

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

1-3. DESCRIPTION.

a. This manual contains the best operating instructions and procedures for the RC-12N aircraft under most circumstances. The observance of limitations, performance, and weight/balance data provided is mandatory. The observance of procedures is mandatory except when modification is required because of multiple emergencies, adverse weather, terrain, etc. Your flying experience is recognized, and therefore, basic flight principles are not included. THIS MANUAL SHALL BE CARRIED IN THE AIRCRAFT AT ALL TIMES.

b. The RC-12N is a pressurized, low wing, all metal aircraft and is powered by two turboprop engines. The basic mission of the aircraft is radio reconnaissance.

1-4. APPENDIX A, REFERENCES.

Appendix A is a listing of official publications cited within the manual applicable to and available for flight crews.

1-5. APPENDIX B, ABBREVIATIONS AND TERMS.

Appendix B is a listing of abbreviations and terms used throughout the manual.

1-6. INDEX.

The index lists in alphabetical order, titled paragraphs, figures, and tables contained in this manual.

1-7. ARMY AVIATION SAFETY PROGRAM.

Reports necessary to comply with the safety program are prescribed in AR 385-40.

1-8. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

For information concerning destruction of Army materiel to prevent enemy use, refer to TM 750-244-1-5**.**

1-9. FORMS AND RECORDS.

Army aviators flight record and aircraft maintenance records which are to be used by crew members are prescribed in DA PAM 738-751 and weight and balance manual TM 55-1500-342-23.

1-10. EXPLANATION OF CHANGE SYMBOLS.

Except as noted in this paragraph, changes to the text and tables, including new material on added pages, are indicated by a vertical line in the outer margin extending close to the entire area of the material affected. Exception: pages with emergency markings, which consist of black diagonal lines around three edges, may have the vertical line or change symbol placed along the inner margins. Symbols show current changes only. A miniature pointing hand symbol is used to denote a change to an illustration. However, a vertical line in the outer margin, rather than miniature pointing hands, is utilized when there have been extensive changes made to an illustration. Change symbols are not utilized to indicate changes in the following:

a. Introductory material.

b. Indexes and tabular data where the change cannot be identified.

c. Blank space resulting from the deletion of text, an illustration or a table.

d. Correction of minor inaccuracies, such as spelling, punctuation, relocation of material, etc., unless correction changes the meaning of instructive information and procedures.

1-10.1 EFFECTIVITY CODES.

The designator symbol CA is used throughout this manual to identify text, illustrations, and performance data for aircraft equipped with the Improved Constant Area Exhaust Stacks. The designator symbol IR identifies text, illustrations, and performance data for aircraft equipped with the Infra Red Reducing Exhaust Stacks. Data which has no icons applies to both.

1-11. AIRCRAFT DESIGNATION SYSTEM.

The designation system prescribed by AR 70-50 is used in aircraft designations as follows:

EXAMPLE RC-12N

R - Modified mission symbol (Reconnaissance)

C - Basic mission and type symbol (Cargo)

12 - Design number

N - Series symbol

1-12. USE OF WORDS SHALL, SHOULD, AND MAY.

Within this technical manual the word “shall” is used to indicate a mandatory requirement. The word “should” is used to indicate a nonmandatory but preferred method of accomplishment. The word “may” is used to indicate an acceptable method of accomplishment.

1-13. PLACARD ITEMS.

Where applicable, placarded items (switches, control, etc.) are shown throughout this manual in capital letters.

CHAPTER 2

AIRCRAFT AND SYSTEMS DESCRIPTION AND OPERATION

Section I. AIRCRAFT

2-1. INTRODUCTION.

The purpose of this chapter is to describe the aircraft, and its systems and controls which contribute to the physical act of operating the aircraft. It does not contain descriptions of avionics or mission equipment covered elsewhere in this manual. This chapter also contains the emergency equipment installed. This chapter is not designed to provide instructions on the complete mechanical and electrical workings of the various systems; therefore, each is described only in enough detail to make comprehension of that system sufficiently complete to allow for its safe and efficient operation.

2-2. GENERAL.

The RC-12N is a pressurized, low wing, all metal aircraft, powered by two PT6A-67 turboprop engines (fig. 2-1), having all weather capability. Distinguishable features of the aircraft are the slender, streamlined engine nacelles, four-bladed propellers, aft rotating boom antenna, mission antennas, wing tip pods, stabilons, T-tail, and a ventral fin below the empennage. The basic mission of the aircraft is radio reconnaissance. Cabin entrance is made through a stair-type door aft of the wing on the left side of the fuselage (fig. 2-1). The interior configuration of the aircraft is shown in figure 2-2.

2-3. DIMENSIONS.

Overall aircraft dimensions are shown in figure 2-3.

2-4. GROUND TURNING RADIUS.

Minimum ground turning radius of the aircraft is shown in figure 2-4.

2-5. MAXIMUM WEIGHTS.

a. Takeoff. Maximum gross takeoff weight is 16,200 pounds.

b. Landing. Maximum gross landing weight is 15,400 pounds.

c. Maximum Ramp Weight. Maximum ramp weight is 16,320 pounds.

d. Maximum Zero Fuel Weight. Maximum zero fuel weight is 13,100 pounds.

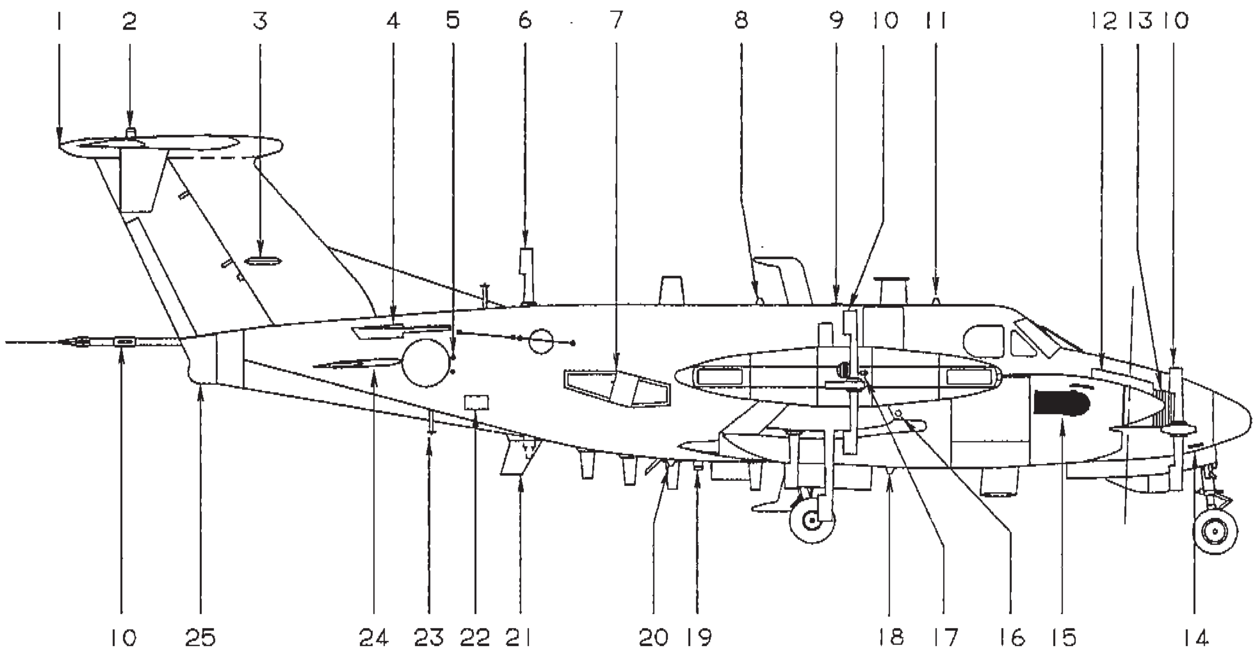
2-6. EXHAUST AND PROPELLER DANGER AREA.

Danger areas to be avoided by personnel while aircraft engines are being operated on the ground are depicted in figure 2-5. Distance to be maintained with engines operating at idle are also shown. Temperature and velocity of exhaust gases at varying locations aft of the exhaust stacks are shown for maximum power. The danger area extends to 40 feet aft of the exhaust stack outlets. Propeller danger areas are also shown.

2-7. LANDING GEAR SYSTEM.

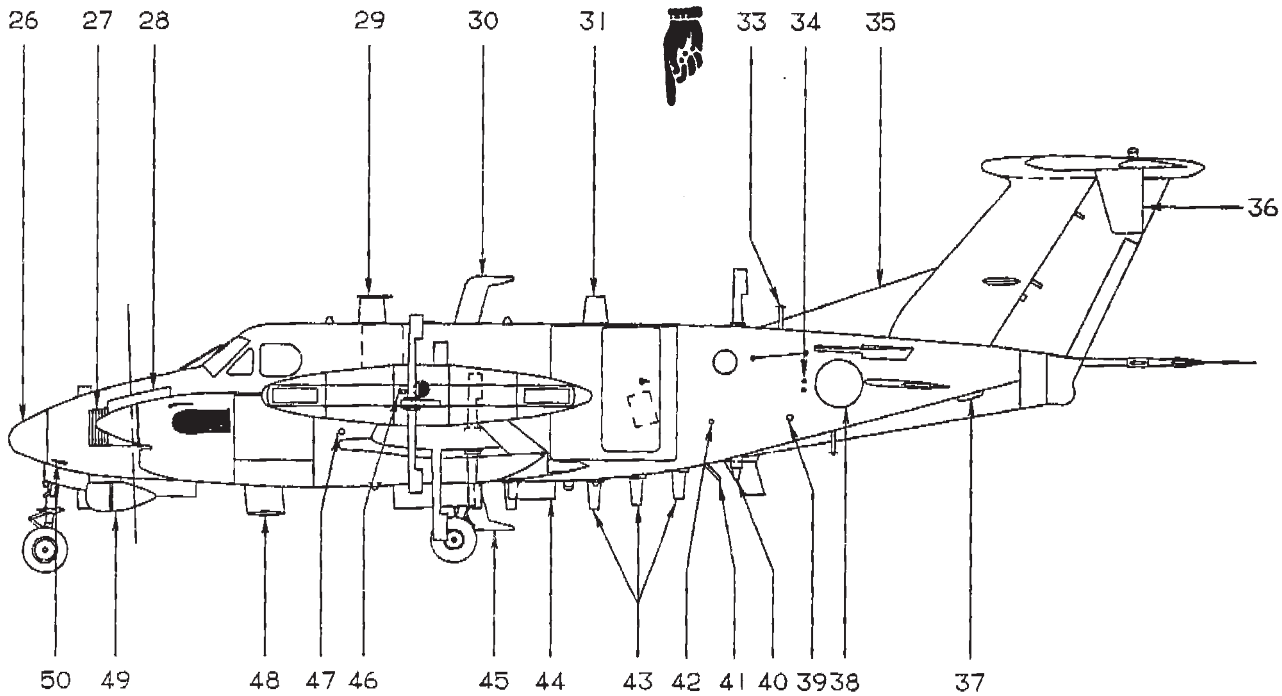
The retractable tricycle landing gear is electrically controlled and hydraulically actuated. The landing gear assemblies are extended and retracted by a hydraulic power pack, located in the left wing center section, forward of the main spar. The power pack consists primarily of a hydraulic pump, a 28 VDC motor, a gear selector valve and solenoid, a two section fluid reservoir, filter screens, gear-up pressure switch and low fluid level sensor. Engine bleed air, regulated to 18 to 20 PSI, is plumbed into the power pack reservoir and the system fill reservoir to prevent cavitation of the pump. The fluid level sensor activates an amber caution annunciator, placarded HYD FLUID LOW, located on the caution/advisory annunciator panel, whenever the fluid level in the power pack is low. The annunciator is tested by pressing the HYD FLUID SENSOR TEST switch located on pilot's subpanel (fig. 2-6).

Power for the hydraulic power pack is supplied through the landing gear motor relay and a 60-ampere circuit breaker located under the floorboard forward of the main spar. The motor relay is energized by power furnished through the 2-ampere LANDING GEAR CONTROL circuit breaker located on the overhead circuit breaker panel (fig. 2-7). The power pack motor is protected by a time delay module which senses operation voltage through a 5-ampere circuit breaker. Both are located beneath the aisleway floorboards, forward of the main spar. Landing gear extension or retraction is normally accomplished in 6 to 7 seconds. Voltage to the power pack is terminated after the fully extended or retracted position is reached. If electrical power has not terminated within 14 seconds, a relay and 2-ampere landing gear circuit breaker will open, and electrical power to the system power pack will be interrupted.



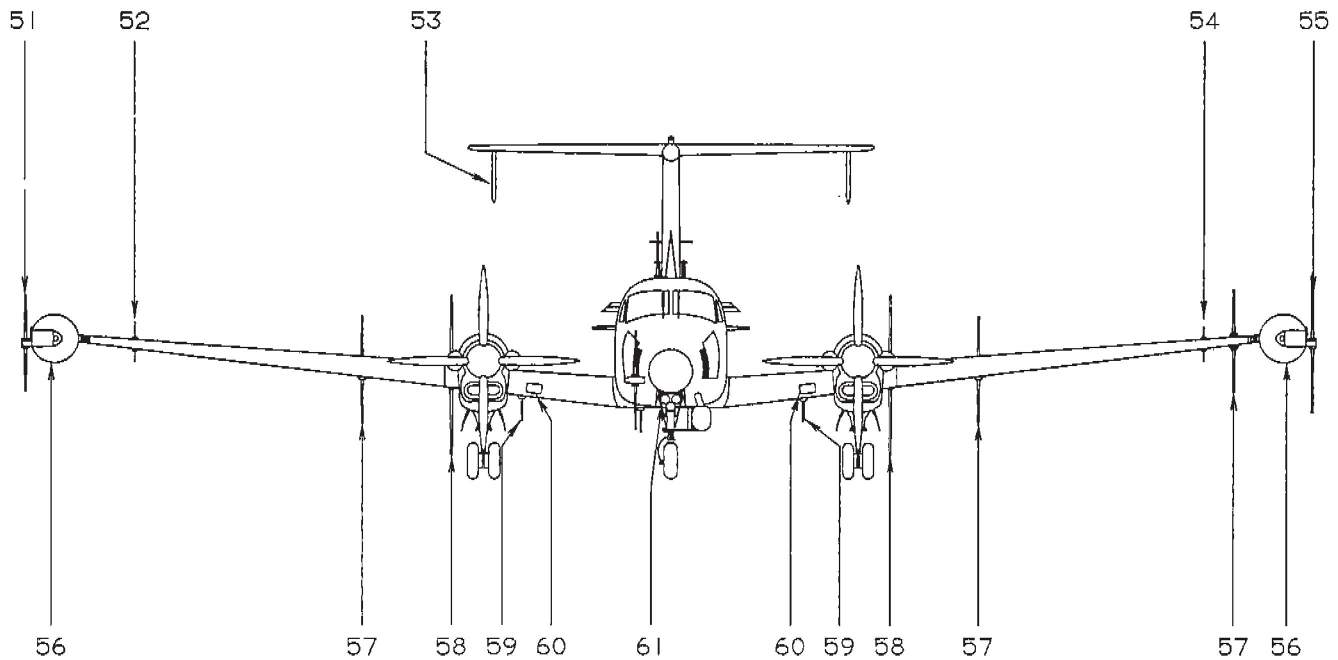
1. Tail Navigation Light
2. Strobe Beacon (Upper)
3. VOR/Localizer Antenna
4. Strake
5. Static Air Ports
6. Low Band Monopole
7. Chaff/Flare Dispenser
8. Transponder Antenna
9. Global Positioning System Antenna
10. Low Band Dipole Antenna
11. TACAN Antenna (Upper)
12. Nose Avionics Compartment Access Door
13. Air Conditioner Condenser Air Inlet
14. Pitot Tube
15. Exhaust Stack
16. Ice Light
17. Navigation Light
18. AN/APR-39 Blade Antenna
19. Strobe Beacon (Lower)
20. TACAN Antenna (Lower)
21. VHF Communications Receiver #2 Antenna
22. Oxygen System Servicing Door
23. AN/APR-44 Antenna
24. Stabilon
25. Interoperable Data Link Antenna

Figure 2-1. General Exterior Arrangement - Right Side (Sheet 1 of 6)



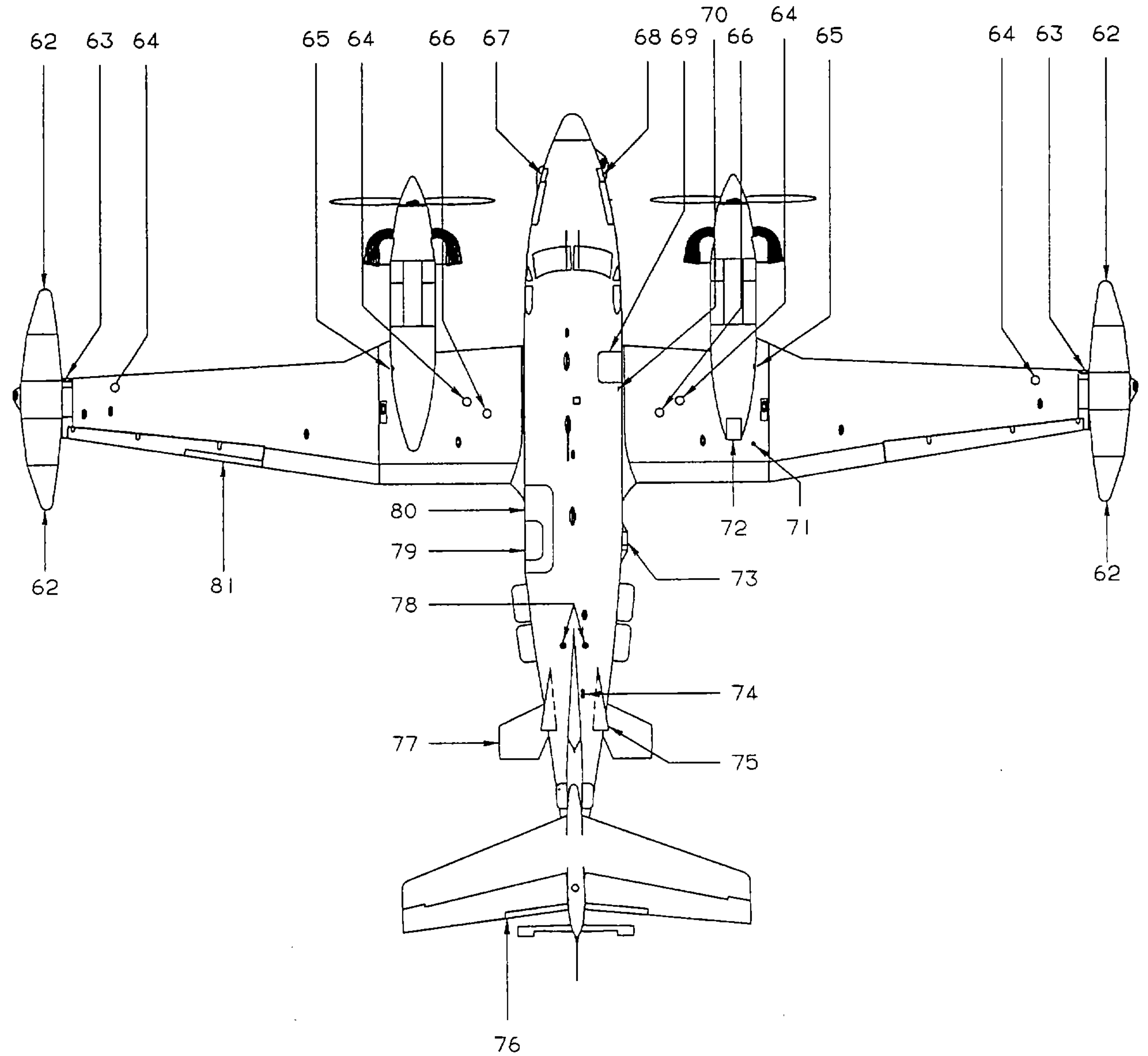
26. Radome
27. Air Conditioner Condenser Air Outlet
28. Nose Avionics Compartment Access Door
29. VHF-FM (SINCGARS) Antenna
30. Low/Mid Band Vertical Bent Blade (Upper)
31. VHF/UHF Communications Antenna
32. Deleted
33. AN/APR-44 Antenna
34. Static Air Ports
35. Dorsal Fin
36. Taillet
37. Lightning Sensor System Antenna
38. P-Band Antenna
39. Emergency Locator Transmitter Switch Access Door
40. UHF/Transponder Antenna
41. Relief Tube Drain
42. Emergency Light
43. High Band Vertical Antenna (6 Blades)
44. Strobe Beacon Light Shield
45. Low/Mid Band Bent Vertical Antenna (Lower)
46. Navigation Light
47. Ice Light
48. High Band Vertical/Horizontal Antenna
49. Interoperable Data Link Antenna
50. Pitot Tube

Figure 2-1. General Exterior Arrangement - Left Side (Sheet 2 of 6)



51. Low Band Dipole Antenna
52. High Band CTT Dipole
53. Taillet
54. High Band Intercept Dipole Antenna
55. Low Band Intercept Antenna
56. DF/ELINT Pod
57. Low Band Dipole Antenna
58. Mid Band Dipole Antenna
59. High Band Vertical Antenna
60. Bleed Air Heat Exchanger Air Inlet
61. Landing/Taxi Lights

Figure 2-1. General Exterior Arrangement - Front (Sheet 3 of 6)



62. AN/APR-39 Antenna
63. Recognition Light
64. Fuel Filler Cap
65. Ice Light
66. Auxiliary Fuel Tank Gage
67. Air Conditioner Condenser Air Outlet
68. Air Conditioner Condenser Air Inlet
69. Emergency Exit Hatch
70. Emergency Light
71. Flare/Chaff Dispenser Safety Switch
72. Chaff Dispenser
73. Chaff/Flare Dispenser
74. Emergency Locator Transmitter Antenna
75. Strake
76. Elevator Trim Tab
77. Stabilon
78. AN/APR-44 Antennas
79. Entrance Door
80. Cargo Door
81. Aileron Trim Tab

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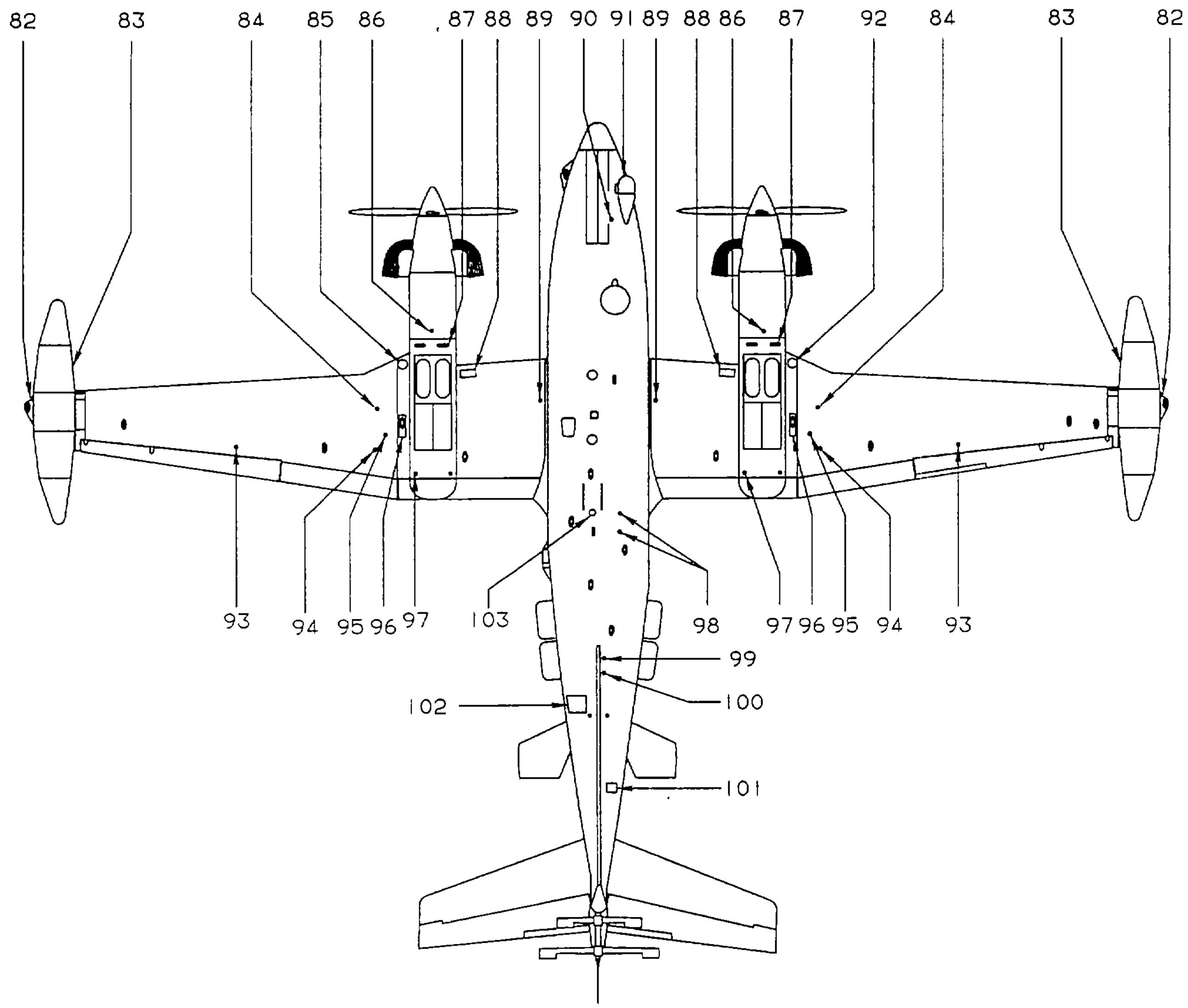
Figure 2-1. General Exterior Arrangement - Top (Sheet 4 of 6)



82. Navigation Light
83. DF/ELINT Pod
84. Leading Edge Fuel Tank Drain
85. DC External Power Receptacle
86. Firewall Fuel Filter Drain
87. Strainer Drain
88. Bleed Air Heat Exchanger Air Outlet
89. Extended Range Fuel System Drain
90. Hydraulic Reservoir Drain
91. Interoperable Data Link Antenna
92. AC External Power Receptacle
93. Outboard Wing Fuel Sump Drain
94. Ram Heated Fuel Vent
95. Recessed Fuel Vent
96. Three Phase Inverter Cooling Air Outlet
97. Engine Oil Vent
98. Antenna Deice System Boot Hold-down Ejector Tubes
99. Oxygen Regulator Vent
100. Aft Compartment Drain
101. Lightning Sensor System Antenna
102. Tailcone Access Door
103. Strobe Beacon

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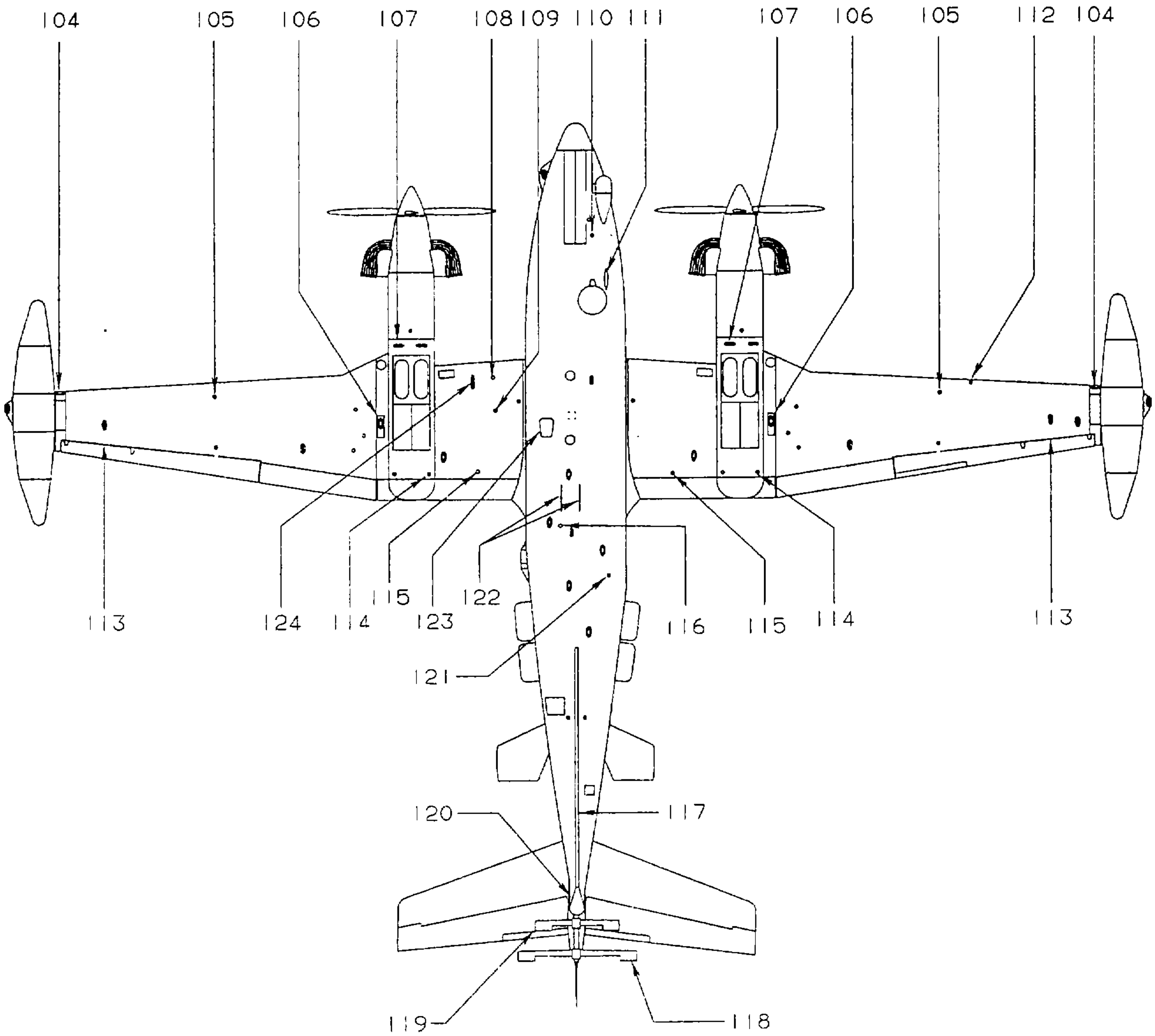
Figure 2-1. General Exterior Arrangement - Bottom 1 (Sheet 5 of 6)



104. Recognition Light
105. Tiedown Ring
106. Three Phase Inverter Cooling Air Intake
107. Standby Fuel Pump Drain
108. Battery Ram Air Vent
109. Battery Drain
110. Nose Jack Pad
111. Marker Beacon Antenna
112. Stall Warning Vane
113. Outboard Wing Fuel Vent (In Aileron Cove)
114. Gravity Fuel Line Drain
115. Wing Jack Pad
116. Surface Deice System Ejector Exhaust
117. Ventral Fin
118. Mid-band Vertical Rotating Dipole Antenna
119. Low-band Rotating Dipole Antenna
120. Aft Wide Band Data Link Antenna
121. Relief Tube Drain
122. Strobe Beacon Light Shields
123. ADF Antenna
124. Air Data Probe

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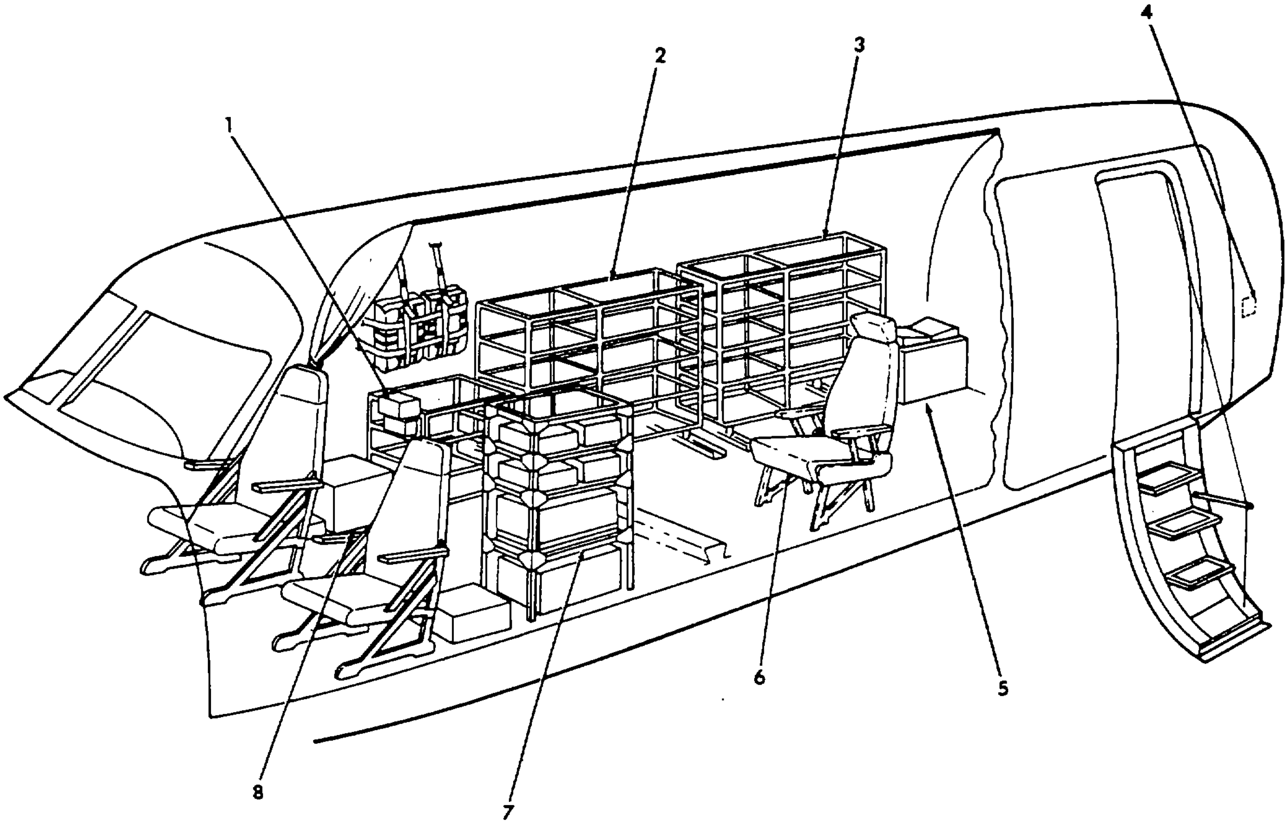
Figure 2-1. General Exterior Arrangement - Bottom 2 (Sheet 6 of 6)



1. Mission Rack #1 (Right Forward Avionics Rack)
2. Mission Rack #2
3. Mission Rack #3
4. Relief Tube
5. Toilet
6. Ferry Chair (Optional F.S. 211.87)
7. Mission Rack #4 (Left Forward Avionics Rack)
8. Mission AC/DC Power Cabinet

Figure 2-2. General Interior Arrangement

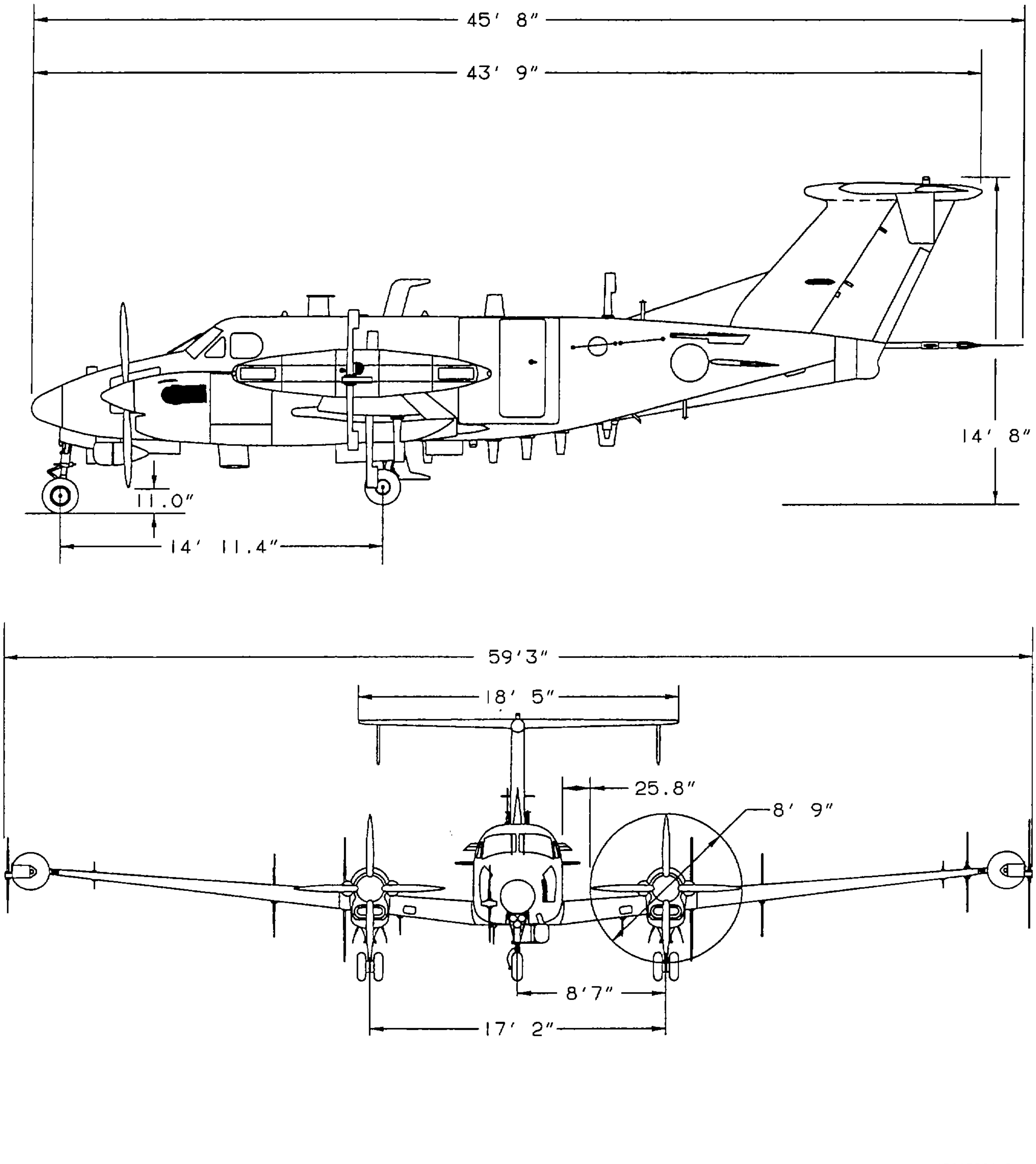
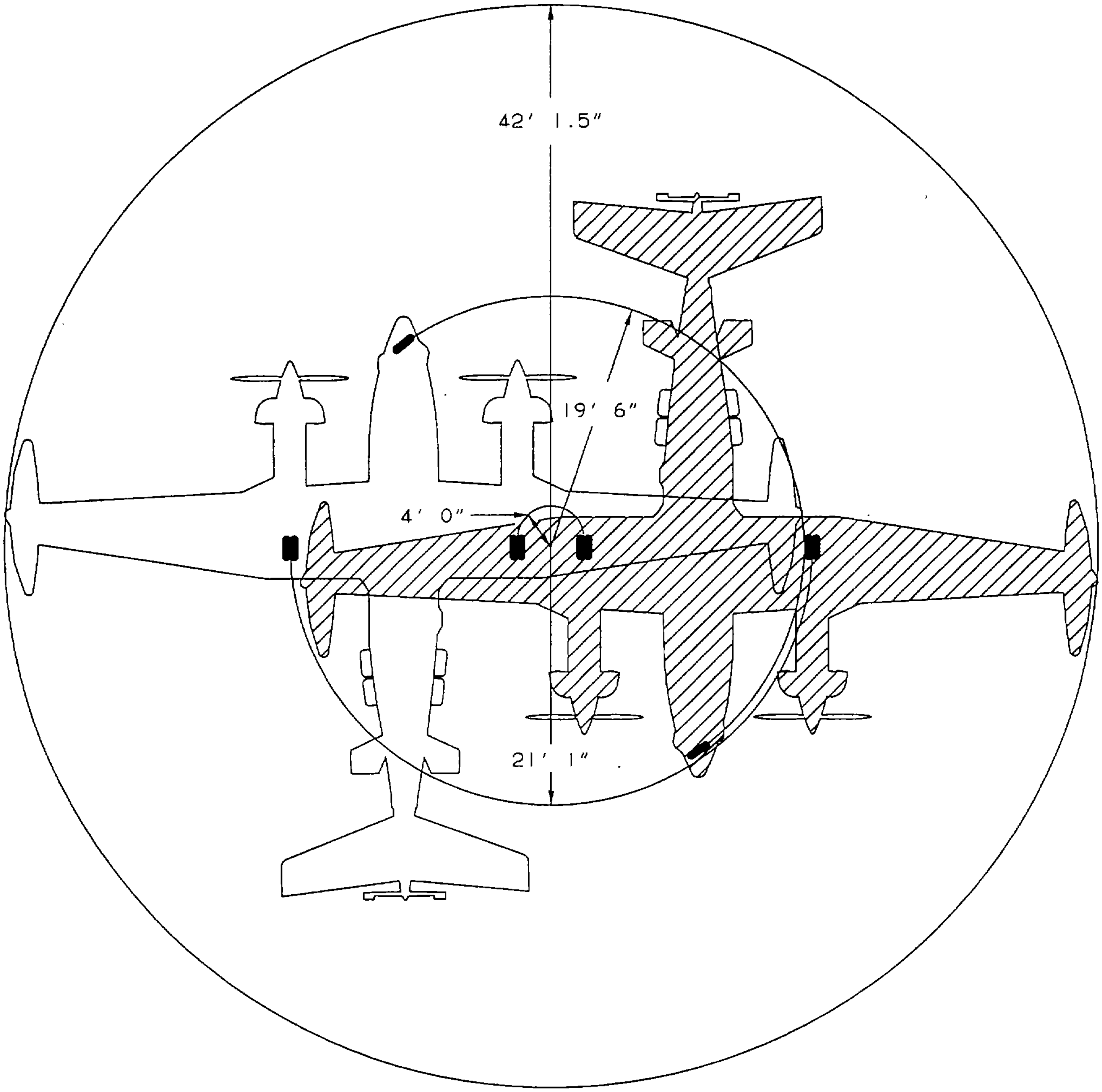


Figure 2-3. Principal Dimensions



RADIUS FOR INSIDE GEAR..................................4 FEET
RADIUS FOR NOSE WHEEL..................................19 FEET 6 INCHES
RADIUS FOR OUTSIDE GEAR...............................21 FEET 1 INCH
RADIUS FOR WINGTIP.......................................42 FEET 1.5 INCHES

TURNING RADII ARE PREDICATED ON THE USE OF DIFFERENTIAL BRAKING ACTION AND DIFFERENTIAL POWER. ACTUAL TURNING RADII DEPEND ON SURFACE CONDITIONS AND PILOT TECHNIQUE.

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Figure 2-4. Ground Turning Radius

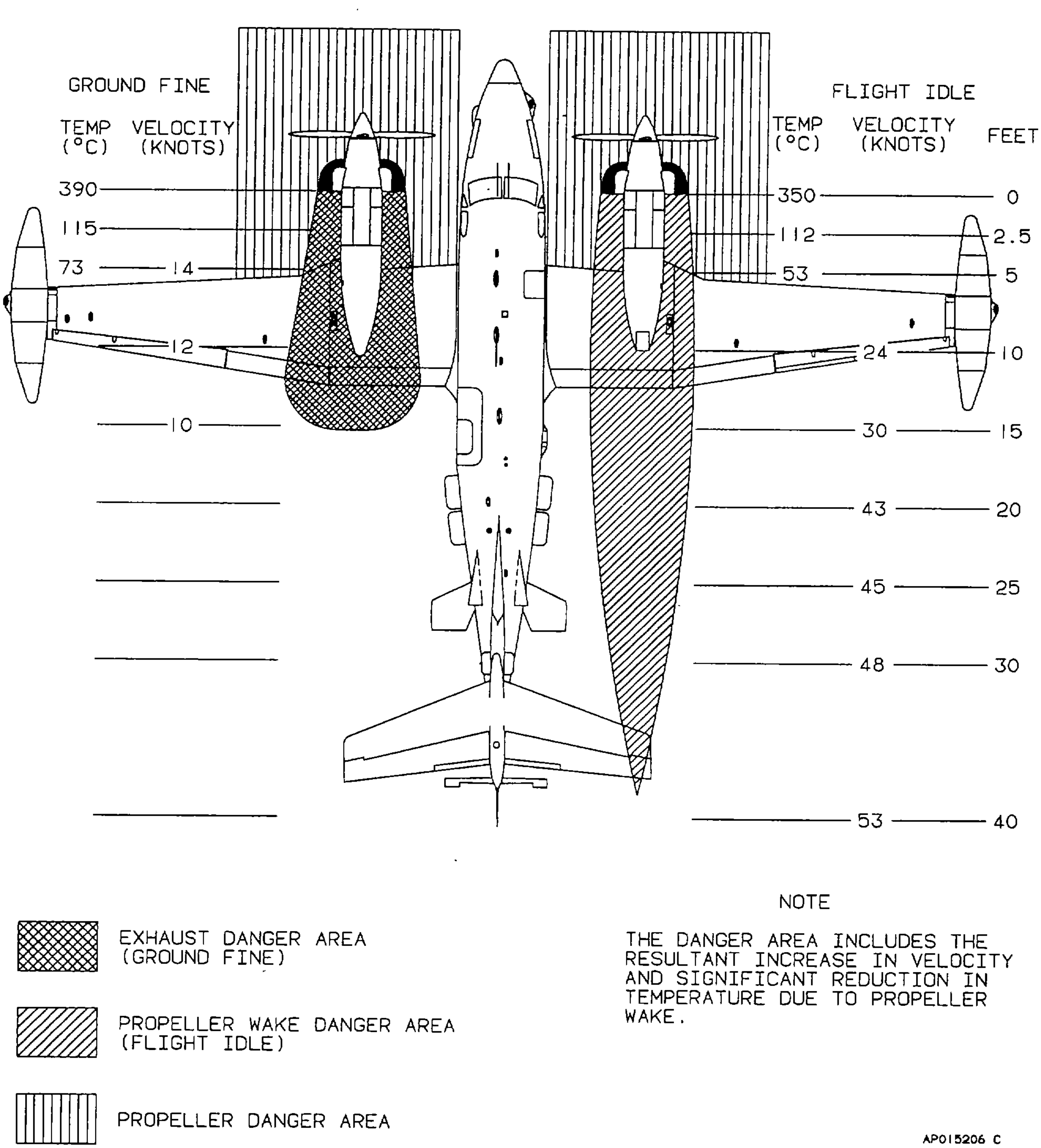
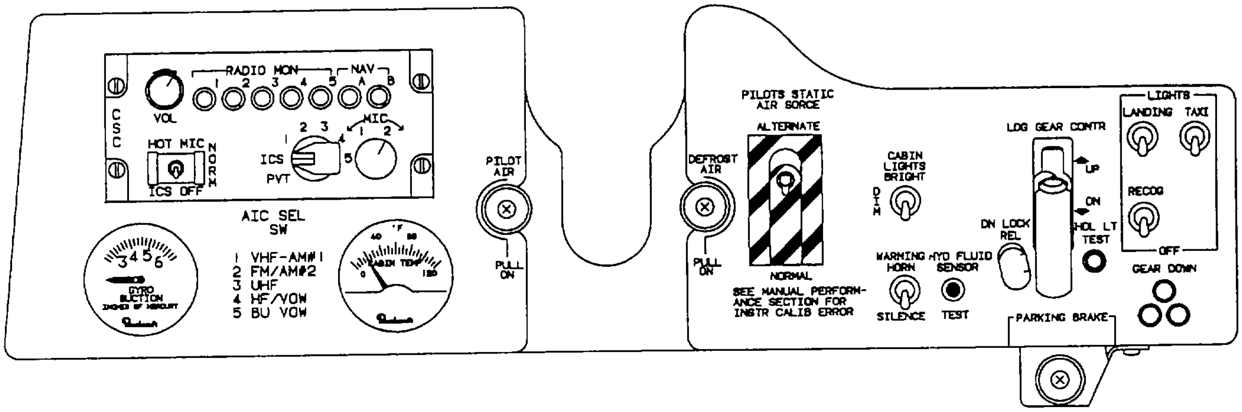
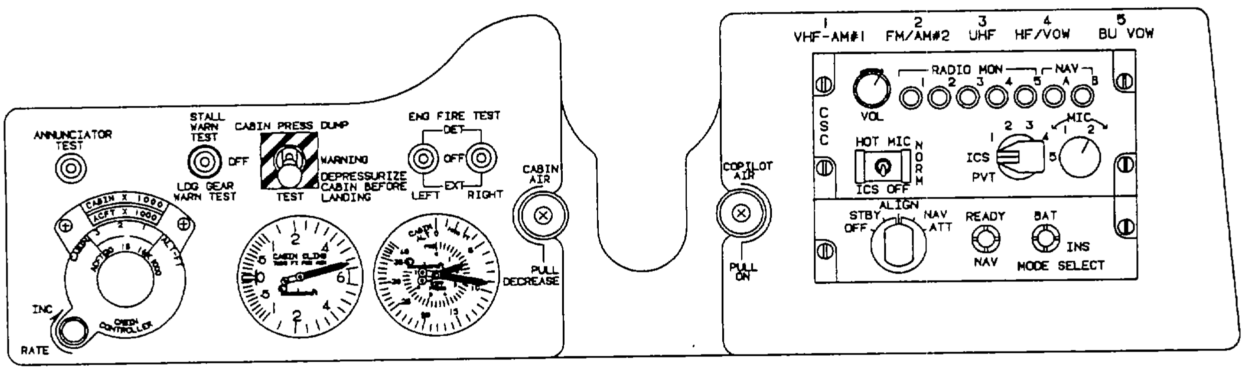


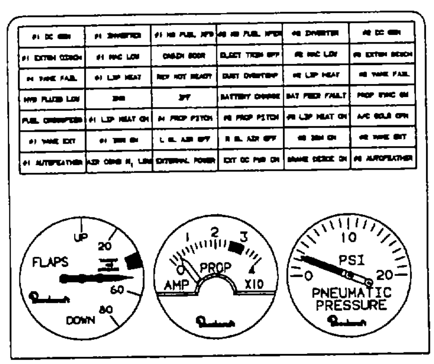
Figure 2-5. Exhaust and Propeller Danger Area



PILOT'S SUBPANEL



COPILOT'S SUBPANEL



CENTER SUBPANEL

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Figure 2-6. Subpanels

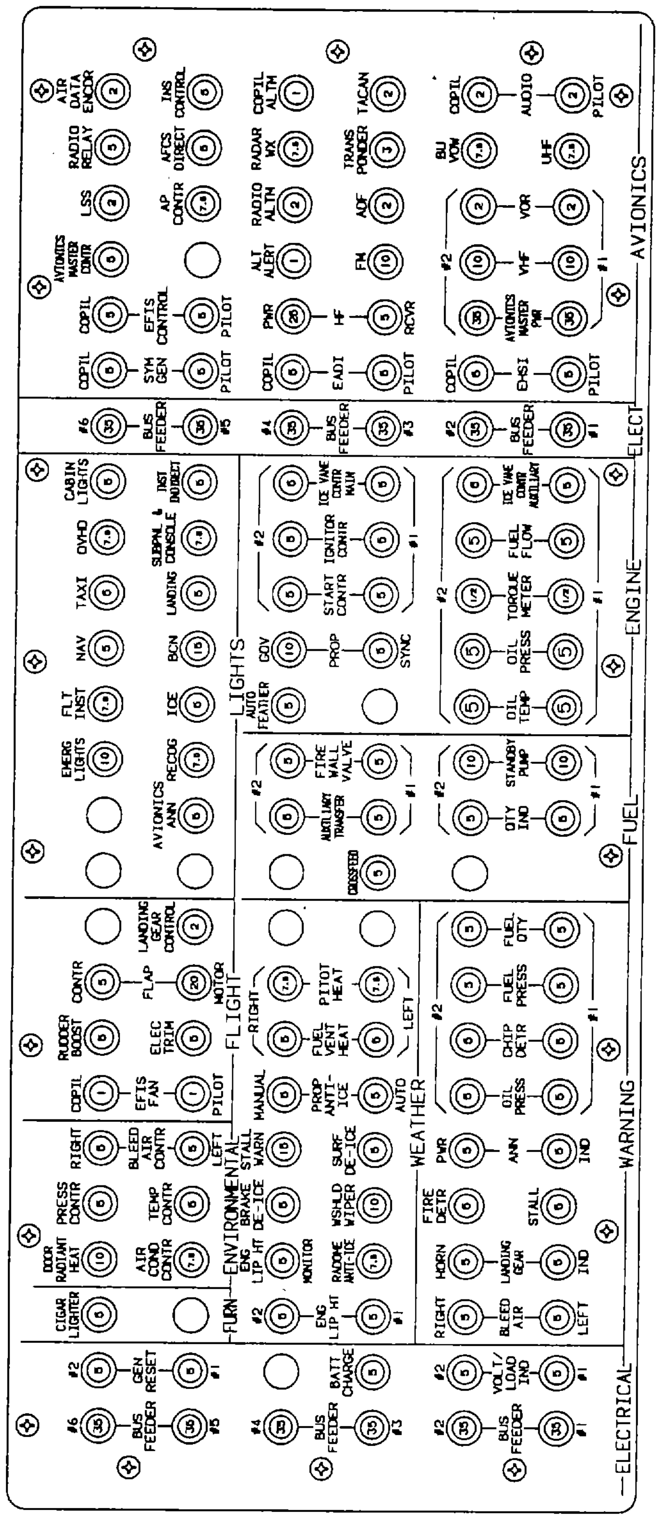

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Figure 2-7. Overhead Circuit Breaker Panel

The landing gear system utilizes folding braces called drag legs, that lock into place when the gear is fully extended The nose landing gear actuator incorporates an internal down lock to hold the gear in the fully extended position. However, the two main landing gear are held in the fully extended position by mechanical hook and pin locks. The landing gear is held in the up position by hydraulic pressure. The pressure is controlled by the power pack pressure switch and an accumulator that is precharged with nitrogen to 800 ±50 psi. Gear doors are opened and closed through a mechanical linkage connected to the landing gear. The nose wheel steering mechanism is automatically centered and the rudder pedals relieved of the steering load when the landing gear is retracted. Air-oil type shock struts, filled with compressed nitrogen and hydraulic fluid, are incorporated with the landing gear.

a. Landing Gear Control Switch. Landing gear system operation is controlled by a manually actuated wheel-shaped switch placarded LDG GEAR CONTR - UP - DN, on the pilot's subpanel (fig. 2-6). The control switch and associated relay circuits are protected by a 2-ampere circuit breaker, placarded LANDING GEAR CONTROL located on the overhead circuit breaker panel (fig. 2-7).

b. Landing Gear Down Position Indicator Lights. Visual indication of the landing gear position is provided by three individual green GEAR DOWN position indicator lights located on the pilot's subpanel. Testing of the indicator lights is accomplished by pressing the annunciator test switch. The circuit is protected by a 5-ampere circuit breaker, placarded LANDING GEAR IND, on the over-head circuit breaker panel (fig. 2-7).

c. Landing Gear Position Warning Lights. Two red parallel-wired indicator lights, located in the LDG GEAR CONTROL switch handle, illuminate to show that the gear is in transit or unlocked. The red indicator lights in the handle also illuminate when the landing gear warning horn is actuated. Both red indicator lights indicate the same warning conditions, but two are provided for a fail-safe indication in case one bulb bums out The circuit is protected by a 5-ampere circuit breaker, placarded LANDING GEAR IND, on the overhead circuit breaker panel (fig. 2-7).

d. Landing Gear Warning Indicator Light Test Switch. A test switch, placarded HDL LT TEST, is located in the pilot's subpanel (fig. 2-6). Failure of the landing gear handle to illuminate red when this test switch is pressed, indicates two defective bulbs or a circuit fault The circuit is protected by a 5-ampere circuit breaker, placarded LANDING GEAR HORN, on the overhead circuit breaker panel (fig. 2-7).

e. Landing Gear Warning System. The landing gear warning system is provided to warn the pilot that the landing gear is not down and locked during specific flight regimes. Various warning modes result, depending upon the position of the flaps.

At airspeeds above 140 KIAS with flaps in the UP or APPROACH position and either or both POWER levers retarded below approximately 84% N_1, the landing gear switch handle annunciator will illuminate. The horn is automatically silenced by an altitude sensing switch, provided to silence the landing gear warning horn when above 12,500 feet. This prevents the horn from sounding above 12,500 feet when either POWER lever is pulled back, provided the flaps are at the approach position or above.

At airspeeds below 140 KIAS with flaps in the UP or APPROACH positions with either or both POWER levers retarded below approximately 84% N_1, the warning horn will sound and the landing gear switch handle indicator lights will illuminate. The horn can be silenced by moving the WARNING HORN SILENCE switch located adjacent to the landing gear switch handle, to the up position. However, the annunciators in the landing gear switch handle cannot be canceled. The gear warning silence switch is a magnetically held switch. Once actuated it will stay in the up position until both POWER levers are advanced above 86% N_1, and/or airspeed increases above approximately 153 KIAS.

In either case (airspeeds above or below 140 KIAS) the landing gear warning system will be rearmed if both power levers are advanced above 86% N_1.

With the landing gear retracted and flaps beyond the APPROACH position, the warning horn and landing gear switch handle annunciators will be activated regardless of the power setting. The horn cannot be silenced in this case, until either the landing gear is lowered, or the flaps are retracted to the UP or APPROACH position.

f. Landing Gear Warning Horn Test Switch. The warning horn and gear handle indicator lights can be tested by placing the switch placarded STALL WARN TEST - OFF - LDG GEAR WARN TEST to the LDG GEAR WARN TEST position (fig. 26). The gear handle warning lights will illuminate, and the warning horn will sound. Releasing the LDG GEAR WARN TEST switch to the OFF position will extinguish the gear handle indicator lights, and silence the warning horn. The landing gear warning horn circuit is protected by a 5-ampere circuit breaker, placarded LANDING GEAR HORN, located on the overhead circuit breaker panel (fig. 2-7).

g. Landing Gear Safety Switches. A safety switch on each main landing gear shock strut controls the operation of various aircraft systems that function only during flight or only during ground operation. These switches are mechanically actuated whenever the main landing gear shock struts are extended (normally after takeoff), or compressed (normally after landing). The safety switch on the right main landing gear strut deactivates the landing gear control circuits, cabin pressurization circuits, and the flight hour meter when the shock strut is compressed. This switch also activates a downlock hook, preventing the landing gear from being raised while the aircraft is on the ground. The hook, which unlocks automatically after takeoff, can be manually overridden by pressing down on the red button, placarded DN LOCK REL located adjacent to the landing gear handle (fig. 2-6). If the override is used, the landing gear warning horn will sound intermittently and two red parallel-wired indicator lights located in the landing gear control switch handle will illuminate, provided the BATTERY switch is on. The safety switch on the left main landing gear strut activates the left and right engine ambient air shut-off valves when the strut is extended.

h. Landing Gear Alternate Extension.

WARNING

After an emergency landing gear extension has been made, do not move any landing gear controls, or reset any switches or circuit breakers until the aircraft is on jacks. The failure may have been in the gear-up circuit which could cause the gear to retract while the aircraft is on the ground.

If for any reason the three green GEAR DOWN indicator lights do not illuminate (e.g., in case of an electrical system failure), continue pumping until sufficient resistance is felt to ensure that the gear is down and locked. Do not stow the hand pump handle. Stowing the handle will release hydraulic pressure. If the three GEAR DOWN indicator lights are not illuminated, the landing gear downlocks may not be engaged and hydraulic pressure may be the only thing holding the landing gear down.

An extension lever, placarded LANDING GEAR ALTERNATE EXTENSION, is located on the floor between the crew seats. A manual pumping action with the handle lowers the landing gear. The hydraulic pump, which is utilized to manually lower the gear is located under the floor.

To engage the system, pull the LANDING GEAR CONTROL circuit breaker, located on the overhead circuit breaker panel (fig. 2-7), and ensure that the LDG GEAR CONTR handle is in the DN position. Remove the extension lever from the securing clip and pump the lever up and down until the three green GEAR DOWN indicator lights illuminate. As the handle is moved, hydraulic fluid is drawn from the hand pump suction port of the power pack and routed through the hand pump pressure port to the actuators. After an alternate extension of the landing gear, ensure that the extension lever is in the full down position prior to stowing the pump handle in the retaining clip. When the pump handle is stowed, an internal relief valve is actuated to relieve the hydraulic pressure in the pump.

After a practice alternate extension, stow the extension handle, reset the LANDING GEAR CONTROL circuit breaker, and retract the gear in the normal manner with the landing gear control handle.

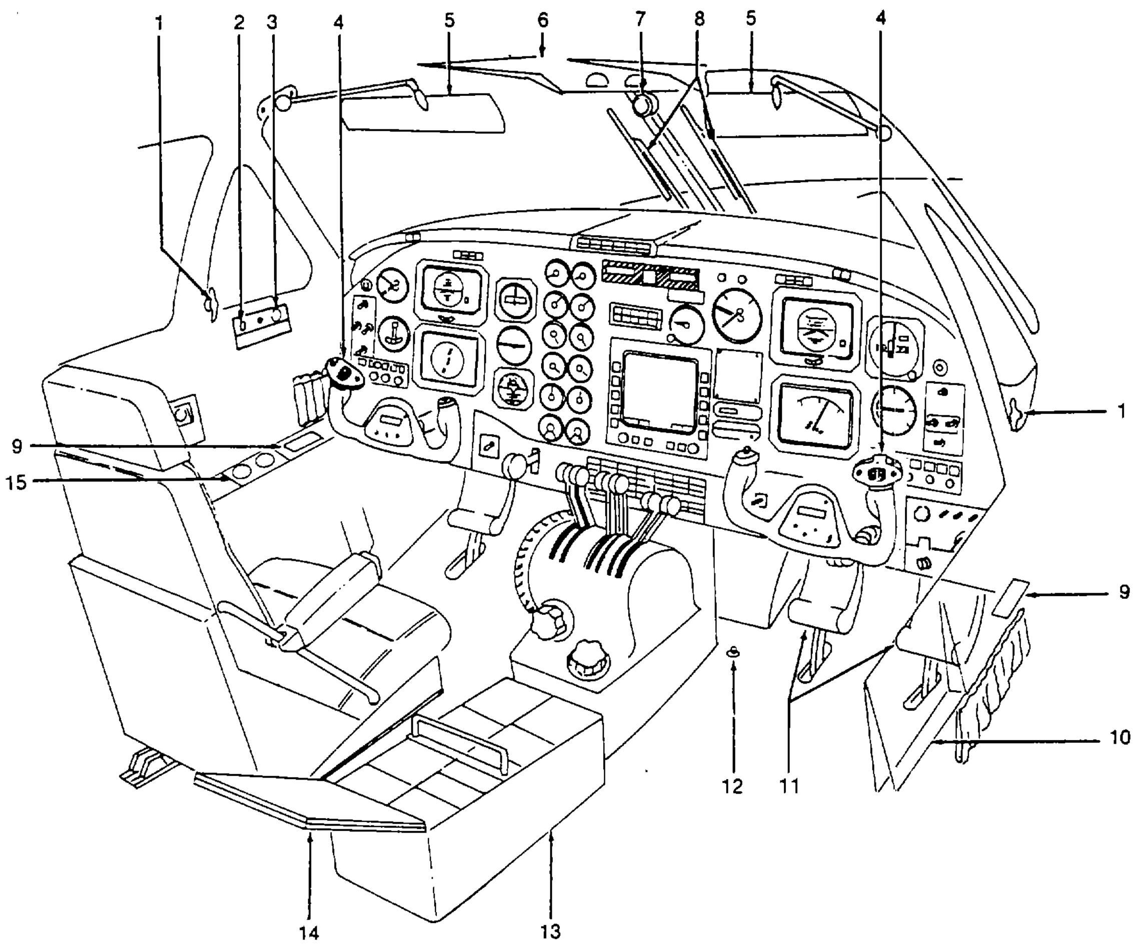
i. Tires. The aircraft is equipped with dual 22 x 6.75 x 10, 8 ply rated, tubeless rim-inflation tires on each main gear and a 22 x 6.75 x 10, 8 ply rated, tubeless tire on the nose wheel.

j. Steerable Nose Wheel. The aircraft is maneuvered on the ground by the steerable nose wheel system. Direct linkage from the rudder pedals (fig. 2-8) to the nose wheel steering linkage allows the nose wheel to be turned 12° to the left of center or 14° to the right. When rudder pedal steering is augmented by main wheel braking action, the nose wheel can be deflected up to 48° either side of center. Shock loads which would normally be transmitted to the rudder pedals are absorbed by a spring mechanism in the steering linkage. Retraction of the landing gear automatically centers the nose wheel and disengages the steering linkage from the rudder pedals.

k. Wheel Brake System. The main wheels are equipped with multiple-disc hydraulic brakes, actuated by master cylinders attached to the toe brake sections of the rudder pedals. Brake fluid is supplied to the system from a reservoir in the nose compartment Braking is permitted from either set of rudder pedals. No emergency brake system is provided. Repeated application of brakes with insufficient cooling time between applications will cause a loss of braking efficiency, and may cause brake or wheel failure, tire blowout, or destruction of wheel assembly by fire.

2-8. PARKING BRAKE.

Dual parking brake valves are installed below the cock-pit floor. Both valves can be closed simultaneously by pressing both brake pedals to build up pressure, then pulling out the handle placarded PARKING BRAKE, on the pilot's subpanel (fig. 2-6). Pulling the handle full out sets the check valves in the system and any pressure being applied by the toe brakes is maintained The parking brake is released when the brake handle is pushed in. The parking brake may be set from either cockpit position. The parking brake shall not be set during flight.



NOTE:
COPILOT SEAT REMOVED FOR CLARITY

1. Storm Window Lock
2. Cigar Lighter
3. Free Air Temperature Gage
4. Control Wheel
5. Sun Visor
6. Overhead Circuit Breaker Panel, Overhead Control Panel, and Fuel Management Panel
7. Magnetic Compass
8. Windshield Wiper
9. Oxyen Regulator Control Panel
10. Mission Control Panel
11. Rudder Pedals
12. Foot-Operated Microphone Switch
13. Pedestal Extension
14. Assist Step
15. Oxygen System Pressure Gages

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Figure 2-8. Cockpit

2-9. ENTRANCE AND EXIT PROVISIONS.

NOTE

Two keys are provided in the loose tools and equipment bag. Both keys will fit the locks on the cabin door, emergency hatch, tailcone access door, and the right and left nose avionics compartment doors.

a. Cabin Door.

CAUTION

Structural damage may occur if more than one person is present on the airstair cabin door at one time. The door is weight limited to 300 pounds.

An airstair door (fig. 2-9), hinged at the bottom, provides a stairway for normal and emergency entrance and exit. Two of the steps fold flat against the door in the closed position. A step folds down over the door sill when the door opens to provide a platform (step) for door seal protection. A plastic-encased cable provides a handhold and support for the door in the open position and a convenience for closing the door from inside. A hydraulic damper permits the door to lower gradually during opening. A rubber seal around the door, seals the pressure vessel while the aircraft is in flight. The door locking mechanism is operated by either of the two mechanically interconnected handles, one inside and the other outside the door. When either handle is rotated, three rotating cam-type latches on either side of the door capture posts mounted on the cargo door. In the closed position, the door becomes an integral part of the cargo door. A button adjacent to the door handle must be depressed before the handle can be rotated to open the door. A bellows behind the button is inflated when the air-craft is pressurized to prevent accidental unlatching and/or opening of the door. A placard adjacent to the window instructs the operator that the safety lock arm is in position around the bellows shaft which indicates a properly locked door. Pushing the red button adjacent to the window will illuminate the inside door mechanism. A CABIN DOOR annunciator on the caution/ advisory panel will illuminate if the door is not closed and all latches fully locked. The cabin door opening is 21.5 inches wide by 50.0 inches high.

b. Cargo Door. A swing-up door (fig. 2-9), hinged at the top, provides access for loading cargo or bulky items. The cargo door opening is 52.0 inches wide by 52.0 inches high. After initial opening force is applied, gas springs will completely open the cargo door automatically. The door is counterbalanced and will remain in the open position. A door support rod is used to hold the door in the open position, and to aid in overcoming the pressure of the gas spring assemblies when closing the door. Once closed, the gas springs apply a closing force to assist in latching the door. A rubber seal around the door seals the pressure vessel while in flight The door locking mechanism is operated only from inside the aircraft, and is operated by two handles, one in the bottom forward portion of the door and the other in the upper aft portion of the door. When the upper aft handle is operated per placard instructions, two rotating cam-type latches on the forward side of the door and two on the aft side, rotate, capturing posts mounted on the fuselage side of the door opening. The bottom handle, when operated per placard instructions, actuates four pin-lug latches across the bottom of the door. A button on the upper aft handle must be pressed before the handle can be released to open or latch the door. A latching lever on the bottom handle must be lifted to release the handle before the lower latches can be opened. These act as additional aids in preventing accidental opening or unlatching of the door. The cabin and cargo doors are equipped with dual sensing circuits to provide the crew with remote indication of cabin/cargo door security. An annunciator placarded CABIN DOOR will illuminate if the cabin or cargo door is open and the BATTERY switch is on. If the BATTERY switch is off, the annunciator will illuminate only if the cabin door is not securely closed and latched. The cabin/cargo door sensing circuit receives power from the hot battery bus.

CAUTION

When operating the cargo door, ensure that the cabin door is closed and locked. Operating the cargo door while the cabin door is open may damage the door hinge and adjacent structure.

(1) Opening the cargo door.

CAUTION

Avoid side loading of the gas springs to prevent damage to the mechanism.

1. Handle access door (lower forward comer of door) - Unfasten and open.
2. Handle - Lift hook and move to OPEN position.
3. Handle access door - Secure.
4. Handle access door (upper aft comer of door) - Unfasten and open.

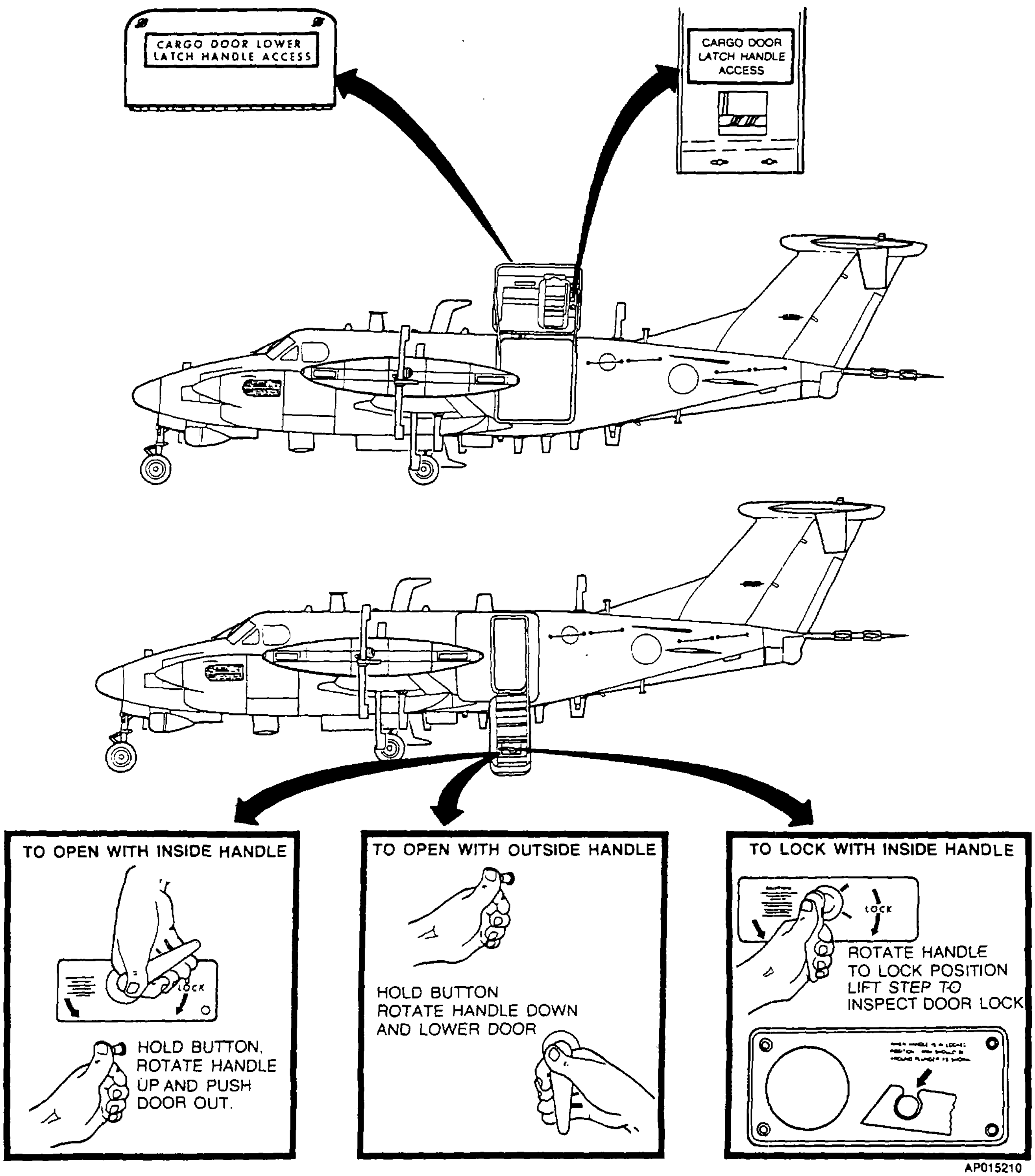


Figure 2-9. Cabin and Cargo Doors

5. Handle - Press button and lift to OPEN position then latch in place.
6. Handle access door - Secure.
7. Door support rod - Attach one end to cargo door ball stud (on forward side of door).
8. Support rod detent pin - Check in place.
9. Cabin door sill step - Push out on and allow cargo door to swing open. Gas springs will automatically open the door.
10. Door support rod - Attach free end to ball stud on forward fuselage door frame.

(2) *Closing the cargo door.*

CAUTION

Avoid side loading of the gas springs to prevent damage to the mechanism.

1. Door support rod - Detach from fuselage door frame ball stud, then firmly grasp free end of rod while exerting downward force to overcome the pressure of gas spring assemblies, then remove support rod from door as gas spring assemblies pass the over-center position
2. Cargo door - Pull closed, using finger hold cavity in fixed cabin door step.
3. Handle access door (upper aft comer of door) - Unfasten and open.
4. Handle - Press button and pull handle down until it latches in closed position.
5. Handle access door - Secure-
6. Handle access door (lower forward comer of door) - Unfasten and open.
7. Handle - Move to full forward position.
8. Safety hook - Check locked in position by pulling aft on handle.
9. Handle access door - Secure.

c. Cabin Door Annunciator. As a safety precaution, two illuminated MASTER CAUTION annunciators in the glare shield and a steadily illuminated CABIN DOOR amber caution annunciator on the caution/advisory panel indicate the cabin door is not closed and locked. This circuit is protected by the two, 5-ampere circuit breakers, placarded ANN PWR and ANN IND located on the over-head circuit breaker panel (fig. 2-7).

d. Cabin Emergency Exit Hatch. The cabin emergency hatch, placarded EXIT - PULL, is located on the right cabin sidewall just aft of the copilot's seat. The hatch may be released from the inside with a pull-down handle. A flush-mounted, pull out handle allows the hatch to be released from the outside. The hatch is of the non-hinged plug type which removes completely from the frame when the latches are released. The hatch can be key locked from the inside to prevent opening from the outside. The inside handle will unlatch the escape hatch whether or not it is locked, by overriding the locking mechanism. The keylock should be unlocked prior to flight to allow removal of the escape hatch from the outside in the event of an emergency. The key remains in the lock when the hatch is locked and can be removed only when the hatch is unlocked. The key slot is in the vertical position when the hatch is unlocked. Removal of the key from the lock before flight assures the pilot that the hatch can be removed from the outside if necessary.

2-10. WINDOWS.

a. Cockpit Windows. The pilot and copilot have side windows, a windshield, and storm windows, which provide visibility from the cockpit The storm windows may be opened on the ground or during unpressurized flight

b. Cabin Windows. The outer cabin windows, constructed of two-ply stretched acrylic, are of the pressure type and are an integral part of the pressure vessel. The windows have flaps which may be removed to permit visibility or installed to black out the windows.

2-11. SEATS.

a. Pilot's and Copilot's Seats. The controls for vertical height adjustment and fore and aft travel are located under each seat. The forward and aft adjustment handle is located beneath the lower front inboard comer of each seat. Pulling up on the handle allows the seat to move fore or aft. The height adjustment handle is located beneath the lower front outboard comer of each seat. Pulling up on the handle, allows the seat to move up and down. Both seats have adjustable headrests and armrests which will raise and lower for access to the cockpit. Handholds on either side of the overhead panels and a fold-away protective pedestal step are provided for pilot and copilot entry into the cock-pit. For the storage of maps and the operator's manual pilot's and copilot's seats have an inboard-slanted expandable pocket affixed to the lower portion of the seat back. Pocket openings are held closed by shock cord tension (fig. 2-10).

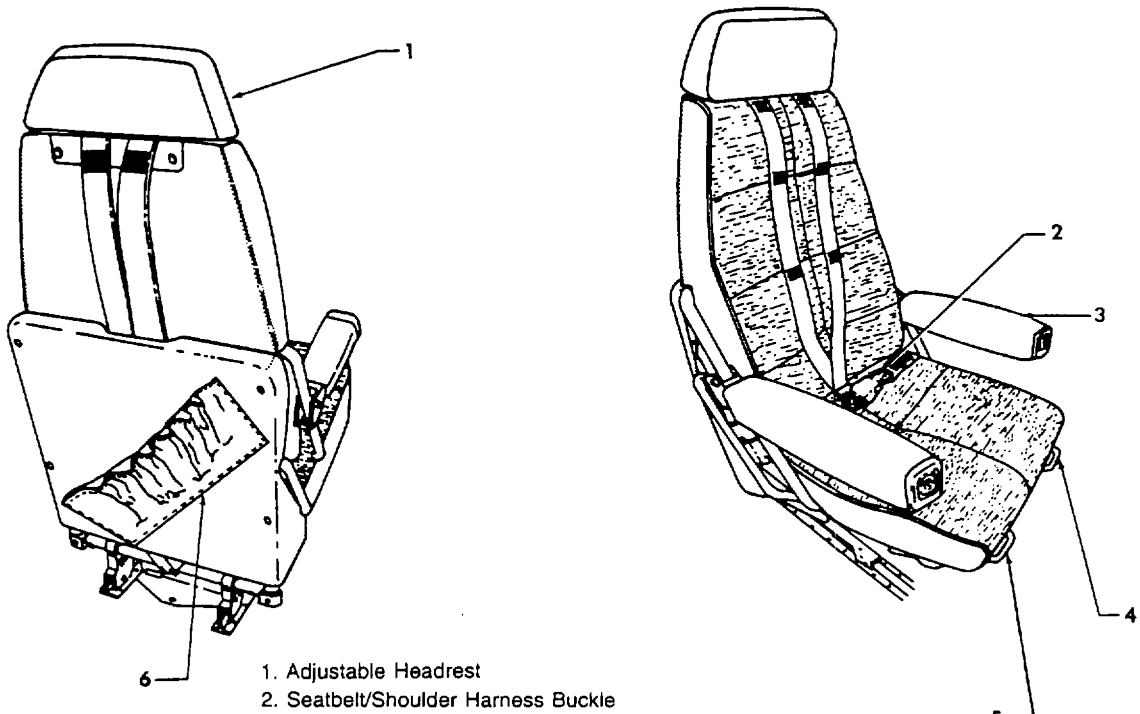


Figure 2-10. Pilot's and Copilot's Seats

b. Pilot's and Copilot's Seat Belts and Shoulder Harnesses. The pilot's and copilot's seats are equipped with laptype seat belts and shoulder harnesses connected to an inertia reel. The shoulder harness belt is of the Y configuration with the single strap being contained in an inertia reel attached to the base of the seatback. The two straps are worn with one strap over each shoulder and fastened by metal loops into the seat belt buckle. The spring loading at the inertia reel keeps the harness snug but will allow normal movement required during flight operations. The inertia reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action.

Section II. EMERGENCY EQUIPMENT

2-12. DESCRIPTION.

The equipment covered in this section includes all emergency equipment, except that which forms part of a complete system. For example, landing gear system, etc. Chapter 9 describes the operation of emergency exits and location of all emergency equipment

2-13. FIRST AID KITS.

Three first aid kits are included in the survival kit.

2-14. HAND-OPERATED FIRE EXTINGUISHER.

WARNING

Repeated or prolonged exposure to high concentrations of monobromotrifluoromethane (CF_3Br) or decomposition products should be avoided. The liquid shall not be allowed to come into contact with the skin, as it may cause frost bite or low temperature burns because of its very low boiling point

One hand-operated fire extinguisher is mounted below the pilot's seat and a second and a second extinguisher is located in the left cabin sidewall, aft of the cabin door.

They are of the monobromotrifluoromethane (CF_3Br) type. The extinguisher is charged to a pressure of 150 to 170 PSI and emits a forceful stream. Use an extinguisher with care within the limited area of the cabin to avoid severe splashing.

NOTE

Engine fire extinguisher systems are described in Section III.

2-15. SURVIVAL KITS.

Tie-down provisions for three survival rafts and kits are provided just aft of the toilet on the right side of the aft cabin area.

Section III. ENGINES AND RELATED SYSTEMS

2-16. ENGINES.

The aircraft is powered by two PT6A-67 turboprop engines, rated at 1200 SHP (fig. 2-11). Each engine is equipped with a hydraulically controlled, reversible, constant-speed, four-bladed full-feathering propeller. The engines are reverse-flow free turbines, employing four-stage axial compressors and single-stage centrifugal compressors in combination, driven by the gas generator turbine. The gas generator turbine and the two power turbines are in line with each other and have opposite rotations. The power turbines are connected through planetary reduction gearing to a flanged propeller shaft. The oil tank, filler cap and dipstick are an integral part of the engine.

Being a reverse flow engine, the ram air supply enters the lower portion of the nacelle and is drawn in through the aft protective screens. The air is then routed into the compressor. After it is compressed, it is forced into the annular combustion chamber, and mixed with fuel that is sprayed in through 14 nozzles mounted around the gas generator case. A capacitance discharge ignition unit and two spark igniter plugs are used to start combustion. After combustion, the exhaust passes through the compressor turbine and two stages of power turbines, then is routed through two exhaust ports near the front of the engine. A pneumatic fuel control system schedules fuel flow to maintain power set by the gas generator POWER lever. The accessory drive at the aft end of the engine provides power to drive the fuel pumps, fuel control, oil pumps, refrigerant compressor (right engine), starter/generator, and the tachometer generator. The reduction gearbox forward of the power turbine provides gearing for the propeller and drives the propeller tachometer generator, the propeller overspeed governor, and the propeller primary governor.

2-17. ENGINE COMPARTMENT COOLING.

The forward engine compartment including the accessory section is cooled by air entering around the exhaust stack cutouts, the gap between the propeller spinner and forward cowling, and exhausting through louvers in the upper forward aid aft cowling.

2-18. AIR INDUCTION SYSTEMS - GENERAL.

Each engine and oil cooler receives ram air, ducted from separate air inlets located within the lower section of the forward nacelle. Induction system components protect the power plant from icing and reduce the possibility of foreign object damage.

2-19. FOREIGN OBJECT DAMAGE CONTROL.

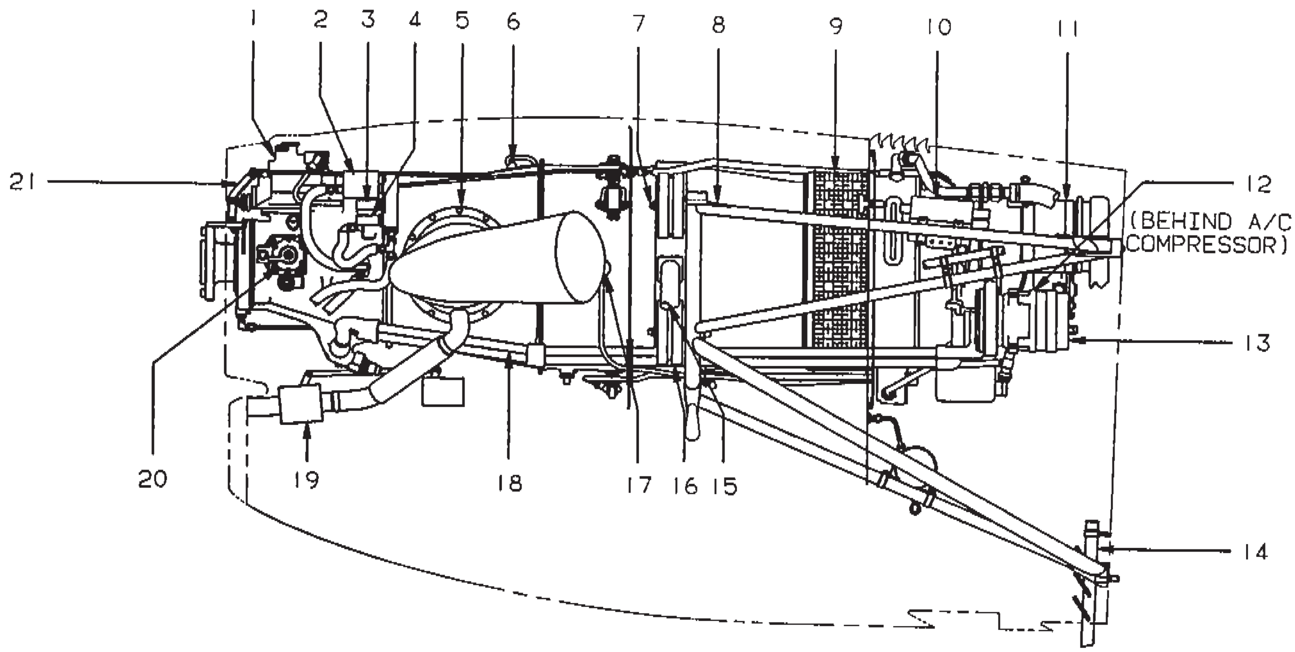
The engine has an integral air inlet screen designed to obstruct objects large enough to damage the compressor.

2-20. ENGINE ICE PROTECTION SYSTEMS.

a. Inertial Separator. An inertial separation system is built into each engine air inlet to prevent moisture particles from entering the engine inlet plenum under icing conditions. A movable vane and a bypass door are lowered into the airstream when operating in visible moisture at 5 °C or colder, by energizing electrical actuators with the switches, placarded # 1 and # 2 ICE VANE CONTROL - ON, located on the overhead control panel (fig. 2-13). The system incorporates an electrical back-up system which operates identically to the main system. The back-up ice vane system is controlled by two switches placarded #1 and #2 ICE VANE POWER SELECT - MAIN - STANDBY, located on the overhead control panel (fig. 2-13). If the main system fails, placing the switch in the STBY position will allow use of the back-up system. Electrical protection is provided through two 5-ampere circuit breakers placarded ICE VANE CONTR MAIN and ICE VANE CONTR AUXILIARY, located on the overhead circuit breaker panel.

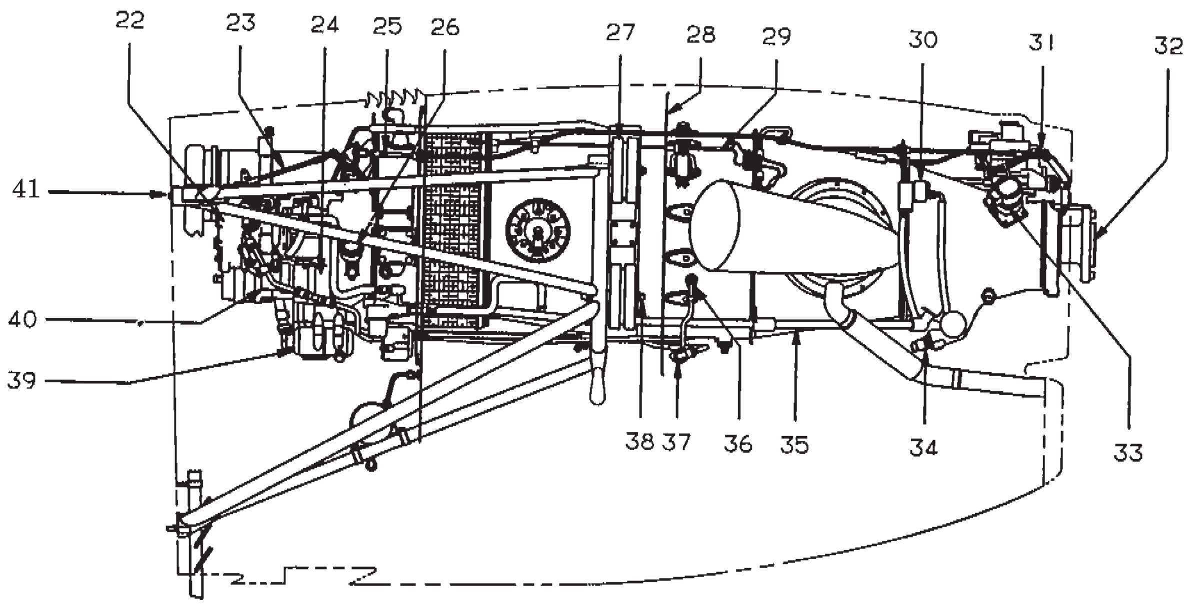
b. Engine Ice Protection Systems Operation. The vane deflects the ram airflow slightly downward to introduce a sudden turn in the airflow to the engine, causing the moisture particles to continue on undeflected, because of their greater momentum, and be discharged overboard.

Once the ice vane system is actuated, the extended position of the vane and bypass door is indicated by green annunciators, placarded # 1 VANE EXT and #2 VANE EXT located on the caution/advisory panel. If for any reason the vane(s) do not attain the selected position within 33 seconds, an amber #1 VANE FAIL or # 2 VANE FAIL annunciator(s) illuminates on the caution/ advisory panel.



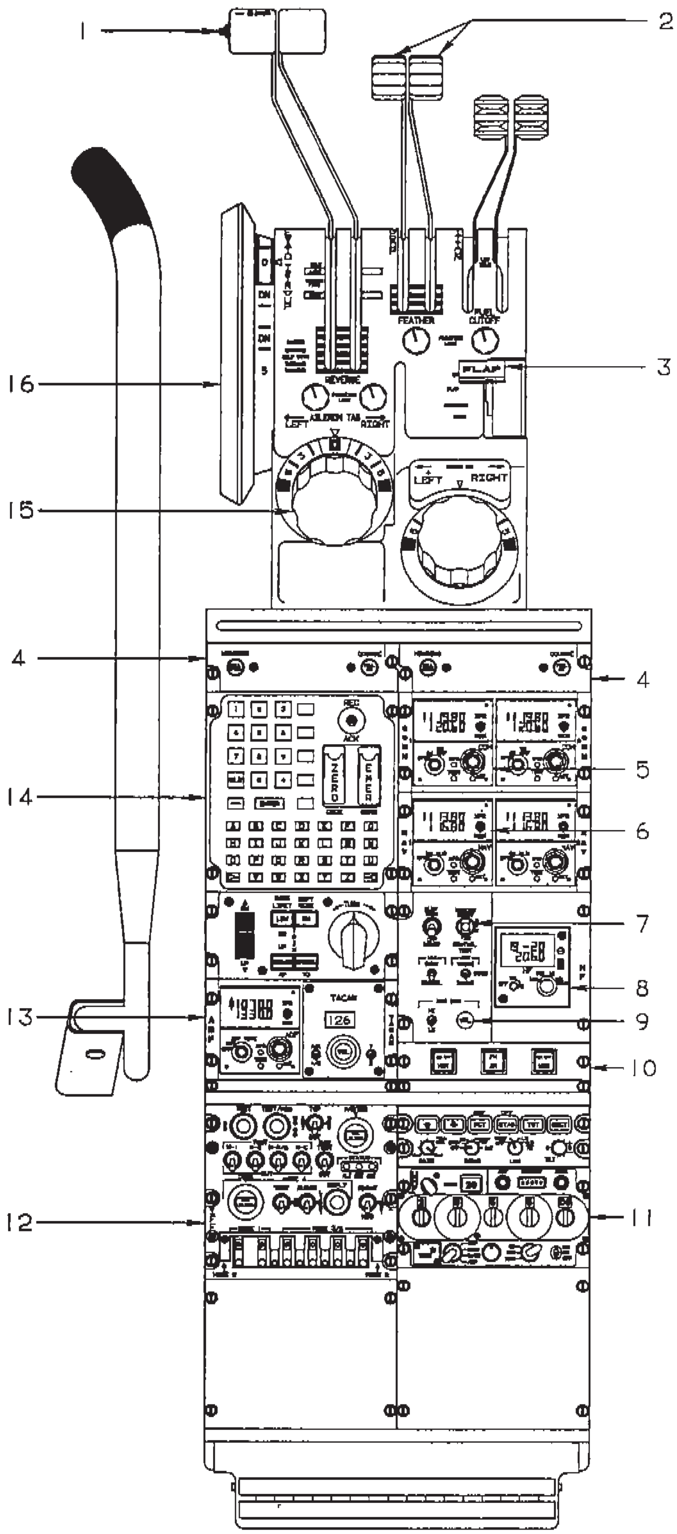
1. Prop Governor
2. Torque Transmitter
3. Pressure Switch (High)
4. Pressure Switch (Low)
5. Exhaust Duct
6. TGT Wire Harness
7. Engine Mount Isolator Bolt
8. Engine Mount Truss Assembly
9. Engine Air Intake Screen
10. Ignition Exciter
11. Starter-Generator
12. Fuel Boost Pump (Behind A/C Compressor)
13. Air Conditioner Compressor (#2 Engine Only)
14. Drain Manifold
15. Bleed Air Line
16. Engine Mount Isolator
17. Spark Igniter Plug (Behind Exhaust Stack)
18. Oil Scavenge Tubes
19. Engine Inlet Heat Shutoff Valve
20. Overspeed Governor
21. Prop Reverse Linkage Lever

Figure 2-11. Engine (Sheet 1 of 2)



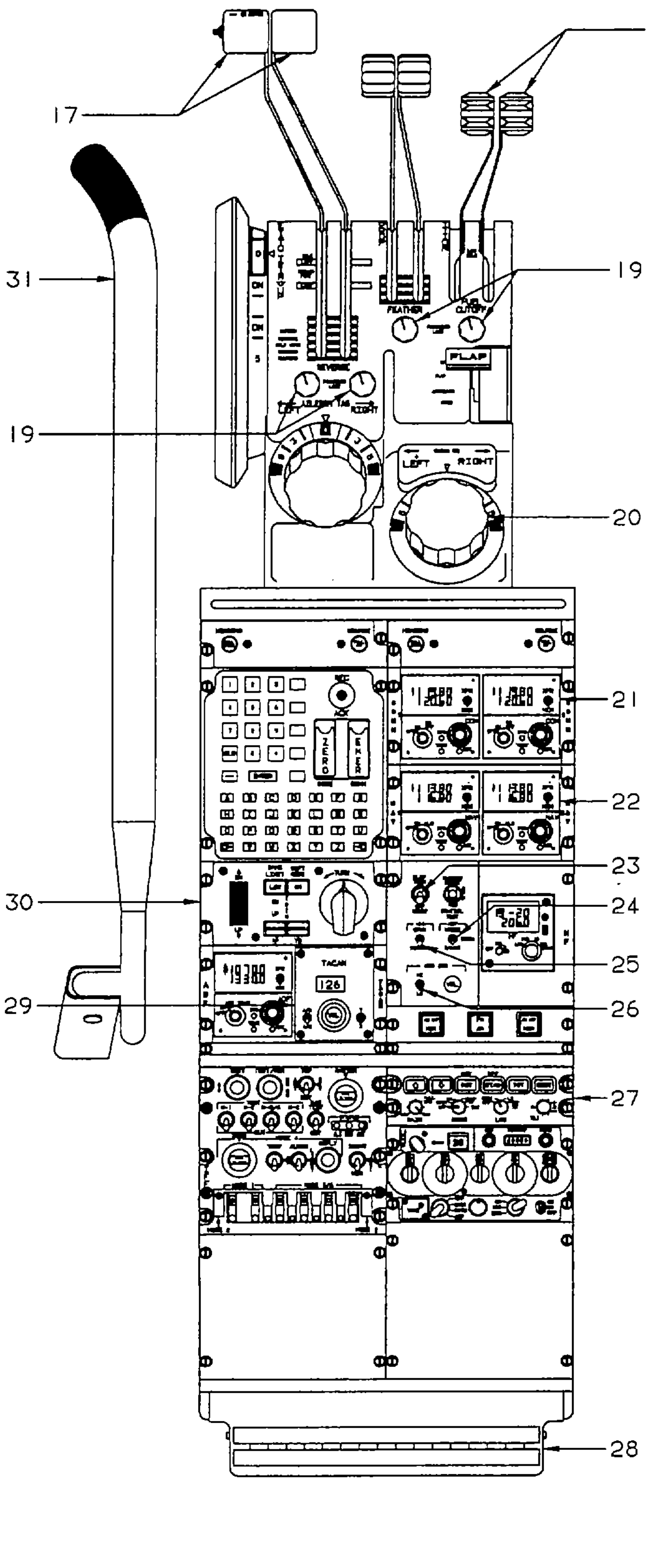
22. Fuel Control Unit
23. Fuel Control Unit Interconnect Rod
24. Fuel Pump
25. Prop Interconnect Linkage (Aft)
26. Oil Pressure Transducer
27. Engine Mount Isolator
28. Fireseal
29. Trim Thermocouple
30. Rudder Boost Sensor
31. Prop Interconnect Linkage (Fore)
32. Prop Shaft
33. Tach Generator (Prop, N_2)
34. Chip Detector
35. Pressure Oil Transfer Tube
36. Spark Igniter Plug
37. Fuel Flow Divider
38. Engine Mount Isolator Bolt
39. Oil-to-Fuel Heater
40. Tach Generator (Gas Generator, N_1)
41. Engine Truss Mounting Bolt

Figure 2-11. Engine (Sheet 2 of 2)



1. Go-Around Switch
2. Propeller Levers
3. Flap Control Switch
4. EHSI Remote Heading/Course Panel
5. #1 VHF Transceiver Control Unit
6. #1 VHF Navigation Receiver Control Unit
7. Rudder Boost/Yaw Control Test Switch
8. HF Transceiver Control Unit
9. Marker Beacon Volume Control
10. VHF-FM/VHF-AM Transceiver Selector Panel
11. UHF Transceiver Control Unit
12. Transponder (IFF)
13. ADF Receiver Control Unit
14. Aircraft Survivability Equipment/ Avionics Cotnrol System (ASE/ACS) Keyboard Unit (KU)
15. Aileron Trim Control
16. Elevator Trim Control

Figure 2-12. Control Pedestal and Pedestal Extension (Sheet 1 of 2)



17. Power Levers
18. Condition Levers
19. Friction Lock Knobs
20. Rudder Trim Control
21. #2 VHF Transceiver Control Unit
22. #2 VHF Navigation Receiver Control Unit
23. Elevator Trim Switch
24. ADF Receiver Voice/Range Switch
25. UHF Transceiver Normal/Standby Switch
26. Marker Beacon High-Low Sensitivity Switch
27. Weather Radar/Lightning Sensor System Control Panel
28. Assist Step
29. TACAN Control Unit
30. Autopilot Controller
31. Landing Gear Alternate Extension Pump Handle

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Figure 2-12. Control Pedestal and Pedestal Extension (Sheet 2 of 2)

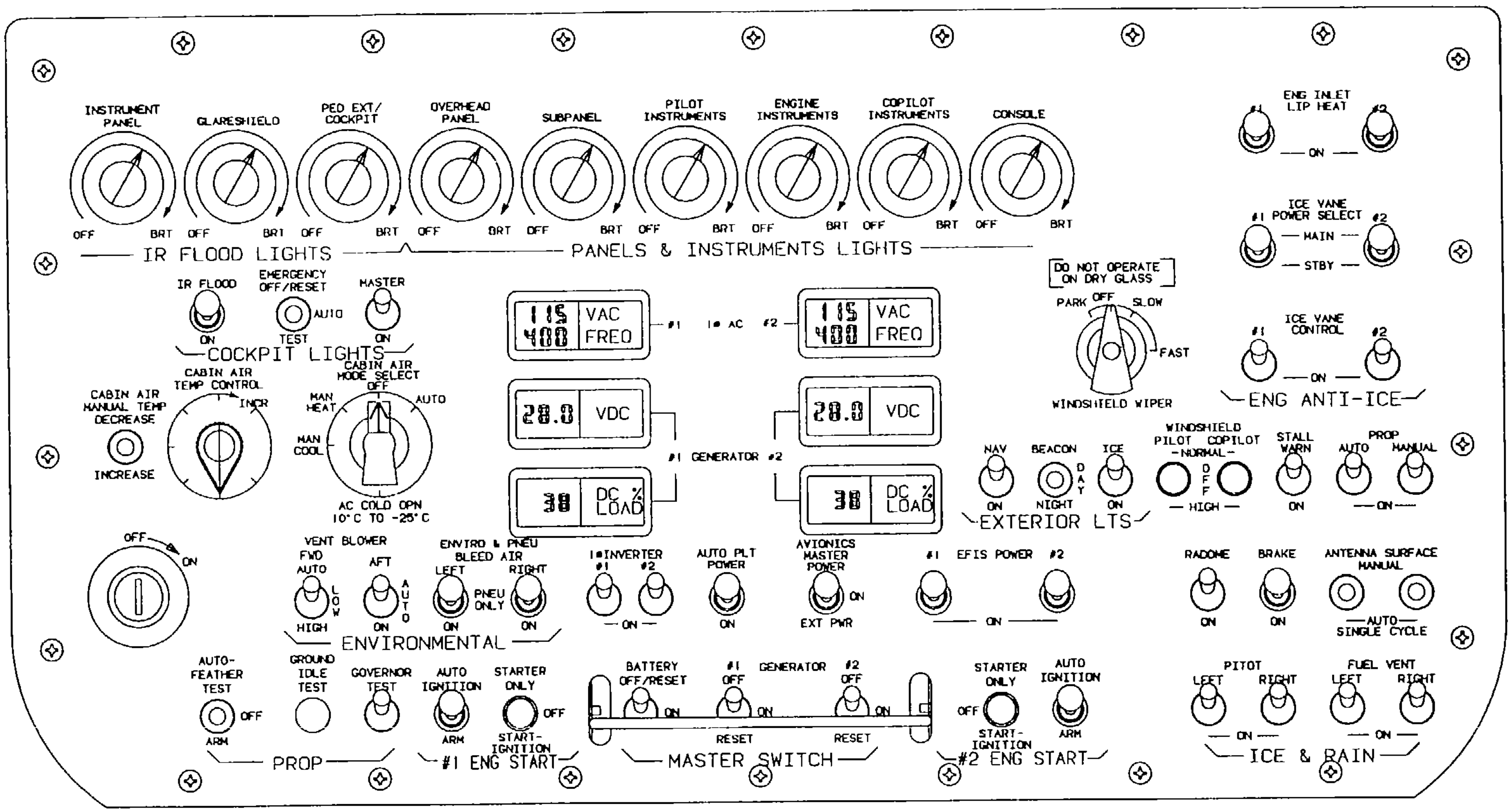

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Figure 2-13. Overhead Control Panel

In this event, the appropriate # 1 or # 2 ICE VANE POWER SELECT switch should be placed in the STBY position. Once the vane is successfully positioned, using the standby (STBY) system, the amber annunciator(s) will extinguish and the applicable green #1 VANE EXT or #2 VANE EXT annunciator(s) will illuminate.

c. Engine Anti-Ice System.

(1) Air Inlet. A small duct, facing into the exhaust flow in the engine's left exhaust stack diverts a small portion of the engine exhaust gases to the engine air inlet lip. The gases are circulated through the engine air inlet lip and then exhausted through a duct in the engine's right exhaust stack. The continuous flow of hot engine exhaust gases heats the engine air inlet lip, preventing the formation of ice. Two switches placarded ENG INLET LIP HEAT #1 and #2 (located on the overhead control panel, fig. 2-13), operate solenoid valves in the lip heat exhaust plumbing. These valves control the flow of hot exhaust gasses to the inlet air lip assemblies.

(2) Fuel Heater. An oil-to-fuel heat exchanger, located in the engine accessory case, operates continuously and automatically to heat the fuel sufficiently to prevent ice from collecting in the fuel control unit.

2-21. ENGINE FUEL CONTROL SYSTEM.

a. Description. The basic engine fuel system consists of an engine driven fuel pump, a fuel control unit, a fuel flow divider, a dual fuel manifold, fourteen fuel nozzles and a purge system. The fuel purge system forces residual fuel from the manifolds to the combustion chamber where it is consumed.

b. Fuel Control Unit. One fuel control unit is mounted on the accessory case of the engine. This unit is a hydropneumatic metering device which determines the proper fuel flow schedule for the engine to produce the amount of power requested by the relative position of its POWER lever. The control of developed engine power is accomplished by adjusting the engine gas generator (N_1) speed. N_1 speed is controlled by varying the amount of fuel injected into the combustion chamber through the fuel nozzles. Engine shutdown is accomplished by moving the appropriate CONDITION lever to the full aft FUEL CUTOFF position, which shuts off the fuel supply.

2-22. POWER LEVERS.

CAUTION

Moving the POWER levers below the flight idle gate without the engines running may result in damage to the reverse mechanism linkage.

The two POWER levers are located on the control pedestal (fig. 2-12), and are placarded POWER. These levers regulate power in the reverse, idle and forward ranges, operating so that forward movement increases engine power. Power control is accomplished through adjustment of the N_1 speed governor in the fuel control unit. Power is increased when N_1 RPM is increased. The POWER levers also control propeller reverse pitch. Distinct movement (pulling up and then aft on the POWER lever) by the pilot is required for operation in the ground fine and reverse ranges. Forward lever travel range is designated INCR (increase), supplemented by an arrow pointing forward. Lever travel range is marked IDLE, LIFT, GROUND FINE, LIFT, and REVERSE. A placard below the lever slots reads: CAUTION - REVERSE ONLY WITH ENGINES RUNNING.

2-23. CONDITION LEVERS.

The two CONDITION levers are located on the control pedestal (fig. 2-12). Each lever starts and stops the fuel supply, and controls the idle speed for its respective engine. The levers have three placarded positions: FUEL CUTOFF, LOW IDLE, and HIGH IDLE. In the FUEL CUTOFF position, the CONDITION lever controls the cutoff function of its engine-mounted fuel control unit. From LOW IDLE to HIGH IDLE, they control the governors of the fuel control units to establish minimum fuel flow levels. LOW IDLE position sets the fuel flow rate to attain 62% minimum N_1 and HIGH IDLE position sets the rate to attain 71 to 73% minimum N_1. The POWER lever for the corresponding engine can select N_1 from the respective idle setting, up to maximum power. An increase in low idle N_1 will be experienced at high field elevation.

2-24. FRICTION LOCK KNOBS.

Four friction lock knobs placarded FRICTION LOCK are located on the control pedestal (fig. 2-12), to adjust friction drag. One knob is below the propeller levers, one below the CONDITION levers, and two below the POWER levers. When the knobs are rotated clockwise, friction is increased, opposing movement of the affected lever as set by the pilot. Counterclockwise rotation of the knobs will decrease friction, thus permitting free and easy lever movement.

2-25. ENGINE FIRE DETECTION SYSTEM.

a. Description. A fire detection system (fig. 2-14), is installed to provide an immediate warning in the event of a fire or overtemperature in the engine compartment. The main element of the system is a temperature sensing tube, routed continuously throughout the engine compartment terminating in a responder unit. The responder unit is mounted in the accessory area on the upper left hand engine mount truss, just forward of the engine firewall. The responder unit contains two sets of contacts: a set of integrity switch contacts, for continuity test functions of the fire detection circuitry; and a set of alarm switch contacts, which complete the circuit to activate the fire warning system when the detector (sensing tubing) senses an overtemperature condition in critical areas around the engine. The detector is dual functioning and responds to overall "average" temperature, or a highly localized "discrete" temperature, caused by flames or hot gases. Both the average and discrete temperatures are preset, and cannot be adjusted in the field.

The sensor tubing consists of an outer tube filled with an inert gas, and an inner gas filled core that is filled with an active gas. The gases within the tube form a pressure barrier that keeps the contacts of the responder integrity switch closed for fire alarm continuity test functions. As the temperature around the sensing cable increases, the gases within the tube begin to expand. When the pressure from the expanding gases reaches a preset point, the contacts of the responder alarm switch close, activating the respective fire warning system.

b. Warning System. The fire warning system consists of two lenses, placarded # 1 FIRE PULL and # 2 FIRE PULL located in the T handles below the glareshield, two MASTER WARNING annunciators located in opposite sides of the glareshield, and two responder units with sensors in the engine compartments. If the detector should develop a leak, the loss of gas pressure would allow the integrity switch to open and signal a lack of detector integrity.

c. Testing. Testing system integrity, availability of power, and the annunciators (#1 and #2 FIRE PULL and MASTER WARNING), is accomplished by two switches located on the copilot's subpanel. The switches are placarded ENG FIRE TEST, DET OFF EXT, LEFT and RIGHT. When either (LEFT or RIGHT) switch is placed in the DET position, electrical current flows from a 5-ampere circuit breaker placarded FIRE DEIR located on the overhead circuit breaker panel, through the engine fire detector circuitry to the integrity switch contacts in the respective responder unit, causing the respective annunciators to illuminate. If the circuit breaker opens, the system will not operate during a test, or activate the annunciators if the detector cable senses an overtemperature condition. The system may be tested either before, after, or in flight as desired.

2-26. ENGINE FIRE EXTINGUISHER SYSTEM.

a. Description. The engine fire extinguisher system (fig. 2-15), consists of a supply cylinder, an explosive squib, and valve located in each of the main gear wheel wells. A gage calibrated in PSI is provided on each supply cylinder for determining the level of charge. The extinguishing agent charge level should be checked during each preflight When fired, the explosive squlb opens the valve, releasing all of the pressurized extinguishing agent into a plumbing network The plumbing network terminates in spray nozzles, strategically located in the probable fire areas of the engine compartment

b. Operation. Fire control T handles used to arm the extinguisher system are centrally located on the instrument panel, immediately below the glareshield (fig. 2-16). These controls receive power from the hot battery bus. The fire detector system will indicate an engine fire by illuminating the MASTER WARNING annunciators on the glareshield and the respective #1 or #2 I;IRE PULL annunciators in the fire control T handles. Pulling the fire control T handle will electrically arm the extinguisher system and close the firewall shutoff valve for that particular engine. This will cause the annunciator in the PUSH TO EXTINGUISH switch and the respective #1 or #2 FUEL PRESS annunciator on the warning annunciator panel to illuminate. Pressing the lens of the PUSH TO EXTINGUISH fire switch will fire the squib, expelling all the agent in the cylinder at one time. A hinged plastic guard covers the PUSH TO EXTINGUISH fire switch to prevent inadvertently actuating the fire extinguish switch squib circuit The respective caution annunciator, # 1 and # 2 EXTGH DISCH on the caution/advisory annunciator panel and the MASTER CAUTION annunciator on the glareshield will illuminate and remain illuminated, regardless of the master switch position, until the squib is replaced.

c. Testing. The test switches located on the copilot's subpanel (fig. 2-6), are placarded ENG FIRE TEST, DET OFFEXT, LEFT and RIGHT , and provide a test of the fire detection and extinguisher circuitry. When either of the switches is placed in the EXI' position, the corresponding PUSH TO EXTINGUISH, SQUIB OK, and EXTGH DISCH annunciators should illuminate. The system may be tested either before, after, or in flight as desired.

A gage calibrated in PSI is mounted on each extinguishing agent supply cylinder for determining the level of charge and should be checked during preflight (table 2-1).

2-27. OIL SUPPLY SYSTEM.

CAUTION

Maximum allowable oil consumption is one quart in 5 hours of engine operation.

a. The engine oil tank is integral with the air-inlet asting located forward of the accessory gearbox. Oil for

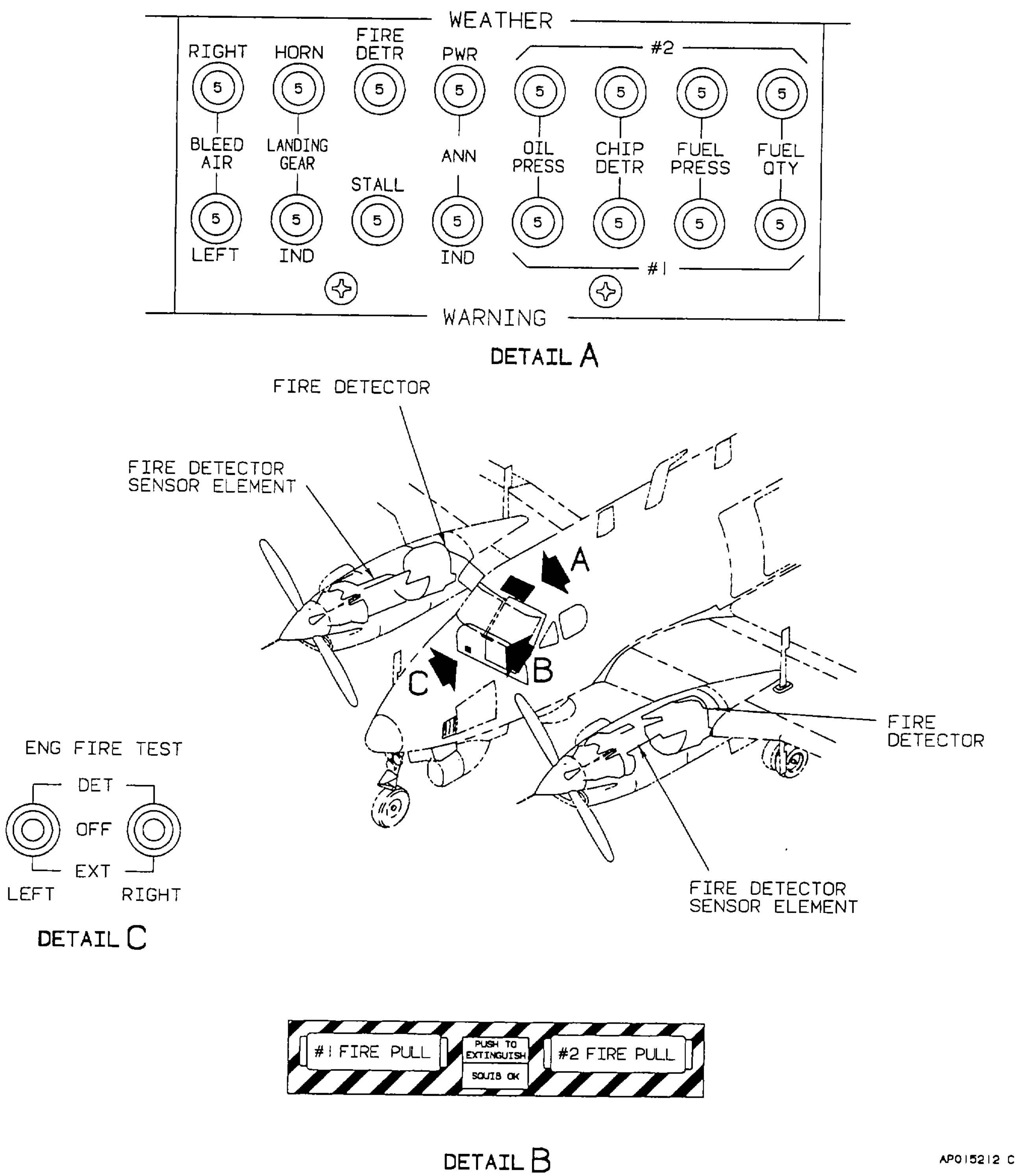


Figure 2-14. Engine Fire Detection System

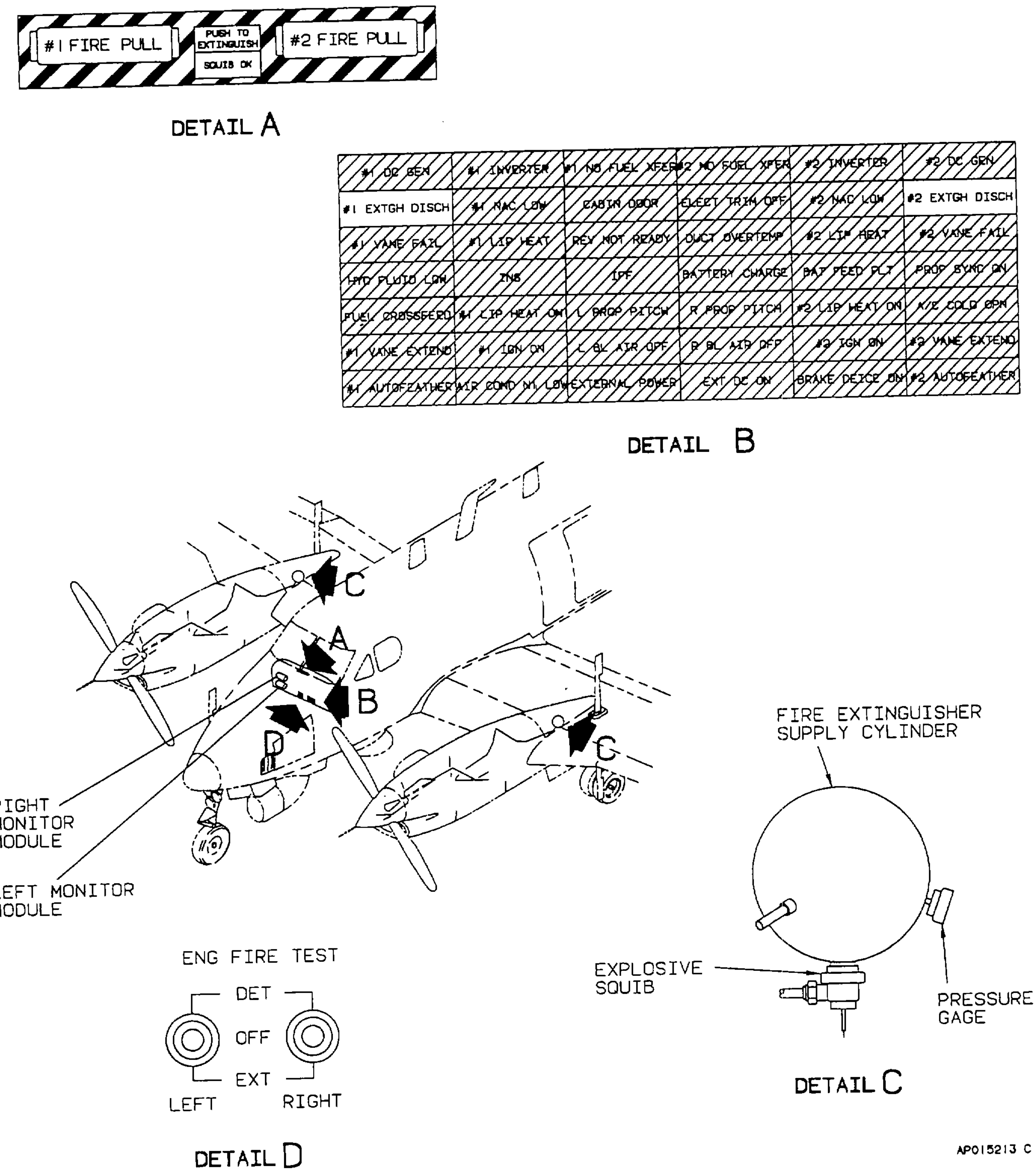
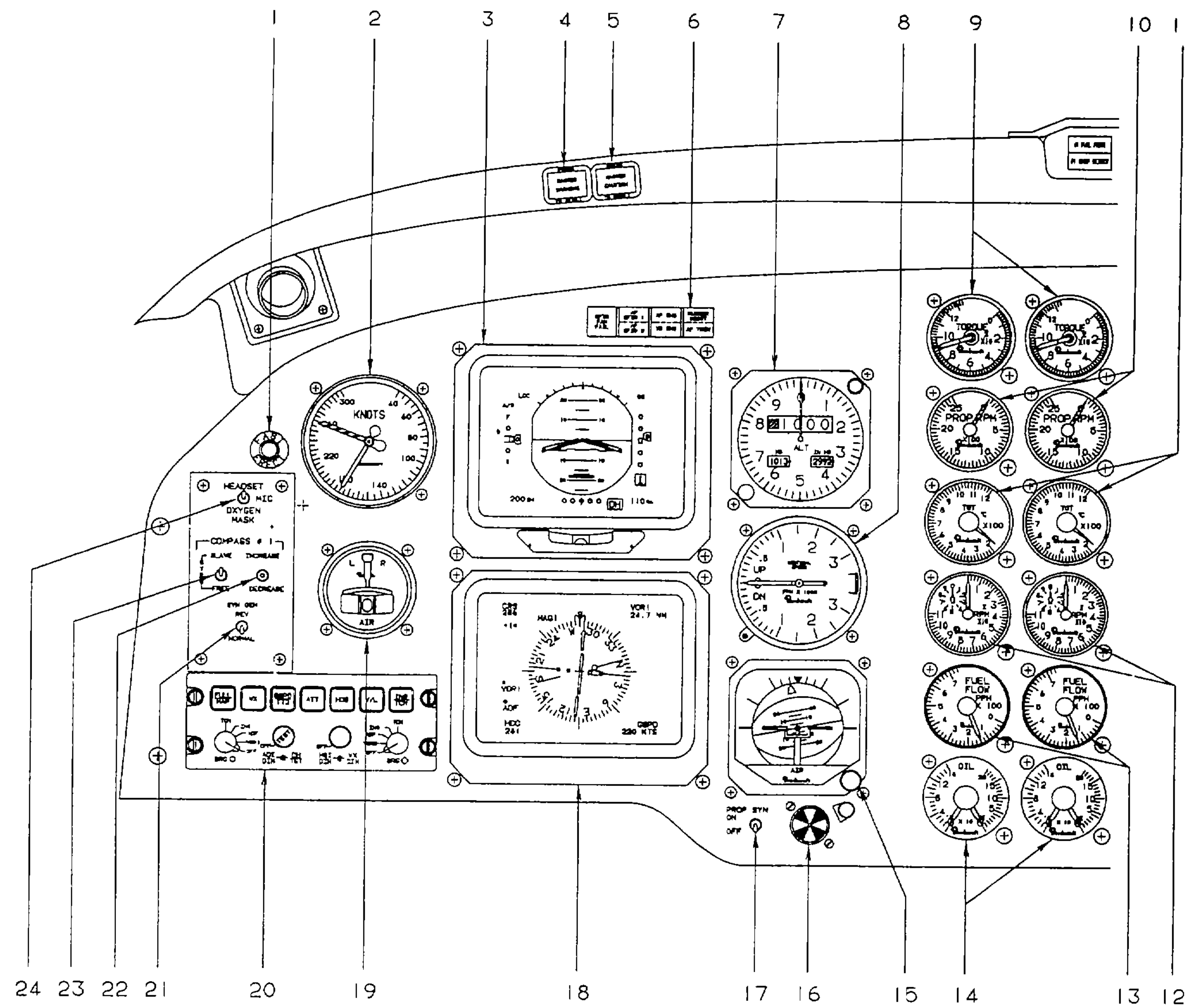


Figure 2-15. Engine Fire Extinguisher System



1. Vertical Gyro Fast Erect Switch
2. Airspeed Indicator
3. Electronic Attitude Director Indicator
4. Master Warning Annunciator
5. Master Caution Annunciator
6. EFIS/Autopilot/Rudder Boost Annunciators
7. Pilot's Barometric Altimeter Indicator
8. Vertical Speed Indicator
9. Torquemeters
10. Propeller Tachometers
11. Turbine Gas Temperature Indicators
12. Gas Generator Tachometers
13. Fuel Flow Indicators
14. Oil Temperature/Pressure Indicators
15. Standby Attitude Indicator
16. Propeller Synchroscope
17. Propeller Synchrophaser Switch
18. Electronic Horizontal Situation Indicator
19. Turn-and-Slip Indicator
20. EFIS Display Controller
21. Symbol Generator Reversionary Switch
22. Compass Heading Increase/Decrease Switch
23. Compass Slave/Free Switch
24. Microphone Headset/Oxygen Mask Selector Switch

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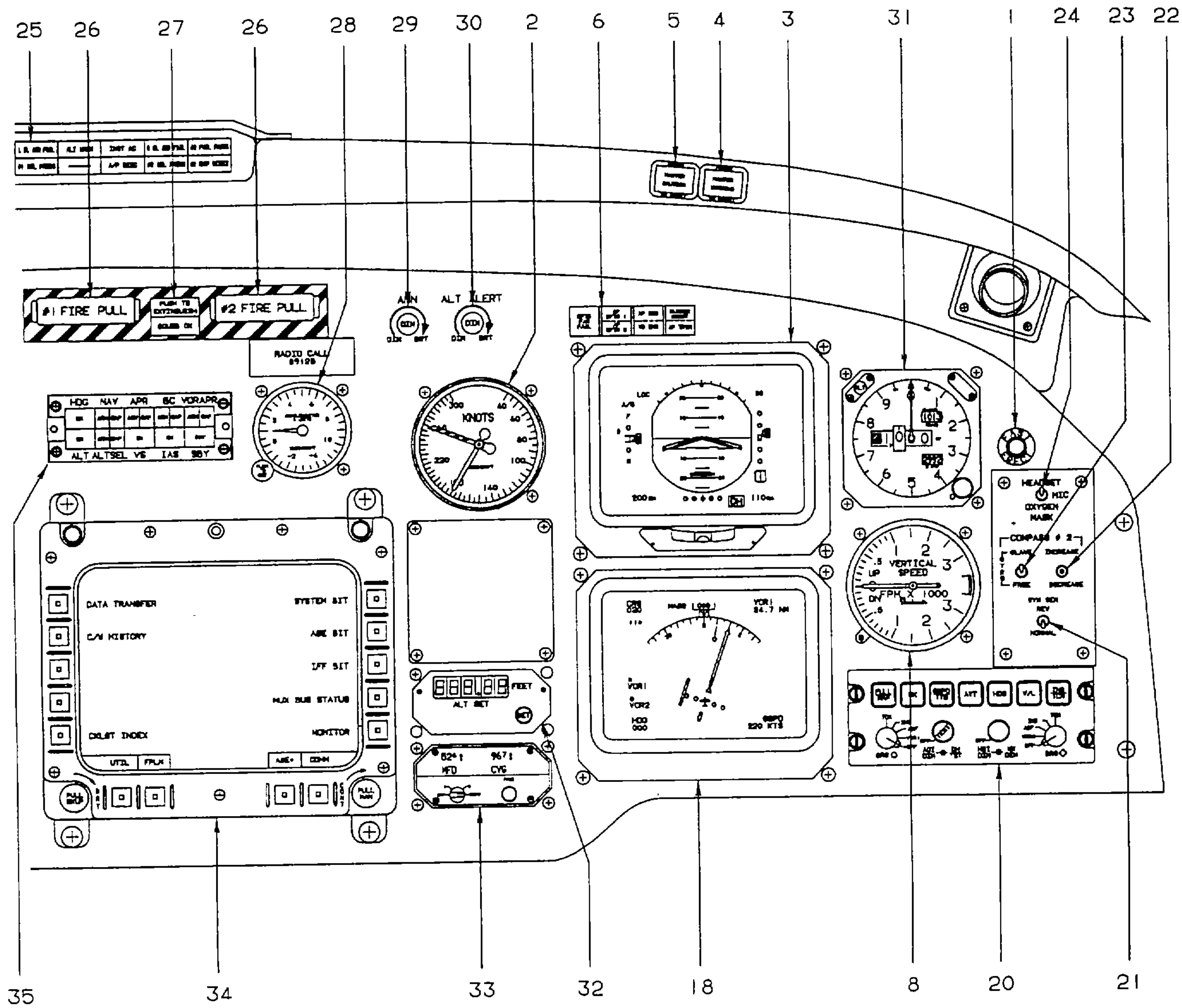
Figure 2-16. Instrument Panel (Sheet 1 of 2)



25. Warning Annunciator Panel
26. Fire Pull Handle
27. Fire Extinguisher Switch/Squib OK Annunciator
28. Accelerometer
29. Annunciator Lights Brightness Control (Autopilot/EFIS/Rudder Boost Only)
30. Altitude Select Controller Brightness Control
31. Copilot's Barometric Altimeter
32. Altitude Preselector
33. DME/TACAN Indicator
34. Multifunction Display (ASE/ACS)
35. Flight Director/Autopilot Mode Selector

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Figure 2-16. Instrument Panel (Sheet 2 of 2)

Table 2-1. Engine Fire Extinguisher Gage Pressure

TEMP °C	-40	-29	-18	-06	04	16	27	38	48
PSI	190 to 240	220 to 275	250 to 315	290 to 365	340 to 420	390 to 480	455 to 550	525 to 635	605 to 730

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propeller operation, lubrication of the reduction gearbox, and engine bearings is supplied by an external line from the high pressure pump. Two scavenge lines return oil to the tank from the propeller reduction gearbox. A noncongealing, external oil cooler keeps the engine oil temperature within operating limits. The capacity of each engine oil tank is 2.5 U.S. gallons. The total system capacity for each engine, which includes the oil tank, oil cooler, lines, etc., is approximately 3.5 U.S. gallons. The oil level is indicated by a dipstick attached to the oil filler cap. Oil grade, specifications, and servicing points, are described in Section XII, Servicing.

b. The oil system of each engine is coupled to an oil cooler unit (radiator) of fin-and-tube design. These oil cooler units are the only airframe mounted part of the oil system and are located in the lower aft nacelles below the engine air intake. Each oil cooler incorporates a thermal bypass valve which assists in maintaining oil at the proper temperature range for engine operation.

2-28. ENGINE IGNITION SYSTEM.

a. Description. The basic ignition system consists of a solid state ignition exciter unit, two igniter plugs, two shielded ignition cables, pilot controlled ignition and engine start switches, and the auto ignition switches (fig. 2-13). Placing either ENG START switch to START IGNITION position will cause the respective engine to motor, and igniter plugs to spark, igniting the fuel/air mixture sprayed into the combustion chamber by the fuel nozzles. The ignition system is activated for ground and air starts, but is switched off after combustion light up.

b. Ignition and Engine Starter Switches. Two threeposition toggle switches, placarded # 1 or # 2 ENG START, are located on the overhead control panel (fig. 2-13). These switches will initiate starter motoring and ignition in the START IGNITION position, or will motor the engine in the STARTER ONLY position. The START IGNITION switch position completes the starter circuit for engine rotation, energizes the igniter plugs for fuel combustion, and activates the respective # 1 IGN ON or # 2 IGN ON annunciator on the annunciator panel. In the center position the switch is OFF. Two 5-ampere circuit breakers on the overhead circuit breaker panel, placarded IGNITOR CONTR # 1 and #2, protect ignition circuits. Two 5-ampere circuit breakers on the overhead circuit breaker panel, placarded START CONTR # 1 and # 2, protect starter control circuits (fig. 2-7).

2-29. AUTO IGNITION SYSTEM.

If armed, the auto ignition system automatically energizes both igniter plugs of either engine, should an accidental flameout occur. The system is not essential to normal engine operation, but is used to reduce the possibility of power loss due to icing or other conditions. Each engine has a separate auto ignition control switch (fig. 2-13), and a green annunciator placarded #1 IGN ON or #2 IGN ON, on the annunciator panel. Auto ignition is accomplished by energizing both igniter plugs in each engine.

NOTE

The system should be turned OFF during extended ground operation to prolong the life of the igniter plugs.

a. Auto Ignition Switches. Two switches, located on the overhead control panel (fig. 2-13), each placarded AUTO IGNITION ARM, control the auto ignition systems. The ARM position initiates a readiness mode for the auto ignition system of the corresponding engine. The system is disarmed when in the off position Each circuit is protected by the corresponding START CONTR # 1 or # 2, 5-ampere circuit breaker on the overhead circuit breaker panel (fig. 2-7).

b. Auto Ignition Annunciators. If an armed auto ignition system changes from a ready condition to an operating condition (energizing the igniter plugs in the engine) the corresponding engine's green annunciator will illuminate. The annunciator is placarded # l IGN ON or #2 IGN ON and indicates that the igniters are energized. The auto ignition system is triggered from a ready condition to an operating condition when engine torque drops below approximately 20% Therefore, when an auto ignition system is armed, the igniters will be energized continuously during the time when an engine is operating at a level below approximately 20% torque. The auto ignition annunciators are protected by the 5-ampere IGNITOR CONTR # 1 or # 2 circuit breakers, located on the overhead circuit breaker panel (fig. 2-7).

2-30. ENGINE STARTER-GENERATORS.

One starter-generator is mounted on the accessory drive section of each engine. Each starter-generator is able to function either as a starter or as a generator. In the starter function, 28 volts DC is required to power rotation. In the generator function, each unit is capable of 400 amperes DC output When the starting function is selected, the starter control circuit receives power through the respective 5-ampere START CONTR circuit breaker on the overhead circuit breaker panel (fig. 2-7), from either the aircraft battery or an external power source. When the generating function is selected, the starter-generator provides electrical power.

2-31. ENGINE INSTRUMENTS.

The engine instruments are arranged vertically near the center of the instrument panel (fig. 2-16).

a. Turbine Gas Temperature Indicators. The two TGT gages on the instrument panel are calibrated in degrees Celsius (fig. 2-16). Each gage is connected to thermocouple probes located in the hot gases between the turbine wheels. The gages register the temperature present between the compressor turbine and a power turbine for the corresponding engine.

b. Engine Torquemeters. The two torquemeters on the instrument panel indicate torque applied to the propeller shafts of the respective engines (fig. 2-16). Each gage shows torque in percent of maximum using two percent graduations and is actuated by an electrical signal from a torque transmitter mounted on the reduction gearbox which senses engine internal torquemeter pressure. The torquemeters are protected by individual 0.5-ampere circuit breakers placarded TORQUE METER # 1 or #2 on the overhead circuit breaker panel (fig. 2-7).

c. Turbine Tachometers. The two tachometers on the instrument panel register compressor turbine RPM (Ni) for the respective engine (fig. 2-16). These indicators register turbine RPM as a percentage of maximum gas generator RPM. Each instrument is slaved to a tachometer generator attached to the respective engine.

d. Oil Pressure/Oil Temperature Indicators. The two gages on the instrument panel register oil pressure in PSI and oil temperature in °C (fig. 2-16). Oil pressure is taken from the delivery side of the main oil pressure pump. Warning annunciators placarded No. 1 OIL PRESS and No. 2 OIL PRESS are located in the warning annunciator panel. Oil temperature is transmitted by a thermal sensor unit which senses the temperature of the oil as it leaves the delivery side of the oil pressure pump. Each gage is connected to pressure and temperature transmitters installed on the respective engine. Both instruments are protected by 5-ampere circuit breakers, placarded OIL PRESS and OIL TEMP # 1 or # 2, on the overhead circuit breaker panel (fig. 2-7).

e. Fuel Flow Indicators. Two gages on the instrument panel (fig. 2-16) register the rate of flow for consumed fuel as measured by sensing units coupled into the fuel supply lines of the respective engines. The fuel flow indicators are calibrated in increments of hundreds of pounds per hour. Both circuits are protected by 5-ampere circuit breakers placarded FUFL FLOW #1 or #2, on the overhead circuit breaker panel (fig. 2-7).

Section IV. FUEL SYSTEM

2-32. FUEL SUPPLY SYSTEM.

The engine fuel supply system (fig. 2-17) consists of two identical systems sharing a common fuel management panel (fig. 2-18) and fuel crossfeed plumbing (fig. 2-19). Each main fuel system consists of five interconnected wing tanks, and a nacelle tank Each auxiliary fuel system consists of one tank located between the nacelle and the fuselage. A fuel transfer pump is located within each auxiliary tank. Additionally, the system has an engine-driven boost pump, a standby fuel pump located within each nacelle tank, a fuel heater (engine oil-to-fuel heat exchanger unit), a tank vent system, a tank vent heating system, and interconnecting wiring and plumbing. Total fuel tank capacity is shown in table 2-2. Gravity feed fuel flow is shown in figure 2-20.

a. Engine Driven Boost Pumps.

CAUTION

Engine operation using only the enginedriven primary (high pressure) fuel pump without standby pump or engine-driven boost pump fuel pressure is limited to 10 cumulative hours. This condition is indicated by illumination of either the # 1 or # 2 FUEL PRESS warning annunciator and the simultaneous illumination of both MASTER WARNING annunciators. All time in this category shall be entered on DA Form 2408-13 for the attention of maintenance personnel. A gear-driven boost pump, mounted on each engine supplies fuel under pressure to the inlet of the engine-driven

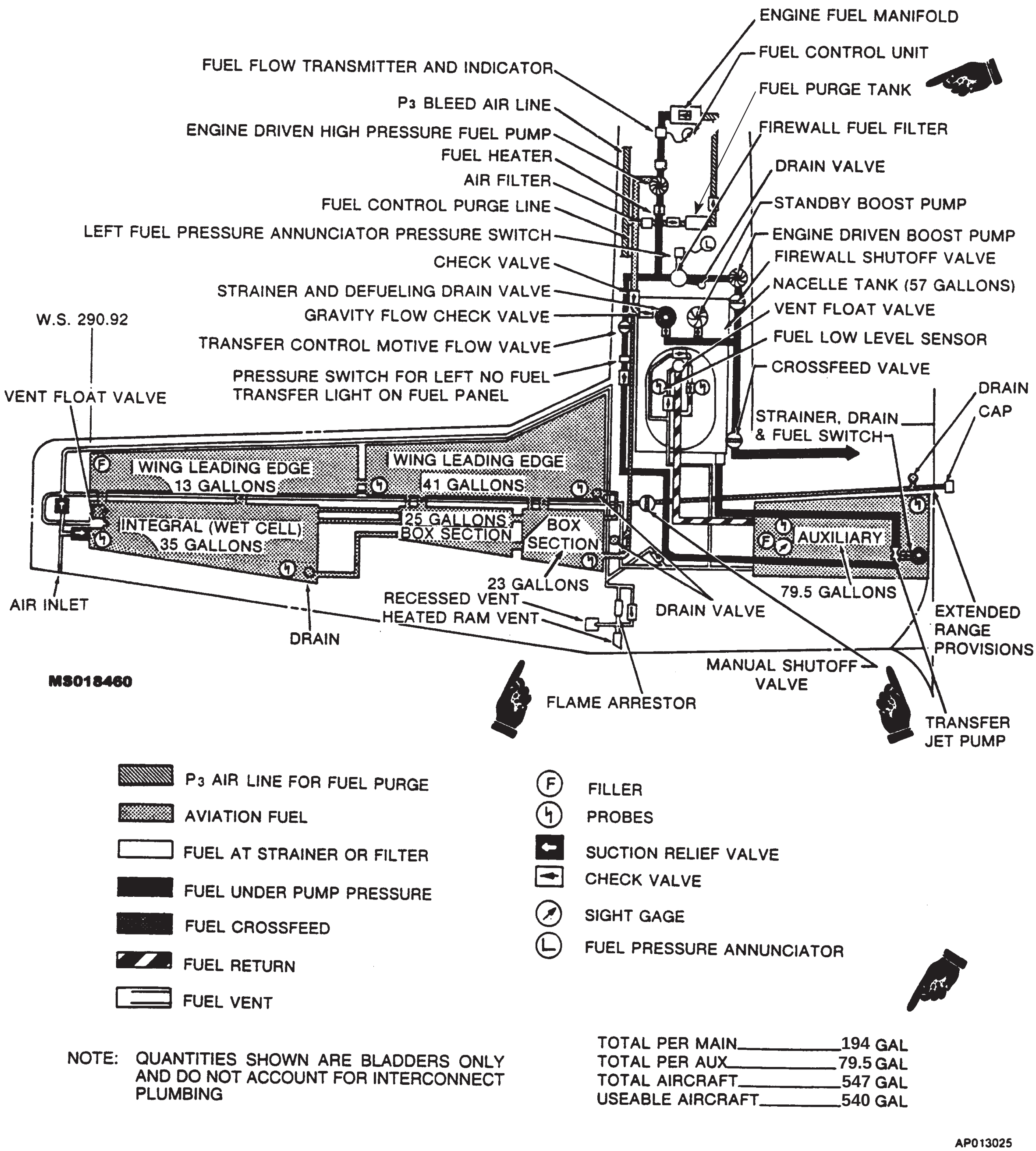
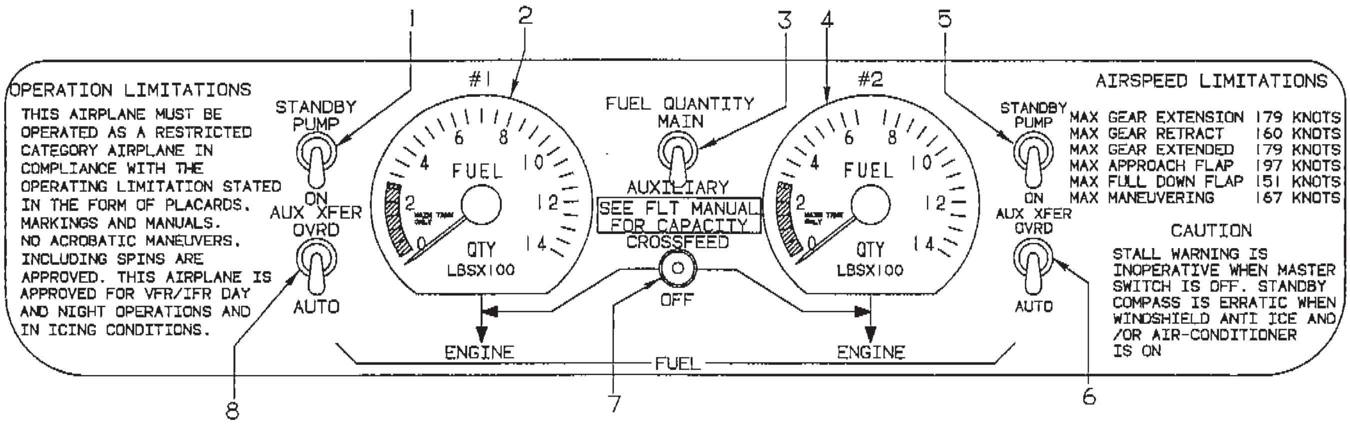


Figure 2-17. Fuel System Schematic



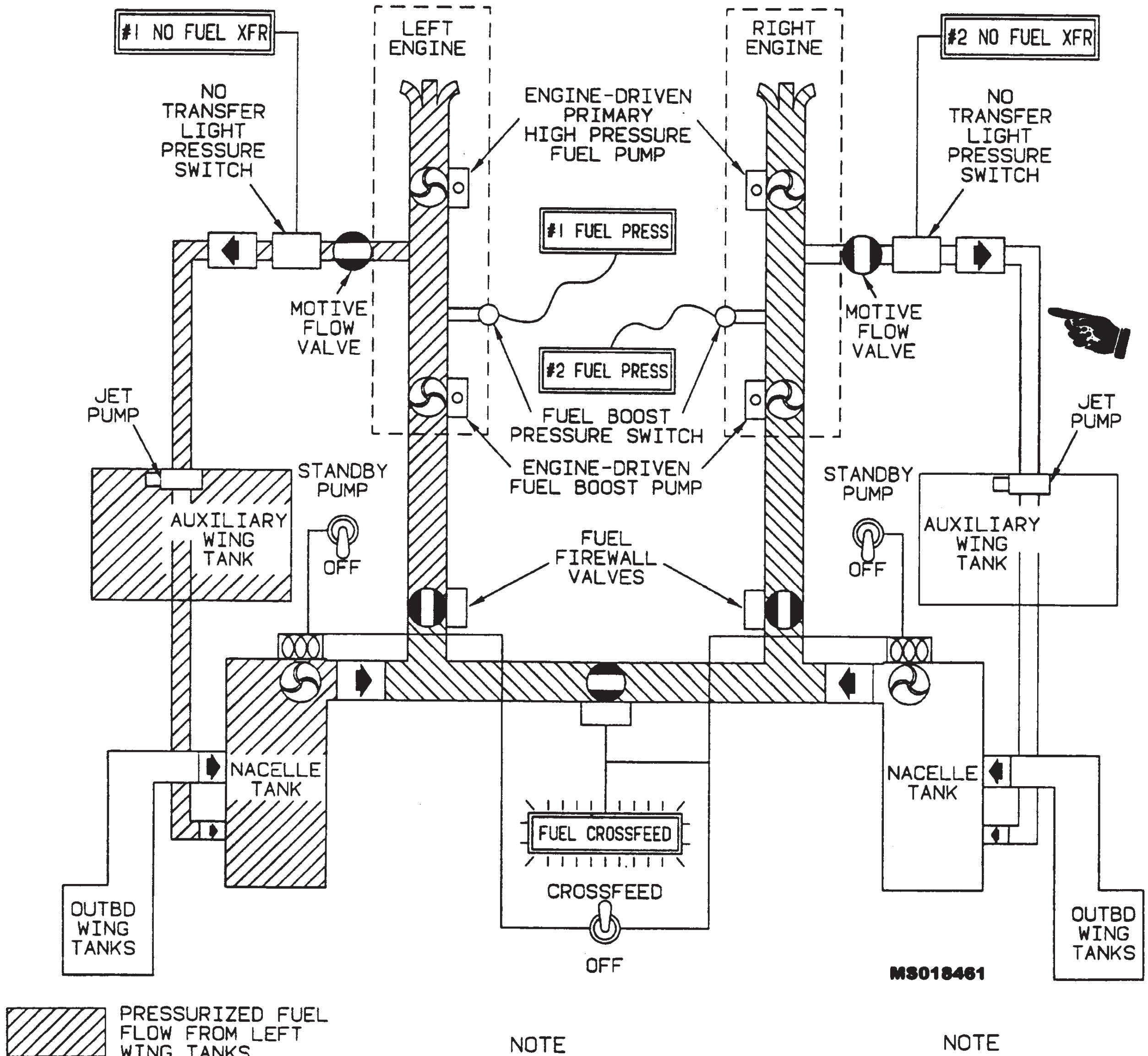
1. Standby Pump Switch (#1 Engine)
2. Fuel Quantity Indicator (#1 Engine)
3. Fuel Quantity Main/Auxiliary Gaging System Selector Switch
4. Fuel Quantity Indicator (#2 Engine)
5. Standby Pump Switch (#2 Engine)
6. Auxiliary Transfer Override Switch (#2 Engine)
7. Crossfeed Switch
8. Auxiliary Transfer Override Switch (#1 Engine)

Figure 2-18. Fuel Management Panel

primary high-pressure pump for engine starting and all normal operations. Either the engine-driven boost pump or electric standby pump is capable of supplying sufficient pressure to the engine-driven primary high-pressure pump and thus maintaining normal engine operation.

b. Standby Fuel Pumps. A submerged, electrically-operated standby fuel pump, located within each nacelle tank, serves as a backup unit for the engine-driven boost pump. The standby pumps are switched off during normal system operations. A standby fuel pump will be operated during crossfeed operation to pump fuel from one nacelle tank to the opposite engine. The correct pump is automatically selected when the CROSSFEED switch is activated. Each standby fuel pump has an inertia switch included in the power supply circuit. When subjected to a 5 to 6 g shock loading, as in a crash situation, the inertia switch will remove electrical power from the standby fuel pumps. The standby fuel pumps are protected by two 10-ampere circuit breakers placarded STANDBY PUMP #1 or #2, located on the overhead circuit breaker panel (fig. 2-7), and four 5-ampere circuit breakers (two each in parallel) on the hot battery bus.

c. Fuel Transfer Pumps. The auxiliary tank fuel transfer system automatically transfers the fuel from the auxiliary tank to the nacelle tank without pilot action. Motive flow to a jet pump mounted in the auxiliary tank sump is obtained from the engine fuel plumbing system downstream from the engine driven boost pump and routed through the transfer control motive flow valve. The motive flow valve is energized to the open position by the control system to transfer auxiliary fuel to the nacelle tank to be consumed by the engine during the initial portion of the flight. When an engine is started, pressure at the engine driven boost pump closes a pressure switch, which after a 30 to 50 second time delay to avoid depletion of fuel pressure during starting, energizes the motive flow valve. When auxiliary fuel is depleted, a low level float switch de-energizes the motive flow valve after a 30 to 60 second time delay. This time delay function prevents cycling of the motive flow valve due to sloshing fuel. If the motive flow valve or the associated control circuitry fails, the loss of motive flow pressure when there is still fuel remaining in the auxiliary fuel tank, is sensed by a pressure switch which illuminates a caution annunciator placarded #1 NO FUEL XFR or #2 NO FUEL XFR. During engine start, the pilot should note that the NO FUEL XFR annunciator extinguishes 30 to 50 seconds after engine start. The NO FUEL XFR annunciator will not illuminate if auxiliary tanks are empty. A manual override is incorporated as a backup for the automatic transfer system. This is initiated by placing the AUX XFER switch, located in the fuel management panel to the OVRD position. This will energize the pedal, forward



NOTE

THE ENGINE-DRIVEN PRIMARY (HIGH PRESSURE) FUEL PUMP IS LIMITED TO 10 HOURS OF OPERATION THROUGHOUT ITS TBO PERIOD WITHOUT STANDBY FUEL PUMP OR ENGINE-DRIVEN BOOST PUMP FUEL PRESSURE.

NOTE

DIAGRAM SHOWS TYPICAL FUEL CROSSFEED SITUATION WITH LEFT WING FUEL SYSTEM SUPPLING BOTH ENGINES (ALL BOOST AND STANDBY PUMPS OPERABLE) FOR SELECTION OF RIGHT WING FUEL FOR CROSSFEED REVERSE SWICH POSITION. EITHER CONFIGURATION WILL SUPPLY EITHER ENGINE DURING SINGLE-ENGINE OPERATIONS. FUEL WILL NOT CROSS TRANSFER BETWEEN TANK SYSTEMS.

NOTE

BOTH STANDBY PUMP SWITCHES WILL BE OFF DURING CROSSFEED OPERATION.

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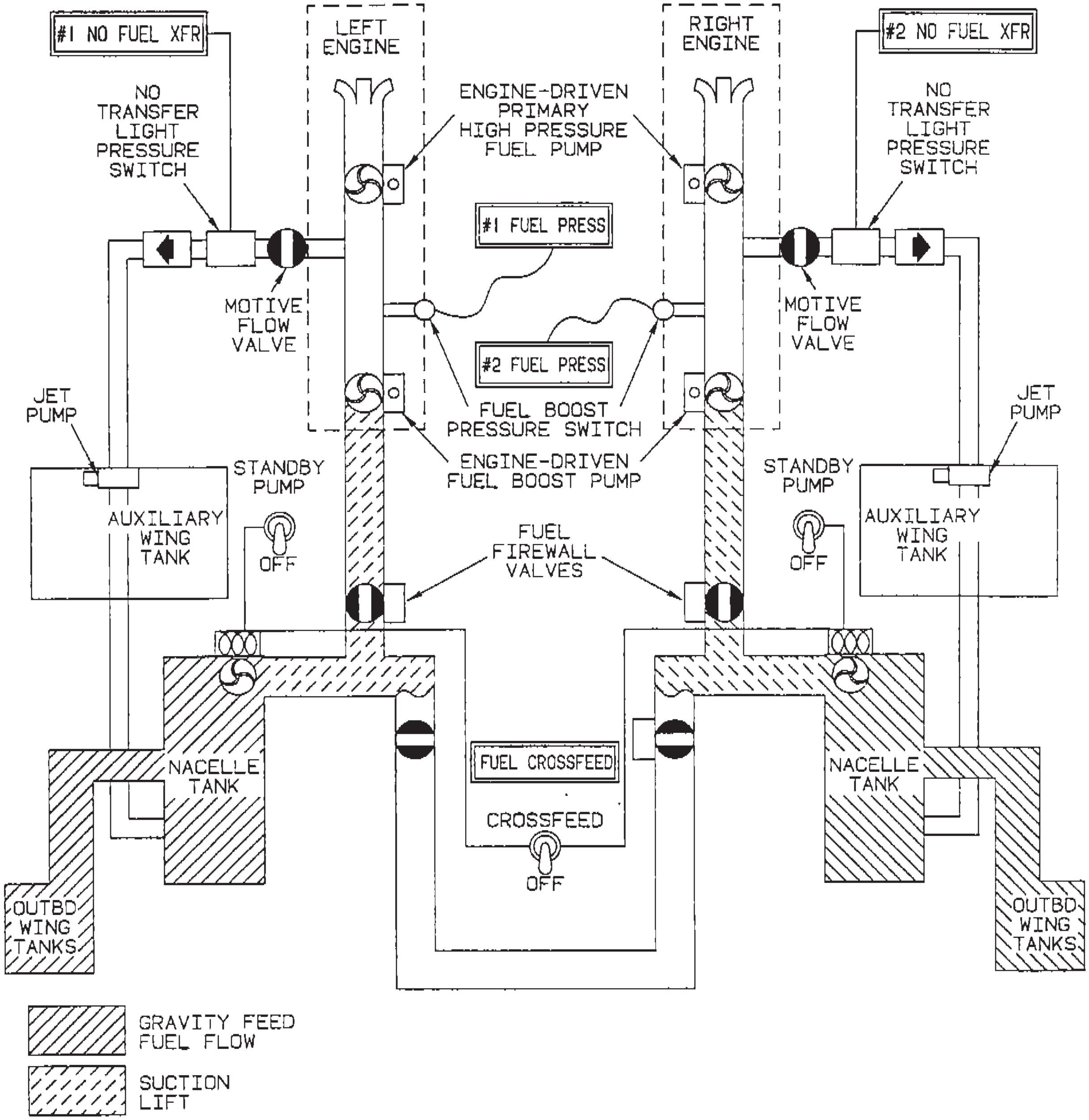
Figure 2-19. Crossfeed Fuel Flow



NOTE

IF AN ENGINE DRIVEN BOOST PUMP FAILS, PRESSURE CAN BE MAINTAINED BY PLACING THE RESPECTIVE STANDBY PUMP SWITCH TO ON.

NOTE

THE ENGINE-DRIVEN PRIMARY (HIGH PRESSURE) FUEL PUMP IS LIMITED TO 10 HOURS OF OPERATION, THROUGHOUT ITS TBO PERIOD, WITHOUT STANDBY FUEL PUMP OR ENGINE-DRIVEN BOOST PUMP FUEL PRESSURE.

NOTE

THE SYSTEM WILL SUCTION LIFT FUEL ONLY TO ITS RESPECTIVE ENGINE DRIVEN BOOST PUMP, I.E., LEFT OR RIGHT. FUEL WILL NOT GRAVITY FEED THROUGH THE CROSSFEED SYSTEM.

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Figure 2-20. Gravity Feed Fuel Flow

or aft, until the locking pin engages in the selected position.

b. Yaw Damper System. A yaw damper system is provided to aid the pilot in maintaining directional stability and increase ride comfort. The system may be used at any altitude, but is required for flight above 17,000 feet. It must be deactivated for takeoff and landing. The yaw damper system is a part of the autopilot. Operating instructions for this system are contained in Chapter 3. The system is controlled by a YAW DAMP switch located on the autopilot control panel.

c. Rudder Boost System. The rudder boost system is a torque sensing, linear actuating system. The system utilizes a pressure transducer on each engine to sense engine torque oil pressure, a stability augmentation computer to monitor torque levels, and the rudder servo to apply boost to aid the pilot.

The stability augmentation computer monitors torque levels and airspeed to determine if boost is required. The level of boost is proportional to the difference in torque between each engine and inversely proportional to airspeed. Boost commences at approximately 50% torque differential and increases to maximum at 100% torque differential. The level of boost available is inversely proportional to airspeed such that maximum rudder boost is obtained at 100% differential and low airspeed (80 knots), while no rudder boost is available at high airspeeds (above 180 knots).

The rudder boost system is controlled by a switch placarded RUDDER BOOST - OFF - YAW CONTROL TEST, located on the pedestal extension (fig. 2-12). The rudder boost system is powered through a 5-ampere circuit breaker placarded RUDDER BOOST, located on the overhead circuit breaker panel (fig. 2-7).

2-38. FLIGHT CONTROL LOCKS.

CAUTION

Remove control locks before towing the aircraft or starting engines. Serious damage could result in the steering linkage if towed by a tug with the rudder lock installed.

Positive locking of the rudder, elevator and aileron control surfaces, and engine controls (POWER levers, PROP levers, and CONDITION levers) is provided by a removable lock assembly (fig. 2-23) consisting of two pins, and an elongated U-shaped strap interconnected by a chain. Installation of the control locks is accomplished by inserting the U-shaped strap around the aligned control levers from the copilot's side; then the aileron/elevator locking pin is inserted through a guide hole in the top of the pilot's control column assembly. The rudder is held in a neutral position by an L-shaped pin which is installed through a guide hole in the floor aft of the pilots rudder pedals. The rudder pedals must be centered to align the hole in the rudder bellcrank with the guide hole in the floor. Remove the locks in reverse order (rudder pin, control column pin, and power control clamp).

2-39. TRIM TABS.

Trim tabs are provided for all flight control surfaces. These tabs are manually actuated, and mechanically controlled by a cable-drum and jack-screw actuator system except the right aileron tab which is of the fixed, bendable type. Elevator and aileron trim tabs incorporate neutral, non-servo action, i.e., as the elevators or ailerons are displaced from the neutral position, the trim tab maintains an as-adjusted position. The rudder trim tab incorporates anti-servo action, i.e., as the rudder is displaced from the neutral position the trim tab moves in the same direction as the control surface. This action increases control pressure as rudder is deflected from the neutral position.

a. Elevator Trim Tab Control. The elevator trim tab control wheel placarded PITCH TRIM, DN - UP, is located on the left side of the control pedestal and controls a trim tab on each elevator (fig. 2-12). The amount of elevator tab deflection, in units from a neutral setting, is indicated by a position arrow.

b. Electric Elevator Trim. The electric elevator trim system is controlled by an ELEV TRIM - OFF/RESET switch located on the pedestal extension (fig. 2-12), dual element thumb switches on the control wheels (fig. 2-22), a trim disconnect switch on each control wheel, and a 5-ampere circuit breaker placarded ELEC TRIM, located on the overhead circuit breaker panel (fig. 2-7). The ELEV TRIM - OFF/RESET switch must be in the ELEV TRIM (on) position to operate the system. The dual element thumb switch is moved forward for trimming nose down, aft for nose up, and when released returns to the center (off) position. Any activation of the trim system through the copilot's trim switch can be over-ridden by activation of the pilot's switch. Operating the pilot's and copilot's switches in opposing directions simultaneously results in the pilot having priority. An annunciator placarded ELEC TRIM OFF on the caution/advisory annunciator panel indicates failure or disconnect of the electric trim system.

A preflight check of the switches should be accomplished before flight by moving the switches individually on both control wheels. No one switch alone should operate the system; operation of elevator trim should occur only by movement of pairs of switches. The trim system disconnect is a bi-level pushbutton momentary-type switch, located on the outboard grip of each

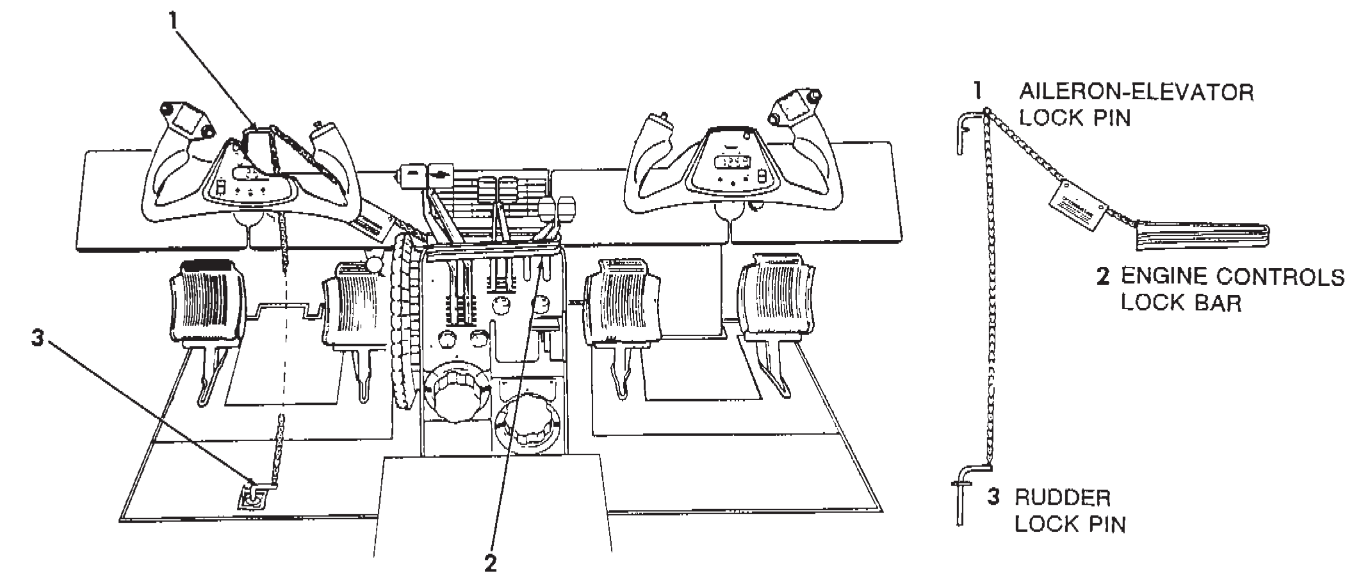

Figure 2-23. Control Locks

control wheel. Depressing the switch to the first of two levels disconnects the autopilot and yaw damp system and the second level disconnects the electric trim system. The system can be reset by moving the ELEV TRIM switch toggle on the pedestal (fig. 2-12) to OFF/RESET position, then back to ELEV TRIM again.

c. Aileron Trim Tab Control. The aileron trim tab control, placarded AILERON TRIM - LEFT, RIGHT, located on the control pedestal, adjusts the aileron trim tab (fig. 2-12). The amount of aileron tab deflection from a neutral setting, as indicated by a position indicator, is relative only and is not in degrees.

d. Rudder Trim Tab Control. The rudder trim tab control, placarded RUDDER TAB - LEFT, RIGHT, located on the control pedestal, controls adjustment of the rudder trim tab (fig. 2-12). The amount of rudder tab deflection, in units from a neutral setting, is indicated by a position indicator.

2-40. WING FLAPS.

The slot-type wing flaps are electrically operated and consist of two sections for each wing. These sections extend from the inboard end of each aileron to the junction of the wing and fuselage. During extension or retraction, the flaps are operated as a single unit, each section being actuated by a separate jackscrew actuator. The actuators are driven through flexible shafts by a single reversible electric motor. Wing flap position is indicated in percent of travel by a flap position indicator on the center subpanel. Full flap extension and retraction time is approximately 11 seconds. The flap control switch is located in the control pedestal. No emergency wing flap actuation system is provided. With flaps extended beyond the APPROACH position, the landing gear warning horn will sound, unless the landing gear is down and locked. The circuit is protected by a 20-ampere circuit breaker, placarded FLAP MOTOR, located on the overhead circuit breaker panel (fig. 2-7).

a. Wing Flap Control Switch. Flap operation is controlled by a three-person switch with a flap-shaped handle on the control pedestal (fig. 2-12). The handle of this switch is placarded FLAP. Switch positions are placarded: FLAP - UP, APPROACH and DOWN. The amount of extension of the flaps is established by the position of the flap switch as follows: UP - 0%, APPROACH - 40%, and DOWN - 100%. Limit switches, mounted on the right inboard flap, establish the flap travel. The flap control switch, limit switch, and relay circuits are protected by a 5-ampere circuit breaker, placarded FLAP CONTR, located on the overhead circuit breaker panel (fig. 2-7). Intermediate flap positions between UP and APPROACH cannot be selected. To return the flaps to full UP, place the flap switch to the UP detent position. To return the flaps to APPROACH, move the flap switch to the UP position and then to the APPROACH detent position. For an intermediate flap position between APPROACH and DOWN, the APPROACH position acts as an OFF position. To return to any position between full DOWN and APPROACH, place flap switch to UP, and when the desired position is obtained, return the switch to the APPROACH detent. In the event that any two adjacent flap sections extend 3 to 5 degrees out of phase with the other, a safety mechanism is provided to discontinue power to the flap motor.

b. Wing Flap Position Indicator. Flap position in percent of travel from 0 percent (UP) to 100 percent (DOWN) is shown on an indicator, placarded FLAPS, located on the center subpanel (fig. 2-6). The approach and full down flap positions are 14 and 35 degrees, respectively. The flap position indicator is protected by a 5-ampere circuit breaker, placarded FLAP CONTR, located on the overhead circuit breaker panel (fig. 2-7).

Section VI. PROPELLERS

2-41. DESCRIPTION.

A four-blade aluminum propeller is installed on each engine. The propeller is of the full feathering, constant speed, variable-pitch, counterweighted, reversible type; controlled by engine oil pressure through single action, engine driven propeller governors. The propeller is flange mounted to the engine shaft. Centrifugal counterweights, assisted by a feathering spring, move the blades toward the low RPM (high pitch) position and into the feathered position. Governor boosted engine oil pressure moves the propeller to the high RPM (low pitch) hydraulic stop and reverse position. The propellers have no low RPM (high pitch) stops; this allows the blades to feather after engine shutdown. Low pitch propeller position is determined by the low pitch stop which is a mechanically actuated, hydraulic stop. Ground fine and reverse blade angles are controlled by the POWER levers in the ground fine and reverse range.

2-42. FEATHERING PROVISIONS.

Both manual and automatic propeller feathering systems are provided. Manual feathering is accomplished by pulling the corresponding PROP lever aft, past a friction detent. To unfeather, the PROP lever is pushed forward into the governing range. The automatic feathering system will sense loss of torque and will feather an unpowered propeller. Feathering springs will feather the propeller when it is not turning.

a. Automatic Feathering. The automatic feathering system provides a means of immediately dumping oil from the propeller servo to enable the feathering spring and counterweights to start feathering action of the blades in the event of an engine failure. Although the system is armed by a switch on the overhead control panel (fig. 2-13), placarded AUTOFEATHER TEST - OFF - ARM, the completion of the arming phase occurs when both POWER levers are advanced above 89% N_1, at which time both annunciators on the caution/advisory annunciator panel indicate a fully armed system. The annunciator panel annunciators are green and placarded #1 AUTOFEATHER (left engine) and #2 AUTOFEATHER (right engine). The system will remain inoperative as long as either POWER lever is retarded below approximately the 89% N_1 position, unless TEST position of the autofeather switch is selected to disable the POWER lever limit switches. The system is designed for use only during takeoff or landing, and should be turned off when establishing cruise climb. During takeoff or landing, should the torque for either engine drop to an indication between 19 - 13%, the autofeather system for the opposite engine will be disarmed. Disarming is confirmed when the AUTOFEATHER annunciator of the opposite engine becomes extinguished. If torque drops further, to a reading between 13 and 7%, oil is dumped from the servo of the affected propeller allowing a feathering spring to move the blades into the feathered spring to move the blades into the feathered position. Feathering also causes the AUTOFEATHER annunciator of the feathered propeller to extinguish. At this time, both the #1 AUTOFEATHER and #2 AUTOFEATHER annunciators are extinguished, the propeller of the defective engine has feathered, and the propeller of the operative engine has been disarmed from autofeathering capability. Only manual feathering control remains for the second propeller.

b. Propeller Autofeather Arm/Off/Test Switch. A switch placarded AUTOFEATHER TEST - OFF - ARM, located on the overhead control panel (fig. 2-13), is provided for arming and disarming the system and for selection of the TEST function. The TEST position of the switch checks the readiness of the autofeather system below 89% N_1.

c. Autofeather Annunciators. Autofeather annunciators consist of two green annunciators on the caution/advisory annunciator panel placarded #1 AUTOFEATHER and #2 AUTOFEATHER. When illuminated, the annunciators indicate that the autofeather system is armed. Both annunciators will be extinguished if either propeller has been feathered or if the system is disarmed by retarding a POWER lever. Autofeather circuits are protected by one 5-ampere circuit breaker placarded AUTOFEATHER, located on the overhead circuit breaker panel (fig. 2-7).

2-43. PROPELLER GOVERNORS.

Two governors, a constant speed governor, and an overspeed governor, control propeller RPM. The constant speed governor, mounted on top of the reduction housing, controls the propeller through its entire range. The propeller controller lever controls the propeller by means of this governor. If the constant speed governor should malfunction and request more than 1700 RPM, the overspeed governor cuts in at 1802 RPM and dumps oil from the propeller to keep the RPM from exceeding approximately 1802 RPM. A solenoid, actuated by the GOVERNOR TEST switch located in the overhead control panel (fig. 2-13), is provided for resetting the overspeed governor to approximately 1540 to 1580 RPM for test purposes. If the propeller sticks or moves too slowly during a transient condition causing the propeller governor to act too slowly to prevent an overspeed condition, the power turbine governor, contained within the constant speed governor housing, acts as a fuel topping governor. When the propeller reaches 106% of selected N_2 RPM, the power turbine governor limits the fuel flow to the gas generator, reducing N_1 RPM, which in turn prevents the propeller from exceeding approximately 1802 RPM. During operation in the reverse range, the power turbine governor is reset to approximately 95% of propeller RPM before the propeller reaches a negative pitch angle. This ensures that engine power is limited to maintain a propeller RPM of somewhat less than that of the constant speed governor setting. The constant speed governor therefore, will always sense an underspeed condition and direct oil pressure to the propeller servo piston to permit propeller operation in beta and reverse ranges.

2-44. LOW PITCH STOP.

Low pitch propeller position is determined by a mechanically-monitored hydraulic low pitch stop. The propeller servo piston is connected by four spring-loaded sliding rods to the beta collar, mounted behind the propeller. A carbon brush block riding in the beta collar transfers the movement of the collar through the propeller reversing lever to the beta valve of the governor. The initial forward motion of the beta valve from its rigged position blocks off the flow of oil to the propeller. Further motion dumps the oil from the propeller into the reduction gear box sump. A mechanical stop limits the forward motion of the beta valve. Rearward movement of the beta valve from its rigged position does not affect normal propeller control. When the propeller is rotating at a speed lower than that selected on the governor, the governor pump provides oil pressure to the servo piston, decreasing pitch of the propeller blades until the feedback of motion from the beta collar pulls the beta valve into a position blocking the supply of oil to the propeller, thus preventing further pitch changes.

2-45. GROUND FINE.

CAUTION

Propeller speeds below 1000 RPM are not authorized, unless the propeller is feathered.

Lifting the POWER levers and moving them aft past the flight idle stop will place the POWER levers into the ground fine position. Approximately half way back to the ground fine gate, a mechanical linkage at the propeller governor will begin to bleed P_y air from the fuel control unit, provided the PROP levers are positioned to the minimum RPM position. This results in a decrease in both engine N_1, torque, and propeller RPM. With the POWER levers at the ground fine gate, engine N_1 should be within the range of 62% to 67%, and propeller RPM should not be less than 1000 RPM.

2-46. PROPELLER SYNCHROPHASER.

a. Description. The propeller synchrophaser matches left and right propeller RPM as well as propeller phase relationship. This phase relationship is designed to decrease cabin noise, and is not adjustable in flight. A toggle switch, placarded PROP SYN - ON - OFF, installed adjacent to the synchroscope on the pilot's instrument panel (fig. 2-16), turns the system on/off.

Signal pulses occurring once per revolution of the propeller are obtained from magnetic pickups (located in the front of the engine on the deice brush mounting bracket) when the target (mounted on the aft side of the spinner bulkhead) passes the magnetic pickup. The signal pulses are sent to a control box installed forward of the pedestal. The control box received these signal pulses and compares them for pulse rate and relative position. Differences in pulse rate and/or propeller position cause the control box to vary the voltage in the primary governor coil, which in turn increases propeller speed until the correct speed and phasing are obtained.

A governor coil increases the speed set by the propeller control lever, but never decreases the speed set by the control lever. The maximum synchrophaser range is approximately 20 RPM. This limited range prevents either propeller from losing more than a limited RPM if the other propeller is feathered with the synchrophaser ON.

There is no master or slave engine in this type system. There is a limited range for synchronizing, called the “holding range”. There is a maximum RPM differential (capture range), at which the synchrophaser, when turned on, will begin to synchronize the propellers. For this reason the propellers should be manually synchronized before turning the synchrophaser on.

NOTE

If the synchrophaser is ON but does not adjust properly, the synchrophaser has reached the limit of its range. Turn the system OFF, manually adjust the propeller RPM into synchronization, then turn the synchrophaser ON.

The propeller synchrophaser may be used on takeoff at the pilot's option.

b. Synchrophaser Control Box. The control box, located forward of the pedestal, converts pulse rate differences into correction commands. Differences in pulse rate, and/or propeller position, cause the control box to vary the voltage in the primary governor coil, which in turn increases propeller speed until the correct speed and phasing are obtained. The system is protected by a 5-ampere circuit breaker placarded PROP SYNC, located on the overhead circuit breaker panel (fig. 2-7).

c. Synchroscope. The propeller synchroscope indicator, located on the pilot's instrument panel, provides an indication of synchronization of the propellers. If the right propeller is operating at a higher RPM than the left, a black and white cross pattern spins in a clockwise direction. Left, or counterclockwise, rotation indicates a higher RPM of the left propeller. This instrument aids the pilot in obtaining complete synchronization of the propellers.

2-47. PROPELLER LEVERS.

Two PROP levers on the control pedestal (fig. 2-12), placarded PROP, are used to regulate propeller speeds. Each lever controls a primary governor, which acts to regulate propeller speeds within the normal operational range. The full forward position of the levers is placarded TAKE-OFF, LANDING, AND REVERSE - HIGH RPM. The full aft position of the levers is placarded FEATHER. When a lever is placed at HIGH RPM, the propeller may attain a static RPM of 1700 depending upon POWER lever position. As a lever is moved aft, passing through the propeller governing range, but stopping at the feathering detent, the propeller RPM will correspondingly decrease to the lowest limit (approximately 1200 RPM). Moving a PROP lever aft past the detent into FEATHER will feather the propeller.

2-48. PROPELLER REVERSING.

CAUTION

Do not move the POWER levers below the flight idle gate unless the engine is running. Damage to the reverse linkage mechanisms will occur.

Propeller reversing on deteriorating surfaces may cause engine FOD and propeller erosion from reversed airflow. Consideration should be given to not reversing propellers when operating in snow or dusty conditions, to prevent obscuring the pilot's vision.

The engine POWER levers actuate an engine mounted cambox which is connected to the engine FCU (fuel control unit) and the propeller reversing cable. The cambox is arranged so that the reversing cable is not affected by POWER lever movement forward of the idle stop. When the POWER levers are lifted over the reversing detent and moved rearward, the reversing cable is pulled aft. This action resets the beta valve rearward, allowing the governor to pump more oil into the propeller, thus moving the blades through the ground fine range toward reverse pitch. As the blades move the mechanical feedback collar is moved forward. This movement is transmitted by a carbon block on the end of the reversing lever to the beta valve, causing it to move forward. As the POWER levers are moved further rearward (into the striped area), the propeller blades are moved further toward the reverse pitch stop, and the FCU is reset to increase engine speed.

2-49. PROPELLER TACHOMETERS.

Two tachometers on the instrument panel register propeller speed in hundreds of RPM (fig. 2-16). Each indicator is slaved to a tachometer-generator unit attached to the corresponding engine, installed on the reduction gearbox.

Section VII. UTILITY SYSTEMS

2-50. DEFROSTING SYSTEM.

a Description. The defrosting system is an integral part of the heating and ventilation system. The system consists of two warm air outlets connected by ducts to the heating system. One outlet is just below the pilot's windshield and the other is below the copilot's windshield. A push-pull control, placarded DEFROST AIR, on the pilot' s subpanel, manually controls airflow to the windshield. When pulled out, defrosting air is ducted to the windshield. As the control is pushed in, there is a corresponding decrease in airflow.

b. Automatic Operation.

1. VENT BLOWER switches - As required

2 CABIN AIR MODE SELECT switch - AUTO.

3. CABIN AIR TEMP CONTROL rheostat - As required.

4. CABIN AIR, COPILOT AIR PILOT AIR, and DEFROST AIR controls - As required.

c. Manual Operation. If the automatic temperature control should fail to operate, the temperature of defrost air and cabin air can be controlled manually by setting the CABIN AIR MODE SELECT switch to the MAN COOL position, then using the CABIN AIR MANUAL TEMP switch to set the desired temperature. This control is located on the overhead control panel (fig. 2-13). Use the following procedure for manual operation:

1. PILOT and COPILOT AIR controls - In.

2 CABIN AIR and DEFROST AIR controls Out

3. CABIN AIR MODE SELECT switch - MAN COOL.

4. Cold air outlets - As required.

5. CABIN AIR MANUAL TEMP switch - As required.

2-51. SURFACE DEICING SYSTEM.

a. Description. Ice accumulation is removed from each inboard and outboard wing leading edge, both horizontal stabilizers, stabilons, and taillets by the flexing of deice boots which are pneumatically actuated. Engine bleed air from the engine compressor is used to supply air pressure to inflate the deice boots, and to supply vacuum through the ejector system. A pressure regulator protects the system from over inflation. When the system is not in operation, a distributor valve keeps the boots held down by vacuum supplied through the ejector systerm

CAUTION

Operation of the surface device system in ambient temperatures below -40°C can cause permanent damage to the deice boots.

NOTE

Under conditions where one bleed air source is inoperative, sufficient bleed air pressure for deice boot inflation may riot be available. Prior to deice boot inflation, check the regulated bleed air pressure gage for a minimum of 16 PSI. If insufficient pressure exists, increasing engine N, and/or decreasing aircraft altitude will increase bleed air pressure.

b. Operation.

WARNING

To ensure adequate bleed air pressure to the deice boots, do not simultaneously actuate surface and antenna deice systems in the manual mode.

(1) Deice boots are intended to remove ice after it has formed rather than prevent its formation. For the most effective deicing operation, allow at least 1/2 inch of ice to form on the boots before attempting ice removal. Very thin ice may crack and cling to the boots instead of shedding.

NOTE

Never cycle the system rapidly, this may cause the ice to accumulate outside the contour of the inflated boots and prevent ice removal.

(2) A two position deice switch on the overhead control panel placarded SURFACE controls the deicing operation. The switch is spring loaded to return to the off position from SINGLE CYCLE AUTO or MANUAL When the SINGLE CYCLE AUTO position is selected, the distributor valve opens to inflate the wing boots. After an inflation period of approximately 6 seconds, an electronic timer switches the distributor to deflate the wing boots and

a 4 second inflation begins in the horizontal stabilizer, stabilon, and taillet boots. When these boots have inflated and deflated, the cycle is complete.

(3) If the switch is held in the MANUAL position, the boots will inflate simultaneously and remain inflated until the switch is released. The switch will return to the OFF position when released. After the cycle, the boots will remain in the vacuum hold down condition until again actuated by the switch.

(4) Either engine is capable of providing sufficient bleed air for all requirements of the surface deice system. Check valves in the bleed air and vacuum lines prevent backflow through the system during single engine operation. Regulated pressure is indicated on a gage, placarded PNEUMATIC PRESSURE, located on the center subpanel.

(5) Under conditions where one bleed air source is inoperative, sufficient bleed air pressure for deice boot inflation may not be available. Prior to deice boot inflation, check the regulated bleed air pressure gage for a minimum of 16 PSL If insufficient pressure exists, increasing engine N1 and/or decreasing aircraft altitude will increase bleed air pressure.

2-52. ANTENNA DEICING SYSTEM.

a. Description. The antenna deicing system removes or prevents ice accumulation on the mission antennas. Pressure regulated bleed air from both engines supply pressure to inflate the boots. To assure operation of the system, in the event of failure of one engine, a check valve is incorporated in the bleed air line from each engine to prevent loss of pressure through the compressor of the inoperative engine. Inflation and deflation phases are controlled by distributor valves.

WARNING

To ensure adequate bleed air pressure to the deice boots, do not simultaneously actuate surface and antenna deice systems in the manual mode.

NOTE

Under conditions where one bleed air source is inoperative, sufficient bleed air pressure for deice boot inflation may not be available. Prior to deice boot inflation, check the regulated bleed air pressure gage for a minimum of 16 PSI. If insufficient pressure exists, increasing engine N, and/or decreasing aircraft altitude will increase bleed air pressure.

b. Antenna Deice System Switch. The antenna deice system is controlled by a switch placarded ANTENNA, MANUAL SINGLE CYCLE AUTO located on the overhead control panel (fig. 2-13). The switch is spring loaded to return to the off position from the SINGLE CYCLE AUTO or MANUAL position When the switch is set to the SINGLE CYCLE AUTO position, the system will run through one timed inflation-deflation cycle. When the switch is held in the MANUAL position the boots will inflate and remain inflated until the switch is released.

c. Operation. Deice boots are intended to remove ice after it has formed rather than prevent its formation. For the most effective deicing operation, allow at least 1/8 to 1/4 inch of ice to form on the boots before attempting removal. Very thin ice may crack and cling to the boots instead of shedding.

NOTE

Never cycle the system rapidly, this may cause the ice to accumulate outside the contour of the inflated boots and prevent ice removal.

2-53. FORWARD INTEROPERABLE DATA LINK ANTENNA RADOME ANTI-ICE.

The forward interoperable data link antenna radome anti-ice system utilizes engine bleed air to prevent the formation of ice on the radome. The system is controlled by a switch placarded RADOME ON, located on the overhead control panel (fig. 2-13). The circuit is protected by a 7.5ampere circuit breaker placarded RADOME ANTI-ICE, located on the overhead circuit breaker panel (fig. 2-7).

2-54. PROPELLER ELECTRIC DEICE SYSTEM.

a. Description. The propeller electric deice system includes electrically heated deice boots, slip rings and brush block assemblies, a timer for automatic operation, ammeter, circuit breakers for left and right propeller and control circuit protection, and two switches located on the overhead control panel (fig. 2-13), for automatic or manual control of the system.

b. Automatic Operation. The two position switch located on the overhead control panel, placarded PROP AUTO ON, is provided to activate the automatic system. Upon placing the switch to the ON position, the timer diverts power through the brush block and slip ring to all heating elements on one propeller. Subsequently, the timer then diverts power to all heating elements on the other propeller for the same length of time. This cycle will continue as long as the switch is in the ON position. The system utilizes a metal foil type single heating element, energized by DC voltage. The timer switches every 90 seconds, resulting in a complete cycle in approximately 3 minutes.

c. Manual Operation. The manual propeller deice system is provided as a backup to the automatic system. The spring-loaded control switch located on the overhead control panel placarded PROP MANUAL ON, controls the manual override relay. When holding the switch in the ON position the automatic timer is overridden, and power is supplied to the heating elements of both propellers simultaneously. This switch is of the momentary type and must be held in position for approximately 90 seconds to dislodge ice from the propeller surface. Repeat this procedure as required to avoid significant buildup of ice, which will result in a loss of performance, vibration, and impingement of ice upon the fuselage. The propeller deice ammeter will not indicate a load while the propeller deice system is being utilized in the manual mode. I-However, each aircraft loadmeter will indicate an approximate 10% increase in load while the manual propeller deice system is operating.

2-55. PITOT AND STALL WARNING HEAT SYSTEM.

a. Pitot Heat

CAUTION

Pitot heat should not be used for more than 15 minutes while the aircraft is on the ground. Overheating may damage the heating elements.

Heating elements are installed in both pitot masts, located on the nose. Each heating element is controlled by an individual switch placarded PITOT, LEFT and RIGHT ON, located on the overhead control panel (fig. 2-13). Circuit protection is provided by the two 7.5-ampere circuit breakers, placarded PITOT HEAT, on the overhead circuit breaker panel (fig. 2-7). The true airspeed temperature probe heat control circuit is also protected by these circuit breakers. If either left or right pitot heat is on, the true airspeed temperature probe heat will be on.

CAUTION

Heating elements protect the stall warning lift Heating elements protect the stall warning lift transducer vane and face plate from ice. However, a buildup of ice on the wing may change or disrupt the airflow and prevent the system from accurately indicating an imminent stall.

b. Stall Warning Heat. The lift transducer is equipped with anti-icing capability on both the mounting plate and the vane. The heat is controlled by a switch located on the overhead control panel placarded STALL WARN. The level of heat is minimal for ground operation but is automatically increased for flight operation through the landing gear safety switch Circuit protection is provided by a 15-ampere circuit breaker, placarded STALL WARN, on the overhead circuit breaker panel (fig. 2-7).

2-56. STALL WARNING SYSTEM.

The stall warning system consists of a transducer, a lift computer, warning horn, and a test switch Angle of attack is sensed by aerodynamic pressure on the lift transducer vane located on the left wing leading edge (fig. 2-1). When a stall is imminent, the output of the transducer activates a stall warning hornr The system has preflight test capability through the use of a switch placarded STALL WARN TEST OFF LDG GEAR WARN TEST on the copilot's subpanel (fig. 2-6). Holding this switch in the STALL WARN TEST position actuates the warning horn by moving the transducer vane. The circuit is protected by the 5-ampere circuit breaker, placarded STALL located on the overhead circuit breaker panel (fig. 2-7).

2-57. BRAKE DEICE SYSTEM.

a. Description. The heated-air brake deice system may be used in flight with gear retracted or extended, or on the ground. When activated, hot air is diffused by means of a manifold assembly over the brake discs on each wheel. Manual and automatic controls are provided. There are two primary occasions which require brake deicing. The first is when an aircraft has been parked in a freezing atmosphere allowing the brake systems to become contaminated by freezing rain, snow, or ice, and the aircraft must be moved or taxied. The second occasion is during flight through icing conditions with wet brake assemblies which are presumed to be frozen, which must be thawed prior to landing to avoid possible tire damage and loss of directional control. Hot air for the brake deice system comes from the compressor stage of both engines obtained by means of a solenoid valve attached to the bleed air system which serves both the surface deice system and the pneumatic systems operation

b. Operation. A switch located on the overhead control panel (fig. 2-13), placarded BRAKE ON, controls the solenoid valve by routing power through a control module box under the aisleway floorboards. The system is protected by a 5-ampere circuit breaker on the overhead circuit breaker panel (fig. 2-7), placarded BRAKE DEICE A 10-minute timer limits operation and avoids excessive wheel well temperatures when the landing gear is retracted.

The control module also contains a circuit to the green BRAKE DEICE ON annunciator, and has a resetting circuit interlocked with the gear uplock switch. When the system is activated, the BRAKE DEICE ON annunciator should be monitored and the control switch selected off after the annunciator extinguishes, otherwise, on the next gear extension the system will restart without pilot action. The control switch should also be selected off if deice operation fails to self-terminate after approximately 10 minutes. If the automatic timer has terminated brake deice operation after the last retraction of the landing gear, the landing gear must be extended in order to obtain further operation of the system.

(1) The L BL AIR FAIL or R BL AIR FAIL annunciator may momentarily illuminate during simultaneous operation of the surface and brake deice systems at low N, speeds. If the annunciators immediately extinguish, they may be disregarded.

(2) During certain ambient conditions, use of the brake deice system may reduce available engine power, and during flight will result in a TGT rise of approximately 200C. Applicable performance charts should be consulted before brake deice system use. If specified power cannot be obtained without exceeding limits, the brake deice system must be selected off until after takeoff is completed. TGT limitations must also be observed when setting climb and cruise power. The brake deice system is not to be operated above 150°C ambient temperature. During periods of simultaneous brake deice and surface deice operation, maintain *8*5% N1 or higher. If inadequate pneumatic pressure is developed for proper surface deice boot inflation, select the brake deice system off. Both sources of pneumatic bleed air must be in operation during brake deice system use. Select the brake deice system off during single eng;ne operation.

2-58. FUEL SYSTEM ANTI-ICING.

a. Description. An oil-to-fuel heat exchanger, located in each engine accessory case, operates continuously and automatically to heat the fuel sufficiently to prevent freezing of any water in the fuel. No controls are involved. Three external fuel vents are provided on each wing. One is recessed to prevent ice formation, the second is flush mounted so that no ice can collect upon it, and the third is electrically heated. Heating is controlled by two toggle switches located on the overhead control panel, placarded FUEL VENT LEFT and RIGHT ON (fig. 2-13). They are protected by two 5-ampere circuit breakers, placarded FUEL VENT HEAT L'FT, RIGHT, located on the overhead circuit breaker panel (fig. 2-7).

CAUTION

To prevent overheat damage to electrically heated anti-ice jackets, the FUEL VENT heat switches should not be turned ON unless cooling air will soon pass over the jackets.

b. Normal Operation. For normal operation, switches for the fuel vent anti-ice circuits are turned ON as required during the BEFORE TAKEOFF procedures.

2-59. WINDSHIELD ELECTROTHERMAL ANTI-ICE SYSTEM.

a. Description. Both the pilot's and copilot's windshields are provided with an electrothermal anti-ice system. Each windshield is part of an independent electrothermal anti-ice system. Each system is comprised of the windshield assembly with heating wires sandwiched between glass panels, a temperature sensor attached to the glass, an electrothermal controller, two relays, a control switch, and two circuit breakers. The two switches, placarded WINDSHIELD, PILOT, NORMAL OFFHIGH and WINID SHIELD, COPILOT, NORMAL OFF HIGH, located on the overhead control panel (fig. 2-13), control system operation. Each switch controls one electrothermal windshield system. The circuits of each system are protected by a 5-ampere circuit breaker and a 50-ampere circuit breaker, which are not accessible to the flight crew.

CAUTION

To help prevent windshield cracking, windshield heat should be placed in NORMAL position for at least 15 minutes prior to using the HIGH position.

b. Normal Operation. Two levels of heat are provided through the three position switches, placarded NORMAL in the aft position, OFF in the center position, and HIGH after lifting the switch over a detent and moving it to the forward position. In the NORMAL position, heat is provided for the major portion of each windshield. In the HIGH position, heat is provided at a higher watt density to a smaller portion of the windshield. The lever lock switch feature prevents inadvertent switching to the HIGH position during system shutdown

2-60. PRESSURIZATION SYSTEM.

a. Description. A mixture of bleed air from the engines and ambient air is available for pressurization to the cabin at a rate of approximately 10 to 17 pounds per minute. The flow control unit of each engine controls bleed air from the engine to make it usable for pressurization, by mixing ambient air with the bleed air, depending upon aircraft altitude and ambient temperature. On takeoff, excessive pressure bumps are prevented by landing gear safety switch actuated solenoids incorporated in the flow control units. These solenoids, through a time delay, stage the input of ambient air flow by allowing ambient air flow introduction through the left flow control unit first, then 4 seconds later air flow through the right flow control unit

b. Pressure Differential. The pressure vessel is designed for a normal workidng pressure differential of 6.5 PSI, which will provide a cabin pressure altitude of 8,000 feet at an aircraft altitude of 29,700 feet, and a cabin altitude of 10,000 feet at an aircraft altitude of 34,000 feet

c. Pressurization Controller. The pressurization controller, located on the copilot's subpanel (fig. 2-6), provides a display of the selected altitude, an altitude selector, and a rate control selector. The cabin and aircraft altitude display is a mechanically coupled dial. The outer scale, (CABIN ALT) of the display, indicates the selected cabin altitude, the inner scale (ACFT ALT) indicates the corresponding altitude at which the maximum differential pressure would occur. The indicated value on each scale is read as placarded, ALT FT X 1000. The rate control selector, placarded RATE INC, regulates the rate at which cabin pressure ascends or descends to the selected altitude. The rate change selected may be from 200 to 2000 feet per minute.

d. Cabin Rate-of-Climb Indicator. An indicator, placarded CABIN CLIMB, is located on the copilot's subpanel (fig. 2-6). It is calibrated in thousands of feet per minute change in cabin altitude.

e. Cabin Altitude Indicator. An indicator, placarded CABIN ALT, is located on the copilot's subpanel (fig. 2-6). The longer needle indicates aircraft altitude in thousands of feet on the outside dial. The shorter needle indicates pressure differential in PSI on the inner dial. Maximum differential is 6.5 +.10 PSI.

f. Outflow Valve. A pneumatically operated outflow valve, located in the aft pressure bulkhead, maintains the selected cabin altitude and rate-of-climb commanded by the cabin rate-of-climb and altitude controller. As the aircraft climbs, the controller modulates the outflow valve to maintain a selected cabin rate of climb and increases the cabin differential pressure until the maximum cabin pressure differential is reached. At a cabin altitude of 12,500 feet, a pressure switch mounted on the back of the overhead control panel completes a circuit to illuminate a red ALT WARN warning annunciator, to warn of operation requiring oxygen.

g. Safety Valve. Before takeoff, the safety valve is open with equal pressure between the cabin and the outside air. The safety valve closes upon lift off if the CABIN PRESS DUMP switch, located on the copilot's subpanel (fig. 2-6), is in the pressurize mode. The safety valve, adjacent to the outflow valve, provides pressure relief in the event of an outflow valve failure. This valve is also used as a dump valve. The safety valve is opened by vacuum, which is controlled by a solenoid valve operated by the CABIN PRESS DUMP switch. It is wired through the right landing gear safety switch If either of these switches is open, or the vacuum source or electrical power is lost, the safety valve will close to atmosphere except at maximum pressure differential of 6.5 -.1.0_PSI. A negative pressure relief diaphragm is also incorporated into the outflow and safety valves to prevent outside atmospheric pressure from exceeding cabin pressure during rapid descent

h. Drain. A drain in the outflow valve static control line is provided for removal of accumulated moisture. The drain is located behind the lower sidewall upholstery access panel in the baggage section of the aft compartment

i. Flow Control Unit. A flow control unit, located forward of the firewall in each engine nacelle controls bleed air flow and the mixing of ambient air to make up the total air flow to the cabin for pressurization, heating, and ventilation. An integral electric solenoid firewall shutoff valve is controlled by the ENVIRO & PNEU BT LEED AIR valve switches on the overhead control panel (fig. 2-13). A solenoid, operated by the right landing gear safety switch, controls the introduction of ambient air to the cabin upon takeoff. Both the ambient air flow control valve and the bleed air flow control valve are motor driven.

(1) The unit receives bleed air from the engine into an ejector which draws ambient air into the venturi of the nozzle. The mixed air is then forced into the bleed air line routed to the cabin.

(2) Bleed air flow is controlled automatically. When the aircraft is on the ground, circuitry from the landing gear safety switch prevents ambient air from entering the flow control unit to provide maximum heating.

(3) The bleed air firewall shutoff valve in the control unit is a spring-loaded bellows-operated valve that is held in the open position by bleed air pressure. When the electric solenoid is shut off, or when bleed air diminishes

on engine shutdown (in both cases the pressure to the fire- wall shutoff valve is cut off), the firewall valve closes.

2-61. OXYGEN SYSTEM.

a. Description. The oxygen system (fig. 2-24) is provided primarily as an emergency system, however, the system may also be used to provide supplemental (first aid) oxyge*n.* Two 70 cubic-foot capacity oxygen supply cylinders, charged with aviator's breathing oxygen, are installed in the unpressunrized portion of the aircraft behind the aft pressure bulkhead. The pilot's and copilot's positions are equipped with diluter demand type regulators, which automatically mix the proper amount of oxygen for a given amount of air at altitude. A first aid oxygen mask is also provided in the cabin. Oxygen system pressure is shown by two gages placarded OXYGEN SUPPLY PRESSURE, located on the pilot's and copilot's oxygen regulator control panels. Two pressure reducers, located in the unpressurized portion of the aircraft behind the aft bulkhead, lower the pressure in the system to 400 PSI, and route oxygen to the regulator control panels. Both cylinders are interconnected, so refilling can be accomplished through a single filler valve located in the aft right side of the fuselage exterior. A pressure gage is mounted in conjunction with the filler valve, and each cylinder has a pressure gage. Table 2-4 shows oxygen flow planning rates vs. altitude. Table 2-5 shows oxygen duration capacities of the system in liters per minute (LPM) per mask at normal temperature and pressure, dry (NTPD).

(1) Regulator control panels.

WARNING

A valid cause for alarm would be the rapid loss of oxygen pressure when the aircraft is above 12,500 feet. Should this condition arise, descend as rapidly as possible to an altitude which does not require the use of oxygen.

CAUTION

When not in use, the diluter control lever should be left in the 100% OXYGEN position to prevent regulator contamination.

Each regulator control panel contains a blinker-type flow indicator, a 500 PSI pressure gage, a red emergency pressure control lever placarded EMERGENCY - NORMAL - TEST MASK, a white diluter control lever placarded 100% OXYGEN - NORMAL OXYGEN, and a green supply control lever placarded ON - OFF. The diluter control lever selects either normal or 100% oxygen when the emergency pressure control lever is in the NORMAL position

(2) The emergency pressure control lever has three positions. Two positions control oxygen consumption for the individual using oxygen, and the remaining position serves for testing hose and mask integrity. In the EMERGENCY position, the control lever causes 100% oxygen to be delivered at a safe, positive pressure. In the NORMAL position, the lever allows delivery of normal or 100% oxygen, depending upon the selection of the diluter control lever. In the TEST MASK position, 100% oxygen at positive pressure is delivered to check hose and mask integrity.

NOTE

Check to ensure that the OXYGEN SUPPLY PRESSURE gage registers adequate pressure before each flight When oxygen is in use, a check of the supply pressure should be made at intervals during flight, to note the quantity available and to approximate the supply duration. The outside temperature is reduced as an aircraft ascends to higher altitudes. Oxygen cylinders thus cooled by temperature change will show a pressure drop. This type of drop in pressure will rise again upon return to a lower or warmer altitude.

(3) The 500 PSI oxygen pressure gage provided on the oxygen control panels should never indicate over 400 PSL If the pressure exceeds 400 PSL a malfunction of the pressure reducer is indicated. Whenever oxygen is inhaled, a blinker-vane slides into view within the flow indicator window, showing that oxygen is being released When oxygen is exhaled, the blinker vane vanishes from view.

b. Oxygen masks.

WARNING

Pure oxygen will support combustion. Do not smoke while oxygen is in use.

Oxygen masks for the pilot and copilot are provided. To connect a mask into the oxygen system, the individual connects the line attached to the mask to the flexible hose which is attached to the cockpit sidewall. The microphone in the oxygen mask is connected to the audio system through the pilot's or copilots headset/oxygen mask microphone selector switch, located on the instrument panel (fig. 2-15). To test mask and hose integrity, the individual

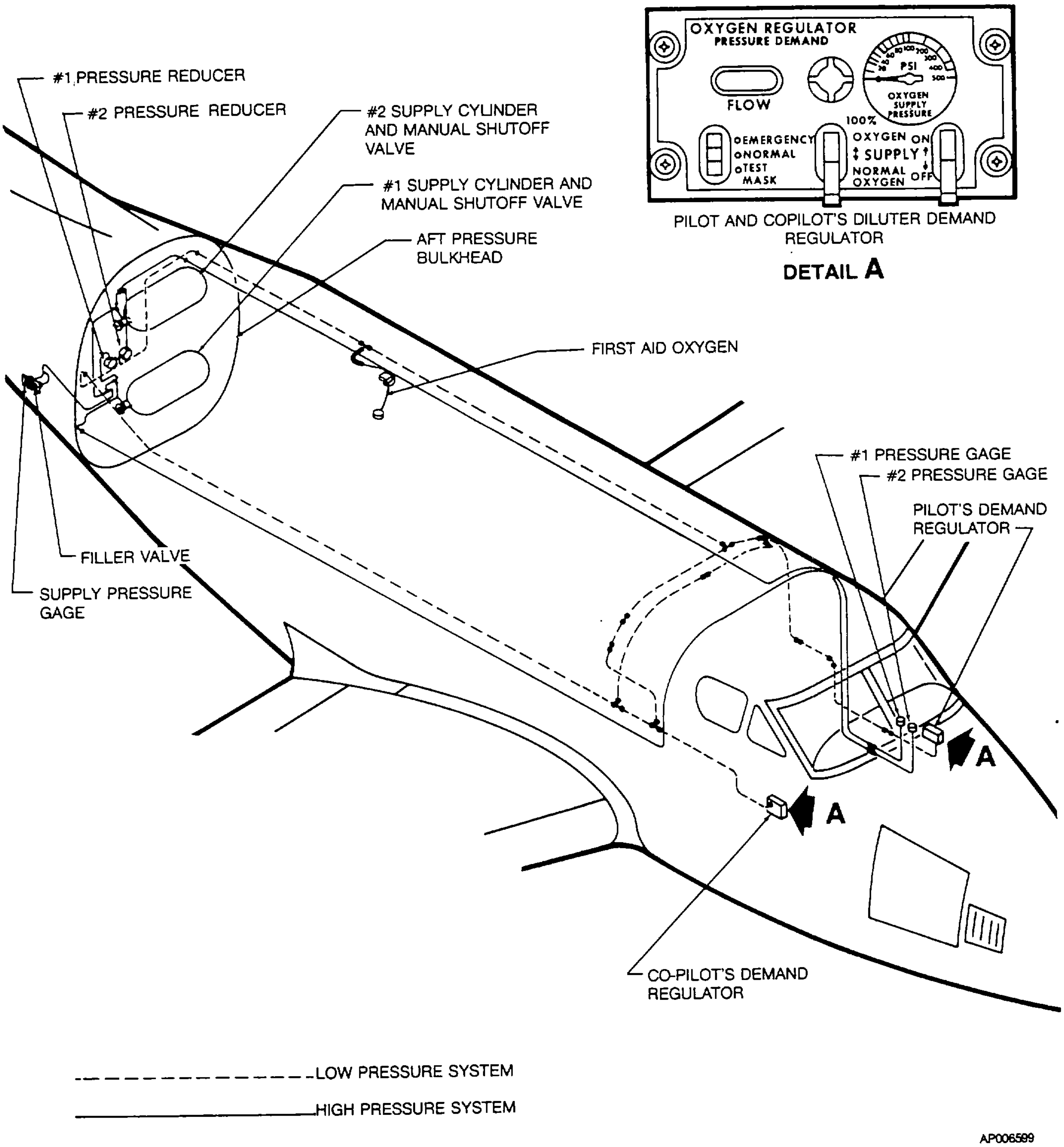

Figure 2-24. Oxygen System

Table 2-4. Oxygen Flow Planning Rates Vs Altitude
(All Flows in LPM Per Mask at NTPD)

CABIN PRESSURE ALTITUDE IN FEET	CREW MASK NORMAL(DILUTER DEMAND) (1)	CREW MASK 100% (1)	PASSENGER MASK
35,000	-0-(2)	3.1	3.7 (3)
34,000	-0-(2)	3.4	3.7 (3)
33,000	-0-(2)	3.7	3.7 (3)
32,000	-0-(2)	3.9	3.7 (3)
31,000	-0-(2)	4.2	3.7 (3)
30,000	-0-(2)	4.4	3.7 (3)
29,000	-0-(2)	4.7	3.7 (3)
28,000	-0-(2)	5.0	3.7 (3)
27,000	-0-(2)	5.3	3.7 (3)
26,000	-0-(2)	5.6	3.7 (3)
25,000	-0-(2)	5.9	3.7
24,000	-0-(2)	6.2	3.7
23,000	-0-(2)	6.6	3.7
22,000	-0-(2)	6.9	3.7
21,000	-0-(2)	7.2	3.7
20,000	3.6	7.6	3.7
19,000	3.9	7.9	3.7
18,000	4.2	8.3	3.7
17,000	4.5	8.7	3.7
16,000	4.8	9.1	3.7
15,000	5.1	9.5	3.7
14,000	5.4	10.0	3.7
13,000	5.8	10.4	3.7
12,00	6.1	10.9	3.7
11,000	6.5	11.3	3.7
10,000	6.9	11.9	3.7

NOTES:
(1) Based on minute volume of 20 LPM-BTPS (Body Temperature and Pressure Saturated).
(2) Use 100% oxygen above 20,000 feet.
(3) Not recommended for other than emergency descent use above 25,000 feet.
If average climb or descent flows are desired, add the values between altitudes and divide by the number of values used. For example, to determine the average rate for a uniform descent between 25,000 feet and 15,000 feet perform the following:
5,9 + 6.2 + 6.6 + 6.9 + 7.2 + 7.6 + 3.9 + 4.2 + 4.5 + 4.8 + 5.1 + 11 = 5.7 LPM
This method is preferred over averaging the extremes as some flow characteristics vary in such a way as to yield an incorrect answer.

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places the supply control lever on the regulator control panel to the ON position, puts on and adjusts his mask, selects TEST MASK position, and checks for leaks.

If any symptoms occur suggestive of the onset of hypoxia, immediately set the emergency pressure control lever to the EMERGENCY position and descend below 10,000 feet Whenever carbon monoxide or other noxious gas is present or suspected, set the diluter control lever to 100% oxygen and continue breathing oxygen until the danger is past

c. Normal Operation. Oxygen pressure is maintained at all times to the regulator control panels if the cylinder

Table 2-5. Oxygen Duration in Minutes 140 Cubic Foot System

	CABIN PRESSURE ALTITUDE	CREW MASK CONDITION	TOTAL FLOW LPM-NTPD	DURATION IN MINUTES (1)
TWO MAN CREW	35,000	100%	6.3	512.1
	31,000	100%	8.4	384.0
	25.000	100%	11.8	273.3
	20,000	100%	15.2	212.2
	20,000	NORMAL	7.2	448.0
	15,000	100%	19.0	169.7
	15,000	NORMAL	10.2	316.2
	10,000	100%	23.8	135.5
	10,000	NORMAL	13.8	233.7
TWO MAN CREW PLUS ONE PASS	35,000	100%	10.0	323
	31,000	100%	12.1	266.6
	25,000	100%	15.5	208.1
	20,000	100%	18.9	170.7
	20,000	NORMAL	10.9	295.9
	15,000	100%	22.7	142.1
	15,000	NORMAL	13.9	232.1
	10,000	100%	27.5	117.3
	10,000	NORMAL	17.5	184.3

(1) For 100% capacity of usable oxygen, 3,226 L.

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shut-off valves are open and if there is pressure in the cylinders. Each individual places the supply lever (green) on the regulator control panel to the ON position, and the diluter lever (white) to the NORMAL OXYGEN position.

d. Emergency Operation. For emergency operation, the affected crew member selects the EMERGENCY position of the emergency pressure control lever (red) on his regulator control panel. This selection provides 100% corygen at a positive pressure, regardless of the position of the diluter control lever.

e. First Aid Operaton. A first aid oxcygen mask is installed in the aft cabin area as a supplemental or emergency source of oxygen. The mask is stowed behind an overhead cover, placarded FIRST AID OXYGEN - PULL Removing the cover allows the mask to drop out of the container, exposing a manual control valve, which releases oxygen to the mask when placed in the ON position. After using the mask, the manual valve in the container must be turned OFF before stowing the mask and replacing the cover.

f. Oxygen Duration Examples.

(1) Example one.

(a) Wanted. Duration in minutes of oxygen at 100% capacity.

(b) Known. 'Iwo man crew plus one passenger, cabin pressure altitude =15,000 feet, crew masks, normal, 100% capacity.

(c) Method. Find "two man crew plus one pass " line (table 2-5), move right then down to 15,000 - "normal", read 232.1 minutes.

(2) Example two.

(a) Wanted. Duration of oxygen for previous example data at 84% of capacity.

(b) Known. 232.1 minutes duration at 100%, 84% capacity, total aircraft flow = 13.9 LPM.

(c) Method. Multiply 232.1 X 0.84 = 194.9 minutes, or Multiply 3,226 X 0.84 =2709.8, divide by 13.9 LPM = 194.9 minutes.

(3) Example three.

(a) Wanted. Duration of oxygen for complement at other cabin pressure altitude, at less than 100% capacity.

(b) Known. -Cylinder at 84% capacity, 100% capacity = 3,226 L, cabin pressure altitude = 21,000 feet

1 crew mask =LPM (100%), 1 passenger mask =LPM

(c) Method. Multiply 3,226 L X 0.84 = 2,709.8 L Multiply 2 crew X 7.2 LPM = 14.4 LPM Multiply 1 passenger X 3.7 LPM, add 14.4 LPM crew plus 3.7 LPM passenger = 18.1 LPM. Divide 2,709.8 L by 18.1 LPM = 149.7 minutes.

g. Oxygen Cylinder Capacity Example Problem. Oxygen cylinder capacity is determined by using figure 2-25.

(1) Example one.

(a) Wanted Percent of capacity at known pressure and temperature and pressure when temperature decreases.

(b) Known. Pressure =1,600 PSIG stabilized cylinder temperature is estimated at 200C, decreased stabilized cylinder temperature is estimated at -30°C

(c) Method Enter 1600 PSIG move up to 20°C line, move right to 84% then move left on 84% line to -30°C line, and move down to 1250 PSIG.

(2) Example two.

(a) Wanted. 100% capacity pressure at known temperature.

(b) Known. Temperature =-30°C

(c) Method. Move left along 100% line to -30'C line and move down to 1420 PSIG.

2-62. WINDSHIELD WIPERS.

a. *Description.* Two electrically-operated windshield wipers, are provided for use at all flight speeds. A rotary switch (fig. 2-13) placarded WINDSHIELD WIPER, located on the overhead control panel, selects mode of windshield wiper operation. An information placard above the switch states: DO NOT OPERATE ON DRY GLASS. Function positions of the switch, as read clockwise, are placarded: PARK - OFF - SLOW - FAST. When the switch is held in the spring-loaded PARK setting, the blades will return to their normal inoperative position on the glass, then, when released, the switch will return to OFF position terminating windshield wiper operation. The FAST and SLOW switch positions are separate operating speed settings for wiper operation. The windshield wiper circuit is protected by one 10-ampere circuit breaker, placarded WSHLD WIPER, located on the overhead circuit breaker panel (fig. 2-7).

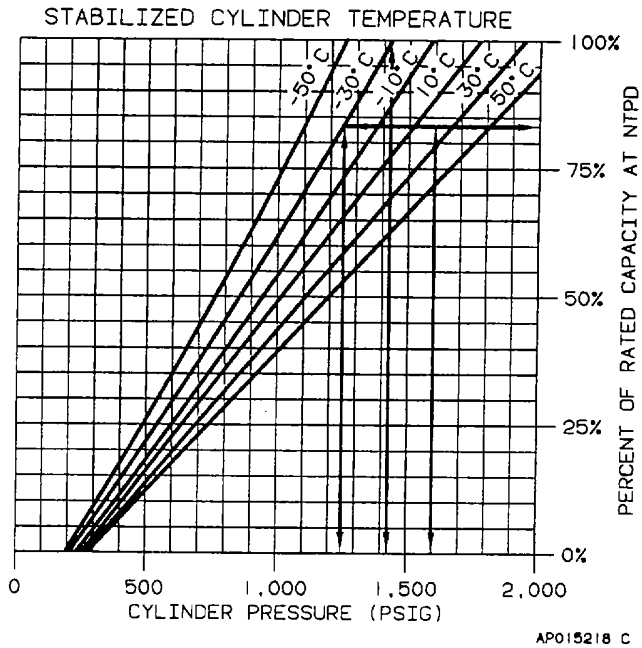


Figure 2-25. Oxygen Cylinder Capacity

CAUTION

Do not operate windshield wipers on dry glass. Such action can damage the linkage as well as scratch the windshield glass.

b. Normal Operation. To start, turn WINDSHIELD WIPER switch to FAST or SLOW speed, as desired. To stop, turn the switch to the PARK position and release. The blades will return to their normal inoperative position and stop. Turning the switch only to the OFF position will stop the windshield wipers, without returning them to the normal inactive position

2-63. FERRY CHAIR.

For ferry purposes, a forward facing chair is provided that may be attached to the floor tracks at fuselage station 211.87.

2-64. CIGARETTE LIGHTERS AND ASH TRAYS.

The pilot and copilot have individual cigarette lighters and ash trays mounted in escutcheons outboard of their seats. The cigarette lighters are protected by a 5-ampere circuit breaker, placarded CIGAR LIG HTER, on the overhead circuit breaker panel (fig. 2-7).

2-65. CHEMICAL TOILET.

a. Description. A side-facing chemical toilet is installed in the aft cabin area, and can also be used as an additional seat Two hinged-lid half-sections must be raised to gain access to the toilet Waste is stored within a removable container located below the seat in the cabinet assembly. This non-flushing system uses a dry chemical preparation to deodorize the stored waste. A toilet tissue dispenser is contained in a slide-out compartment on the forward side of the toilet cabinet A box of disposable waste container liners and a box of chemical deodorant packets are alsostored in the cabinet

b. Operation. During use, a removable throw-away plastic liner is attached to the waste container. After use, dry chemical deodorant obtained from the storage cabinet is deposited on the waste and the hinged lid sections are closed over the cavity. After each flight, the waste container must be removed, emptied, relined, and replaced in the cabinet Consumable toilet items should be resupplied as needed.

2-66. SUN VISORS.

CAUTION

When adjusting the sun visors, grasp only by the top metal attachment to avoid damage to the plastic shield.

Individual sun visors are provided for the pilot and copilot (fig. 2-8). Each visor is manually adjustable. When not needed as a sun shield, each visor may be manually rotated to a position flush with the top of the cockpit so that it does
not obstruct view through the windows.

2-67. RELIEF TUBE.

One relief tube is provided, located immediately aft of the cargo door on the left side of the fuselage.

Section VIII. HEATING, VENTILATION, COOLING, AND ENVIRONMENTAL CONTROL SYSTEM

2-68. HEATING SYSTEM.

Warm air for heating the cockpit, mission equipment compartment, and windshield defrosting is provided by bleed air from both engines. Engine bleed air is combined with ambient air in the heating and pressurization flow control unit in each engine nacelle. If the mixed bleed air is too warm for cockpit comfort, it is cooled by being routed through an air-to-air heat exchanger located in the forward portion of each inboard wing. If the mixed bleed air is not too warm, the air-to-air heat exchangers are bypassed. The mixed bleed air is then ducted to a mixing plenum, where it is mixed with cabin recirculated air. The warm air is then ducted to the cockpit outlets, windshield defroster outlets, and to the floor outlets in the mission equipment compartment. The environmental system is shown in figure 2-26.

a. Bleed air flow control unit. A bleed air flow control unit, located forward of the firewall in each engine nacelle controls the flow of bleed air and the mixing of ambient air to make up the total airflow to the cabin for heating, windshield defrosting, pressurization, and ventilation. The unit is electronically controlled with an integral electric solenoid firewall shutoff valve, controlled by the bleed air switches located on the overhead control panel (fig. 2-13) and a normally open solenoid valve operated by the right landing gear safety switch

b. Pneumatic bleed air shutoff valve. A pneumatic shutoff valve is provided in each engine nacelle to control the flow of bleed air to the surface, antenna, and brake deice systems. These valves are controlled by the bleed air valve switches located on the overhead control panel (fig. 2-13).

c. Bleed air valve switches. The bleed air flow control unit shutoff valve and pneumatic bleed air shutoff valves are controlled by two LEFT and RIGHI switches placarded ENVIRO & PNEU BLEED AIR - PNEU ONLY - ON, located on the overhead control panel (fig. 2-13). When set to the ON position, both the environmental flow control unit shutoff valve and the pneumatic shutoff valve are open; when set to the PNEU ONLY position, the environmental flow control unit shutoff valve is closed, and the pneumatic bleed air valve is open; in the ENVIRO & PNEU position, both are closed. For maximum cooling on the ground, turn the bleed air valve switches to the PNEU ONLY position

d. Cabin temperature mode selector switch. A switch placarded CABIN AIR MODE SELECT - OFF - AUTO- AC COLD OPN 10°C to -25°C - MAN COOL - MAN HEAT located on the overhead control panel, controls cockpit and mission avionics compartment heating and air conditioning. When the cabin temperature mode selector switch is set to the AUTO position, the heating and

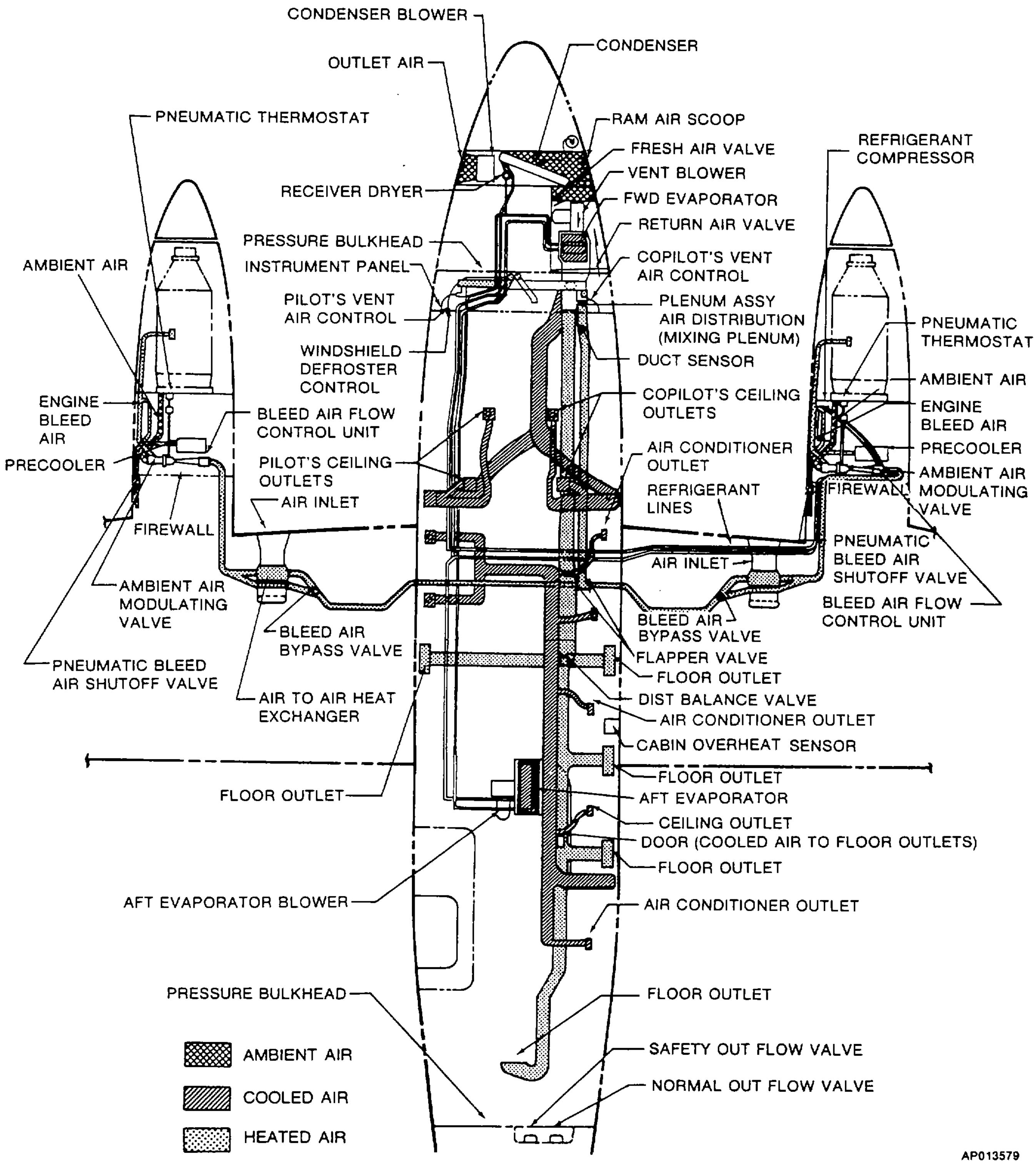


Figure 2-26. Environmental System

air conditioning systems are automatically controlled. Control signals from the temperature control box are transmitted to the bleed air heat exchanger bypass valves. Here, the temperature of the air flowing to the cabin is regulated by the bypass valves controlling the amount of air bypassing the heat exchangers. When the temperature of the cabin air has reached the temperature setting of the cabin temperature control rheostat, the automatic temperature control allows hot air to bypass the air-to-air exchangers admitting hot air into the cabin. When the bypass valves are in the fully closed position, allowing no air to bypass the heat exchangers, the air conditioner begins to operate, providing additional cooling. When the cabin temperature mode selector switch is set to the A/C COLD OPN position, the air conditioning system is in continuous operation. The cabin temperature control rheostat, in conjunction with the cabin temperature control sensor, provides regulation of cockpit and mission equipment compartment temperature. Bleed air heat is added as required to maintain the temperature selected by the cabin temperature control rheostat.

e. Cabin Temperature Control Rheostat. A control knob placarded CABIN AIR TEMP CONTROL - INCR located on the overhead control panel (fig. 2-13), provides regulation of cabin temperature when the cabin temperature mode selector switch is set to the ALTO or the AC COLD OPN position. A temperature sensing unit in the cabin, in conjunction with the setting of the cabin temperature control rheostat, initiates a heat or cool command to the temperature controller for the desired cockpit or mission equipment compartment environment

f. Manual Temperature Control Switch. A switch placarded CABIN AIR MANUAL TEMP - DECREASE - INCREASE located on the overhead control panel (fig. 2-13), controls cockpit and mission equipment compartment temperature with the cabin temperature mode selector switch set to the MAN HEAT or MAN COOL position. The manual temperature control switch controls the cockpit and avionics equipment temperature by providing a means of manually changing the amount that the bleed air bypass valves are opened or closed. To increase cabin temperature, the switch is held to the INCR position. To decrease cabin temperature, the switch is held to the DECR position. Approximately 30 seconds, per valve, is required to drive the bypass valves to the fully open or fully closed position. Only one valve moves at a time.

g. Forward Vent Blower Switch. The forward vent blower is controlled by a switch placarded VENT BLOWER FWD - AUTO - LOW - HIGH located on the overhead control panel (fig. 2-13). In the ALTO position the fan will run at low speed. The forward vent blower will not operate when the cabin temperature mode selector switch is set to the OFF position.

h. Aft Vent Blower Switch. The aft vent blower is controlled by the switch placarded VENT BLOWER AFT - AURO - ON, located on the overhead control panel (fig. 2-13). The single speed blower operates automatically through the N] switch, when the aft vent blower switch is placed in the AUTO position. The blower operates continuously when the switch is placed in the ON position with the air conditioner compressor operating. In the OFF position, the blower will not operate.

(1) Automatic heating mode.

1. BLEED AIR valve switches - ON, LEFT and RIGHT.
2. CABIN AIR TEMP MODE SELECT switch - AUTO.
3. Cabin AIR TEMP CONTROL rheostat - As required.
4. CABIN, PILOT, COPILOT, and DEFROST AIR knobs - As required.

(2) Manual heating mode.

1. BLEED AIR valve switches - ON, LEFT and RIGHT.
2. CABIN AIR TEMP MODE SELECT switch - MAN HEAT.
3. VENT BLOWER switches - As required.
4. CABIN AIR MANUAL TEMP switch - As required.
5. CABIN, PILOT, COPILOT, and DEFROST AIR knobs - As required.

(3) Cargo door radiant heat. A radiant heat panel is provided inside the cargo door to provide supplemental heating in the aft cabin area. The heat panel is operating whenever the cabin temperature mode switch is in the manual heat mode, or in the automatic mode with the temperature control system in the heat mode.

2-69. AIR CONDITIONING SYSTEM.

a. Description. Cabin air conditioning is provided by a refrigerant-gas vapor-cycle refrigeration system (fig. 2-26). The system consists of a belt-driven engine-mounted compressor, installed on the #2 engine accessory section, refrigerant plumbing, N, speed switch, high and low pressure protection switches, condenser coil, condenser under-pressure switch, condenser blower, forward and aft evaporators, receiver-dryer, expansion valve, and a bypass valve.

The plumbing from the compressor is routed through the right inboard wing leading edge to the fuselage and then forward to the condenser coil, receiver-dryer, expansion valve, bypass valve, and forward evaporator, which are located in the nose of the aircraft. A 7.5-ampere circuit breaker, placarded AIR COND CONTR, located on the overhead circuit breaker panel (fig. 2-7), protects the compressor clutch circuit.

(1) Forward evaporator. The forward evaporator and blower supplies airflow for the cockpit, forward ceiling outlets, and forward floor outlets. The forward evaporator blower has a high speed, which can be selected by setting the VENT BLOWER FWD switch, located on the overhead control panel (fig. 2-13), to the HIGH position. The forward vent blower is protected by a circuit breaker located on the DC power distribution panel, located beneath the aisleway.

(2) Aft evaporator. The aft evaporator and blower are located in the fuselage center aisle equipment bay, aft of the rear spar. Environmental air is circulated through the evaporator in either manual or automatic control modes. The rear evaporator supplies airflow for the aft ceiling outlets, rear floor outlets, and toilet compartment. The rear evaporator blower is protected by a circuit breaker located on the DC power distribution panel, located beneath the aisleway.

(3) High and low pressure limit switches. High and low pressure limit switches are provided to prevent compressor operation beyond operational limits. When the low or high pressure switches are activated, compressor operation will be terminated. When compressor operation has been terminated by limit switch activation, the system should be thoroughly checked before returning it to service.

(4) Thermal sense switch. A thermal sense switch is installed on the forward evaporator. This sense switch actuates a hot gas bypass valve which bypasses a portion of the refrigerant from the forward evaporator, thereby preventing icing of the evaporator.

(5) Condenser blower. A vane-axial blower draws air through the condenser when aircraft is on the ground. The blower is protected by a 50-ampere circuit breaker located beneath the aisleway. When the cabin temperature mode selector switch is set to the AC COLD OPN position during ground operation, the condenser blower will be off initially, and will remain off until compressor discharge pressure equals the pressure setting of the blower control high pressure switch. The blower will remain in operation until system pressure drops to equal the setting of the blower control low pressure switch.

(6) Air conditioning cold operation bypass valve. Selecting the AC COLD OPN mode on the CABIN AIR MODE SELECT switch (fig. 2-13), permits the operation of the air conditioning system by overriding the refrigerant low pressure switch. This allows the air conditioning system to operate in the manual mode. Starting the compressor in this optional mode at low ambient temperature will decrease the operational life of the compressor by five hours each time the air conditioning system is started below 10°C using this mode (AC COLD OPN). If the air conditioning system has been operating in the normal mode during flight, and decreasing ambient temperatures make it necessary to switch to the AC cold operation mode, there will be no degradation in the mean time between failure for the compressor.

(7) Air conditioner cold operation. Air conditioner cold operation mode is provided to allow the air conditioner to operate in the event of a hot cabin and an outside air temperature of less than 10°C. At an OAT of less than 10°C, a green advisory annunciator placarded AC COLD OPN, located on the caution/advisory annunciator panel will illuminate. This advises the crew that if air conditioning is required, the CABIN AIR MODE SELECT switch must be in the AC COLD OPN position. This causes the air conditioner compressor to run continuously and the temperature controller to operate the bypass valve.

b. Normal Operation.

(1) Automatic cooling mode.

1. BLEED AIR valve switches - ON, LEFT and RIGHT.
2. CABIN AIR MODE SELECT switch - AUTO.
3. CABIN AIR TEMP CONTROL rheostat - As required.
4. CABIN, PILOT, COPILOT, and DEFROST AIR knobs - As required.

(2) Manual cooling mode.

1. BLEED AIR valve switches - ON, LEFT and RIGHT.

NOTE

For maximum cooling on the ground, set the BLEED AIR valve switches to the PNEU ONLY position.

2. CABIN AIR MODE SELECT switch - MAN COOL.

(3) Air conditioning cold operation mode. (Used if ambient temperature is between 10°C and -25°C).

NOTE

Setting the cabin temperature mode selector switch to the AC COLD OPN position at ambient temperatures below -25°C may cause the air conditioning system to exceed the compressor low pressure limit setting, terminating compressor operation, and thereby rendering the system inoperative for the remainder of the flight

1. BLEED AIR valve switches - ON, LEFT and RIGHT.
2. CABIN AIR MODE SELECT switch - AC COLD OPN.
3. CABIN AIR TEMP CONTROL rheostat - As required.
4. CABIN, PILOT, COPILOT, and DEFROST air knobs - As required.

2-70. UNPRESSURIZED VENTILATION.

Ventilation is provided by two sources. One source is through the bleed air heating system in both the pressurized and unpressurized mode. The second source of ventilation is obtained from ram air through the condenser section in the nose through a check valve in the vent blower plenum. Ventilation from this source is in the unpressurized mode only with the CABIN PRESS DUMP switch in the DUMP position. The check valve closes during pressurized operation. Ram air ventilation is distributed through the main ducting system to all outlets. Ventilation air, ducted to each individual eyeball cold air outlet, can be directionally controlled by moving the ball in the socket Volume is regulated by twisting the outlet to open or close the valve.

2-71. ENVIRONMENTAL CONTROLS.

An environmental control section on' the overhead control panel (fig. 2-13) provides for automatic or manual control of the system. This section contains all the major controls of the environmental system including bleed air valve switches, forward and aft vent blower switches, manual temperature switch for control of the heat exchanger valves, a cabin temperature level control, and the cabin temperature mode selector switch for selecting automatic heating/ cooling or manual heating/cooling.

a. Heating Mode.

(1) If the cockpit is too cold:

1. PILOT and COPILOT AIR knobs - As required.
2. DEFROST AIR knob - As required.
3. CABIN AIR knob - Pull out in small increments. Allow 3 **to 5** minutes after each adjustment for system to stabilize.

(2) If the cockpit is too hot:

1. CABIN AIR knob - As required.
2. PILOT and COPILOT AIR knobs - In as required.
3. DEFROST AIR knob - In as required.

b. Cooling Mode:

(1) If the cockpit is too cold:

1. PILOT and COPILOT AIR knob - In as required.
2. DEFRIST AIR knob - In as required
3. Overhead cockpit outlets - As required.

(2) If the cockpit is too hot:

1. PILOT and C(OPILOT AIR knobs - Out as required.
2. CABIN AIR knob - Close in small increments. Allow 3 - 5 minutes after each adjustment for system to stabilize. If CABIN AIR knob is completely closed before obtaining satisfactory cockpit comfort, it may be necessary to place the AFT VENT BLOWER switch in the ON position to activate the aft evaporator to recirculate cabin air.

c. Automatic Mode Control. When the AUTO mode is selected on the CABIN AIR MODE SELECT switch, the heating and air conditioning systems are automatically controlled. When the temperature of the cabin has reached the selected setting, the automatic temperature control allows heated air to bypass the air-to-air exchangers in the wing center section. The warm bleed air is mixed with the cooled air. The rear evaporator picks up recirculated cabin air only.

(1) When the automatic control drives the environmental system from a heat mode to a cooling mode, the bypass valves close. When the left bypass valve reaches a fully closed position, the refrigeration system will begin cooling, provided the right engine N, speed is above 650a When the bypass valve is opened to a position approximately 30° from full open, the refrigeration system will turn off.

(2) The CABIN AIR TEMP CONTROL provides regulation of the temperature level in the automatic mode. A temperature sensing unit in the cabin, in conjunction with the control setting, initiates a heat or cool command to the temperature controller for desired cockpit and cabin environment

d. Manual Mode Control. With the CABIN AIR MODE SELECT switch in the MAN HEAT or MAN COOL position, regulation of the cabin temperature is accomplished manually with the CABIN AIR MANUAL TEMP switch

(1) In the MAN HEAT mode, the automatic system is overridden and the system is controlled by opening and closing the bypass valves (two) CABIN AIR MANUAL TEMP - INCREASE - DECREASE switch. To increase cabin temperature, hold the switch in the INCREASE position, to decrease cabin temperature, hold the switch in the DECREASE position. Allow approximately 30 seconds per valve to drive the bypass valves to the fully open or fully closed position. Only one valve moves at a time.

(2) With the CABIN AIR MODE SELECT switch in the MAN COOL position, the automatic temperature control system is bypassed. When the left bypass valve reaches a fully closed position, the refrigeration system will begin cooling, provided the right engine N1 speed is above 65% When the bypass valve is opened to a position approximately 30° from full open, the refrigeration system will turn off. Hold the CABIN AIR MANUAL TEMP switch in DECREASE position for approximately one minute to fully close air-to-air heat exchanger bypass valves.

(3) Bleed air entering the cabin is controlled by LEFT and RIGHT bleed air valve switches placarded ENVIRO & PNEU BLEED AIR - PNEU ONLY - ON. When the switch is in the ON position, the environmental flow control unit and the pneumatic valve are open. When the switch is in the PNEU ONLY position, the environmental flow control unit is closed and the pneumatic bleed air valve is open. In the ENVIRO & PNEU BLEED AIR position, both are closed. For maximum cooling on the ground, turn the bleed air valve switches to the PNEU ONLY position.

(4) The forward vent blower is controlled by the switch placarded VENT BLOWER FWD - AUITO - LOW - HIGH. The HIGH and LOW positions regulate the blower to two speeds of operation In the AUTO position, the fan will run at low speed except when the CABIN AIR MODE SELECT switch is placed in the OFF position. In the OFF position, the blower will not operate.

(5) The aft vent blower is controlled by the switch placarded VENT BLOWER AFT - AUTO - ON. The single speed blower operates automatically through the N. speed switch when the aft vent blower switch is placed in the AUTO position. The blower operates continuously when the switch is placed in the ON position with the air conditioner compressor running. In the OFF position, the blower will not operate.

Section IX. ELECTRICAL POWER SUPPLY AND DISTRIBUTION SYSTEM

2-72 DESCRIPTION.

The aircraft employs both direct current (DC) and alternating current (AC) electrical power. The DC electrical power supply (fig. 2-27) is the basic power system energizing most aircraft circuits. Electrical power is used to start the engines, power the landing gear and flap motors, operate the standby fuel pumps, ventilation blower, lights, and electronic equipment AC power is obtained from the DC power system through inverters. The single phase AC power system is shown in figure 2-28, and the three phase AC power system is shown in figure 2-29. The three sources of DC power consist of one 20 cell 34-amperethour battery and two 400-ampere starter-generators. DC power may be applied to the aircraft through an external power receptacle on the underside of the right wing, just outboard of the nacelle. The starter-generators are controlled by generator control units. The output of each generator passes through a cable to the respective generator bus. Other buses distribute power to aircraft DC loads, deriving power from the generator buses. The generators are paralleled to balance the DC loads between the two units. When one of the generating systems is not on line, and no fault exists, all aircraft DC requirements may be supplied by either the other on-line generating system or by an external power source. The generator system is designed to allow cross starting of the other engine. When one generator is on line, all current limiters are bypassed while starting the other engine. Most DC distribution buses are connected to both generator buses but have isolation diodes to prevent power crossfeed between the generating systems, when connection between the generator buses is lost Thus, when either generator is lost because of a ground fault, the operating generator will supply power for all aircraft DC loads except those receiving power from the inoperative generator's bus, which cannot be crossfed. When a generator is not operating, reverse current and over-voltage protection is automatically provided. Two inverters operating from DC power produce the required single-phase AC power. Three phase AC electrical power for the inertial navigation system and mission avionics is supplied by two DC powered three phase mission inverters (fig. 2-30).

The mission ACIDC power cabinet (fig. 2-31) is located in the mission rack, aft of the copilot's seat AC power may be applied through an external power receptacle located on the underside of the left wing, just outboard of the engine nacelle.

2-73. DC POWER SUPPLY.

One nickel-cadmium battery furnishes DC power when the engines are not operating. This 24-volt 34-ampere/hour battery, located in the right wing center section, is accessible through a panel on the top of the wing. DC power is produced by two engine-driven 28 volt, 400-ampere starter-generators. Controls and indicators associated with the DC supply system are located on the overhead control panel (fig. 2-13) and consist of a single battery switch, two generator switches, two DC digital voltmeters, and two DC digital loadmeters.

a. Battery Switch A switch, placarded BATTERY - OFF/RESET - ON (fig. 2-13), is located on the overhead control panel under the MASTER SWITCH (gang bar). The BATTERY switch controls DC power to the aircraft bus system through the battery relay, and must be ON to allow external power to enter aircraft circuits. When the MASTER SWITCH (gang bar) is placed aft, the BATTERY switch is forced OFF.

NOTE

With battery or external power removed from the aircraft electrical system due to fault, power cannot be restored to the system until the BATTERY switch is moved to OFF/RESET, then ON.

b. Generator Switches. Two switches (fig. 2-13), placarded GENERATOR # 1 and # 2 are located on the overhead control panel. These switches control electrical power from the designated generator to paralleling circuits and the bus distribution system. Switch positions are placarded RESET, ON, and OFF. RESET is forward (spring loaded back to ON), ON is center, and OFF is aft. When a generator is removed from the aircraft electrical system, due either to fault or from placing the GENERATOR switch in the OFF position, the affected unit cannot have its output restored to aircraft use until the GENERATOR switch is moved to RESET, then ON.

c. Master Switch. All electrical current may be shut off using the MASTER SWITCH gang bar (fig. 2-13) which extends above the battery and generator switches. The MASTER SWITCH (gang bar) is moved forward when a battery or generator switch is turned on. When moved aft, the bar positions each switch to the OFF position.

d. DC Load and Voltmeters. Four digital meters, located on the overhead control panel (fig. 2-13), display voltage readings and show the rate of current usage from the left and right generating systems. The two loadmeters indicate output amperage as a percent of rated capacity from the respective generator. Current consumption is indicated as a percentage of total output amperage capacity for the generating system being monitored The two voltmeters indicate bus voltage for the respective generating system

e. Battery Volt/Ammeter. The mission control panel (fig. 4-1), located in the fuselage sidewall adjacent to the copilot's seat, incorporates a digital volt/ ammeter that displays available battery voltage and amperage. Minimum battery voltage for engine starting is 22 VDC.

f. Battery Charge Monitor. Nickel-cadmium battery overheating will cause the battery charge current to increase if thermal runaway is imminent The aircraft has a charge-current sensor which will detect a charge current The charge current system senses battery current through a shunt in the negative lead of the battery. Any time the battery charging current exceeds approximately 7 amperes for 6 seconds or longer, the amber BATTERY CHARGE annunciator and the MASTER CAUTION annunciator will illuminate. Following a battery engine start, the caution annunciator will illuminate approximately six seconds after the generator switch is placed in the ON position. The annunciator will normally extinguish within two to five minutes, indicating that the battery is approaching a full charge. The time interval will increase if the battery has a low state of charge, the battery temperature is very low, or if the battery has previously been discharged at a very low rate (i.e., battery operation of radios or lights for prolonged periods). The caution annunciator may also illuminate for short intervals after landing gear and/or flap operation. If the caution annunciator should illuminate during normal steady-state cruise, this indicates that conditions exist that may cause a battery thermal runaway. if this occurs, the battery current should be monitored using the battery ammeter. If battery current continues to increase, the battery is in thermal runaway and should be selected OFF and may be turned back ON only for gear and flap extension and approach to landing.

g. Generator Out Warning Annunciators. Two caution/advisory annunciator panel fault annunciators inform the pilot when either generator is not delivering current to the aircraft DC bus system. These annunciators are placarded #1 DC GEN and #2 DC GEN. Illumination

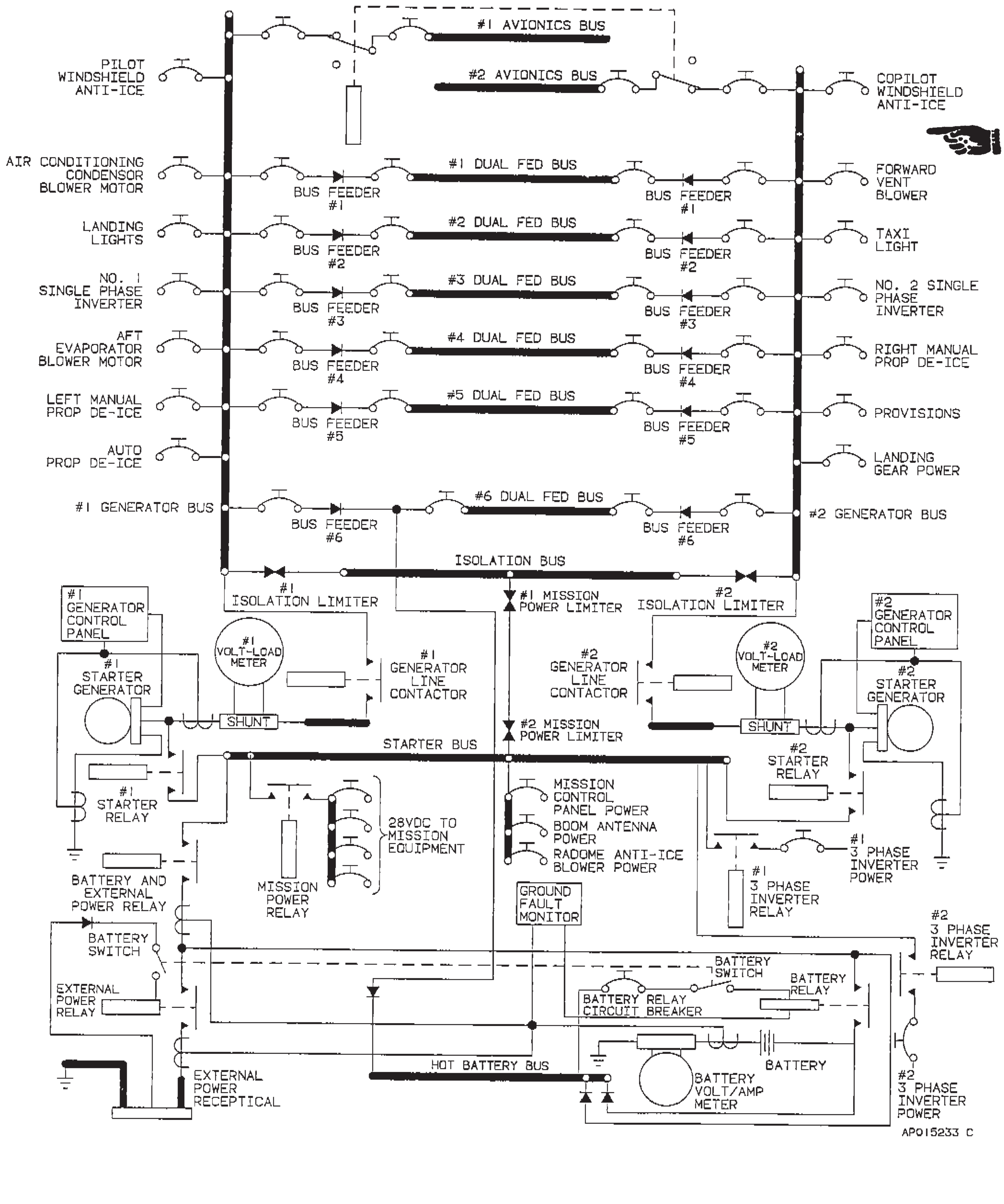


Figure 2-27. DC Electrical System (Sheet 1 of 3)

	#1 AVIONICS BUS	
TACAN	HF RCVR	VHF #1
TRANSPONDER	AP CONTR	VOR #1
ADF	AFCS DIRECT	UHF
FM	INS CONTROL	PILOT AUDIO
	#2 AVIONICS BUS	
HF PWR	COPIL AUDIO	ALT ALERT
VHF #2	COPIL ALTM	LSS
VOR #2	RADAR WX	RADIO RELAY
BU VOW	RADIO ALTM	AIR DATA ENCDR
	#1 DUAL FED BUS	
#1 VOLT/LOAD IND	#1 CHIP DETR	#1 OIL PRESS
LEFT BLEED AIR WARN	#1 FUEL PRESS WARN	#1 FUEL FLOW
LANDING GEAR IND	#1 FUEL QTY WARN	#1 ICE VANE CONTROL, AUXILIARY
STALL WARNING	#1 FUEL QTY IND	PILOT EHSI
ANN IND	#1 STANDBY PUMP	
#1 OIL PRESS WARN	#1 OIL TEMP	
	#2 DUAL FED BUS	
#2 VOLT/LOAD IND	#2 CHIP DETR	#2 OIL PRESS
RIGHT BLEED AIR WARN	#2 FUEL PRESS WARN	#2 FUEL FLOW
LANDING GEAR IND	#2 FUEL QTY WARN	#2 ICE VANE CONTROL, AUXILIARY
FIRE DETR	#2 FUEL QTY IND	COPILOT EHSI
ANN PWR	#2 STANDBY PUMP	
#2 OIL PRESS WARN	#2 OIL TEMP	
	#3 DUAL FED BUS	
BATT CHARGE	LEFT FUEL VENT HEAT	#1 START CONTR
#1 ENG LIP HT	LEFT PITOT HEAT	#1 IGNITOR CONTR
RADOME ANTI-ICE	CROSSFEED	#1 ICE VANE CONTR, MAIN
WSHLD WIPER	#1 AUXILIARY TRANSFER	PILOT EADI
SURF DE-ICE	#1 FIREWALL VALVE	
PROP ANTI-ICE AUTO	PROP SYNC	

Figure 2-27. DC Electrical System (Sheet 2 of 3)

#4 DUAL FED BUS		
#2 ENG LIP HT	RIGHT PITOT HEAT	#2 IGNITOR CONTR
ENG LIP HT MONITOR	#2 AUXILIARY TRANSFER	#2 ICE VANE CONTR, MAIN
BRAKE DE-ICE	#2 FIREWALL VALVE	COPIL EADI
STALL WARN HEAT	AUTO FEATHER	HF PWR
PROP ANTI-ICE, MANUAL	PROP GOV TEST	
RIGHT FUEL VENT HEAT	#2 START CONTR	
#5 DUAL FED BUS		
AIR COND CONTR	LANDING GEAR CONTROL	SUBPANEL & CONSOLE LIGHTS
TEMP CONTR	AVIONICS ANN	INST INDIRECT LIGHTS
LEFT BLEED AIR CONT	RECOG LIGHTS	PILOT SYM GEN
PILOT EFIS FAN	ICE LIGHTS	PILOT EFIS CONTROL
ELEC TRIM	BCN LIGHTS	
FLAP MOTOR	LANDING LIGHTS	
#6 DUAL FED BUS		
CIGAR LIGHTER	FLAP CONTR	CABIN LIGHTS
DOOR RADIANT HEAT	EMERG LIGHTS	COPIL SYM GEN
PRESS CONTR	FLT INST LIGHTS	COPIL EFIS CONTROL
RIGHT BLEED AIR CONTR	NAV LIGHTS	AVIONICS MASTER CONTR
COPIL EFIS FAN	TAXI LIGHTS	
RUDDER BOOST	OVHD LIGHTS	
HOT BATTERY BUS		
CRYPTO HOLD	CABIN LIGHT	#2 STANDBY PUMP
#2 ENGINE FIRE EXT	TRANSPORTER (KIT-1C)	#1 STANDBY PUMP
#1 ENGINE FIRE EXT	#2 FIREWALL FUEL VALVE	CABIN/CARGO DOOR SENSING CIRCUIT
BATTERY RELAY	#1 FIREWALL FUEL VALVE	
STARTER BUS		
MISSION DC POWER RELAY	#2 3 ∅ INVERTER POWER RELAY	
#1 ENGINE START RELAY	#2 ENGINE START RELAY	
BATTERY/EXTERNAL POWER RELAY	#1 3 ∅ INVERTER POWER RELAY	
MISSION CONTROL PANEL	RADOME ANTI-ICE BLOWER	
BOOM ANTENNA POWER		

Figure 2-27. DC Electrical System (Sheet 3 of 3)

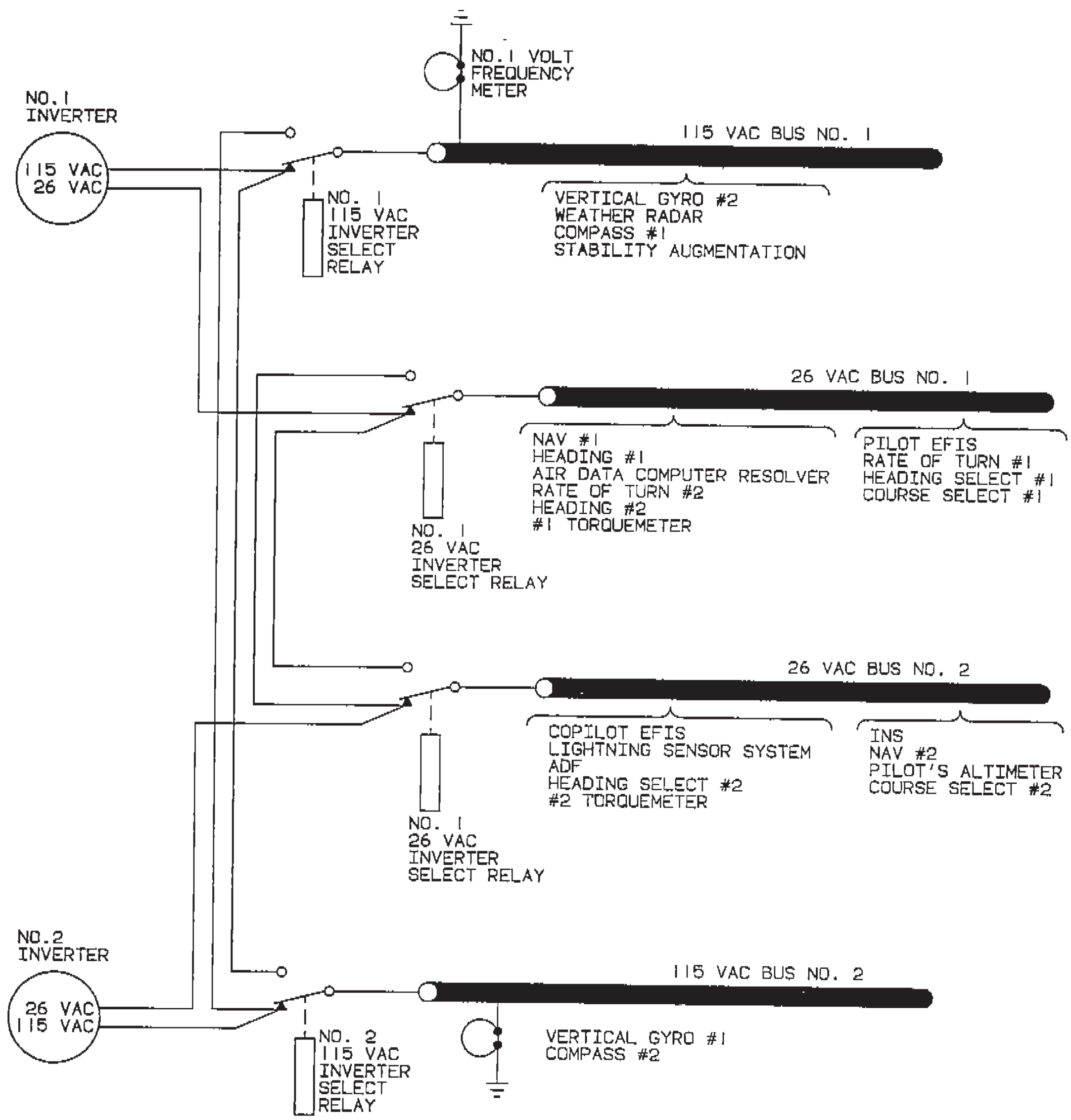


Figure 2-28. Single Phase AC Electrical System

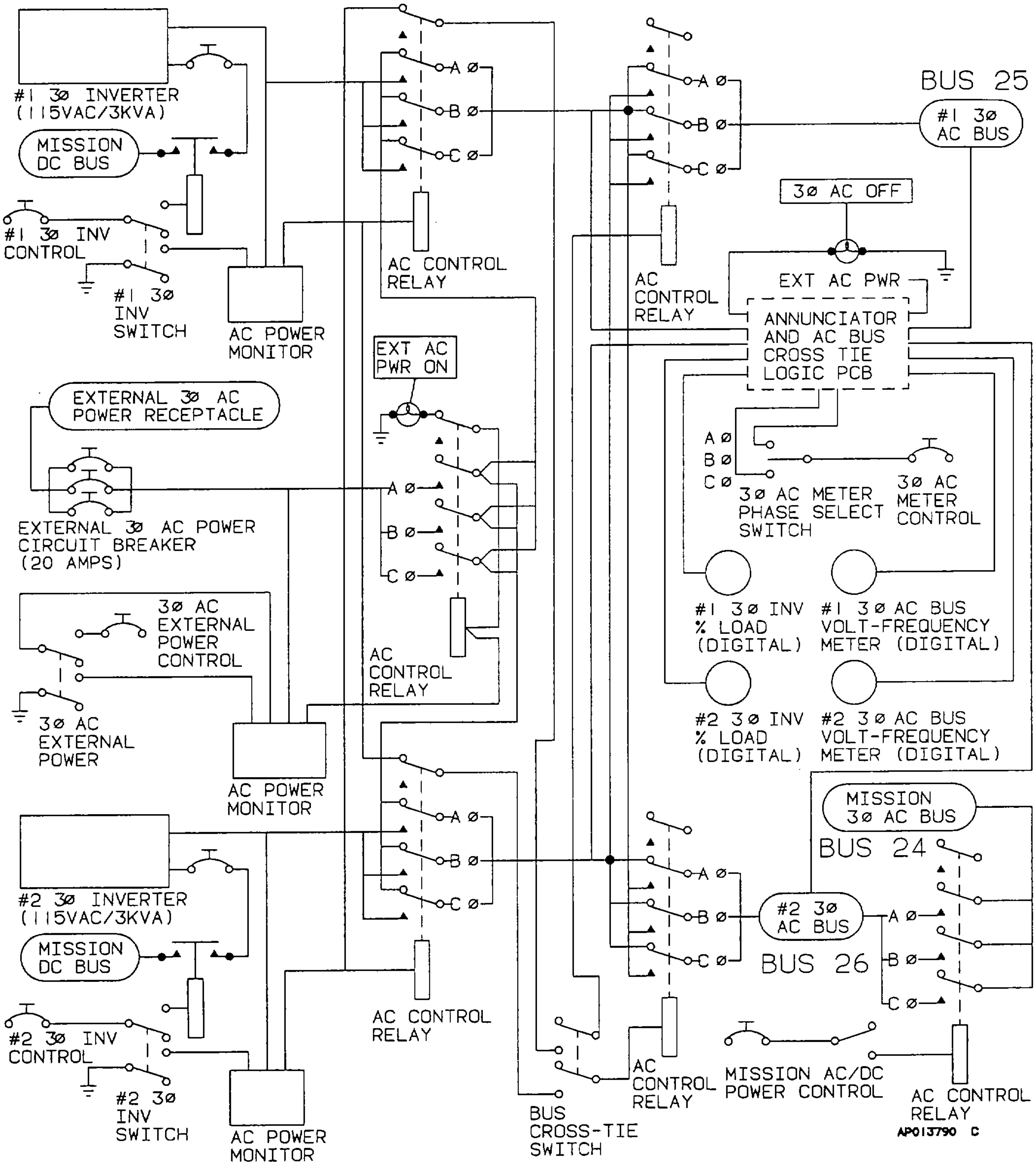


Figure 2-29. Three Phase AC Electrical System

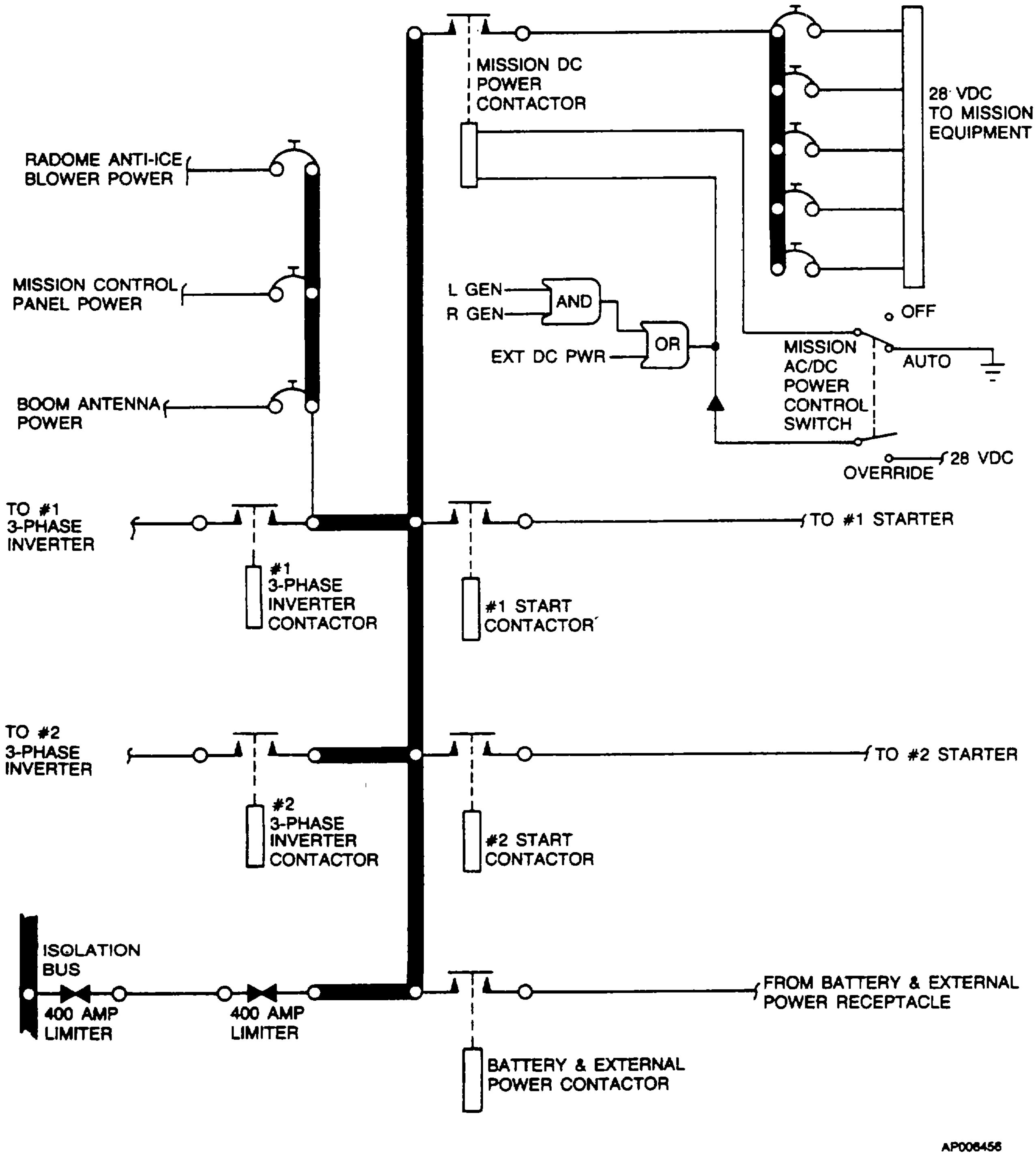


Figure 2-30. Mission Equipment DC Power System

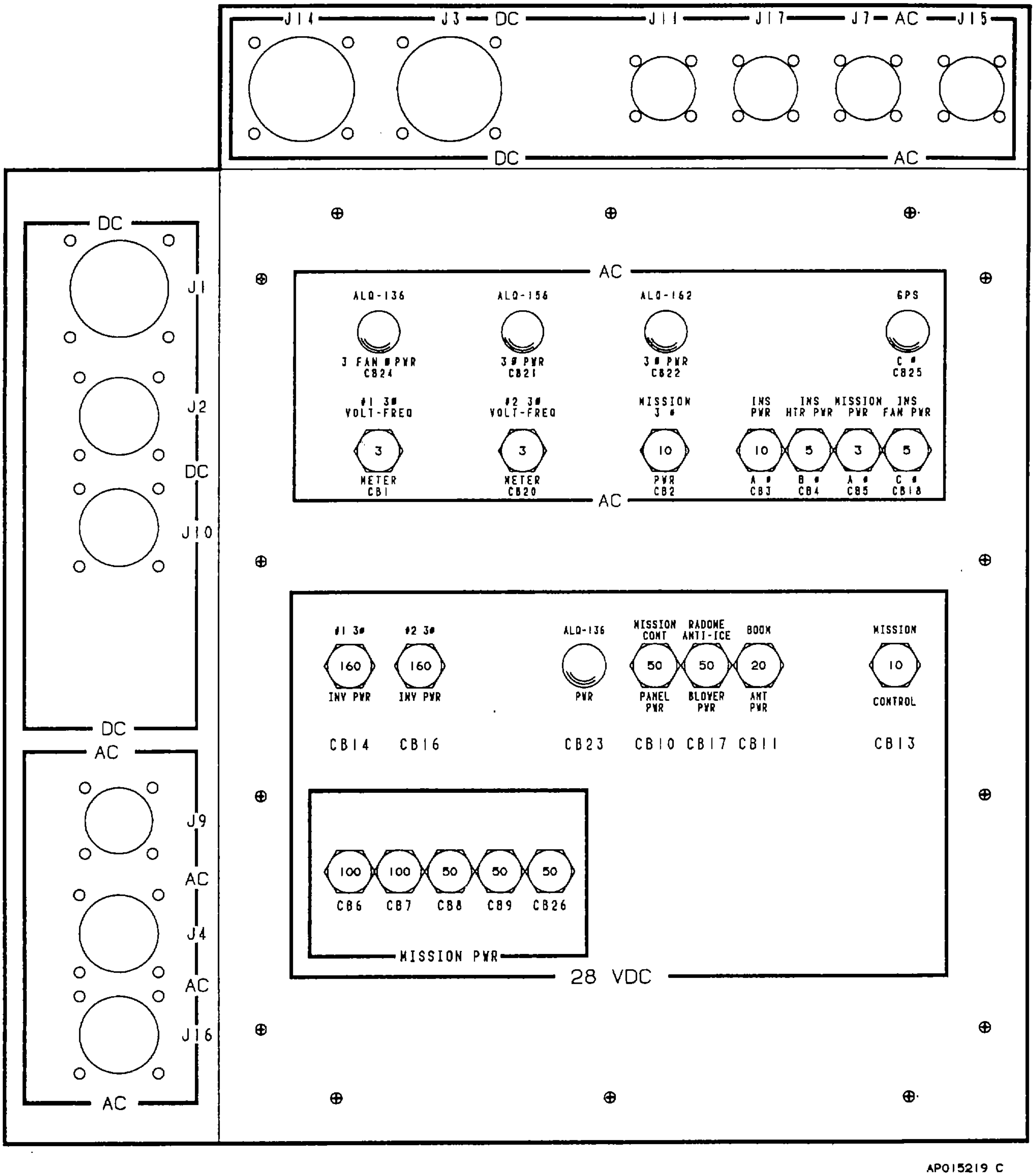


Figure 2-31. Mission AfDC Power Cabinet

of the two MASTER CAUTION annunciators and either fault annunciator indicates that either the identified generator has failed or voltage is not sufficient to keep it connected to the power distribution system.

CAUTION

The GPU shall be adjusted to regulate at 28 t+.2 volts. The GPU shall be capable of producing 1000 amperes for 5 seconds, 500 amperes for 2 minutes, and 300 amperes continuously.

h. DC External Power Source. External DC power can be applied to the aircraft through an external power receptacle on the underside of the right wing, just outboard of the engine nacelle (fig. 2-1). The receptacle is installed inside of the wing structure and is accessible through a hinged access panel. DC power is supplied through the DC external power plug, through the external power relay, directly to the battery bus. Turn off all external power while connecting the power cable to or removing it from the external power supply receptacle. The holding coil circuit of the relay is energized by the external power source when the BATTERY switch is in the ON position. The GPU shall be adjusted to regulate at 28 volts maximum to prevent damage to the aircraft battery. The EXTERNAL POWER annunciator indicates that the DC external power plug is connected. The EXT DC PWR ON annunciator indicates that external power is connected to the aircraft DC bus.

i. Security Keylock Switch. The aircraft has a security keylock switch (fig. 2-13) installed on the overhead control panel, placarded OFF - ON. The switch is connected to the battery relay circuit and must be ON when energizing the BATTERY MASTER SWITCH. The key cannot be removed from the lock when in the ON position.

j. Circuit Breakers. The overhead circuit breaker panel (fig. 2-7) contains circuit breakers for most aircraft systems. The circuit breakers on the panel are grouped into areas which are placarded as to their general function. A DC power distribution panel is mounted beneath the aisleway, forward of the main spar. This panel contains higher current rated circuit breakers and is not accessible to the flight crew under normal conditions.

2-74. AC POWER SUPPLY.

a. Single Phase AC Power Supply. AC power for the aircraft is supplied by inverter units, numbered #1 and #2 (fig. 2-28), which obtain operational current from the DC power system Both inverters are rated at 750 volt-amperes and provide single phase output only. Each inverter provides 115 volts, 26 volts, and 400 Hz AC output The inverters are protected by circuit breakers mounted on the DC power distribution panel mounted beneath the floor. Controls and indicators of the AC power system are located on the overhead control panel and on the caution/advisory annunciator panel.

(1) AC power WARNING/CAUTION annunciators. Illumination of the two MASTER CAUTION annunciators, and the illumination of the # 1 INVEIER and/or #2 INVERTER caution annunciator indicates inverter failure.

(2) Instrument AC annunciator. A red INST AC warning annunciator, will illuminate if all instrument AC buses fail.

(3) Inverter control switches. Two switches, placarded 10 INVERTER # 1 and # 2 on the overhead control panel (fig. 2-13), control the single-phase AC inverters.

b. Volt-Frequency Meters. The two digital volt-frequency meters (fig. 2-13) are mounted on the overhead control panel to provide continuous monitoring of voltage and frequency on each 115 VAC bus. Normal bus conditions will be indicated by a reading of 115 VAC and 400 Hz on each meter.

c. Three Phase AC Power Supply. Three phase AC electrical power (fig. 2-29) for operation of the inertial navigation system and mission avionics is supplied by two DC-powered 3000 volt-ampere solid state three phase inverters.

(1) Three phase inverter control switches. Two three-position switches, placarded #1 INV - RESET - ON - OFF and #2 INV - RESET - ON - OFF, located on the mission control panel (fig. 4-1), control three phase inverter operation.

(2) Three phase volt/frequency meters. Two digital three-phase volt/frequency meters, mounted on the mission control panel (fig. 4-1), monitor and display the voltage and frequency outputs of the three phase inverters.

(3) Three phase loadmeters. Two digital three-phase loadmeters, mounted on the mission control panel (fig. 4-1), monitor inverter output level.

(4) Three phase AC off annunciator. An annunciator placarded 30 AC OFF, located on the mission annunciator panel (fig. 4-1), indicates a problem with one

of the three phase AC power busses.

(5) Three phase AC external power. External three phase AC power for operation of the inertial navigation system or mission equipment can be applied to the aircraft through an external power receptacle located on the underside of the left wing just outboard of the engine nacelle (fig. 2-1). The receptacle is installed inside the wing structure, accessible through a hinged access panel. The AC electrical system is automatically isolated from the external power source if the external power is over or under voltage, over or under frequency, or has an improper phase sequence.

(a) Extenal AC power annunciator. The annunciator placarded EXT AC PWR ON, located on the mission annunciator panel (fig. 4-1), indicates that external AC power is connected to the 3 phase busses. The EXTERNAL POWER annunciator in the advisory annunciator panel indicates that an AC GPU plug is mated to the AC external power receptacle.

(b) External AC power control switch. The switch placarded EXT PWR - RESET - ON - OFF, located on the mission control panel (fig. 4-1), controls application of three phase AC power to the aircraft

Section X. LIGHTING

2-75. EXTERIOR LIGHTING.

Exterior lighting (fig. 2-32) consists of a navigation light on the aft end of the aft portion of the vertical stabilizer, one standard navigation light on the outside of each wing tip pod; two strobe beacons, one on top of the horizontal stabilizer (directly above the vertical stabilizer) and one on the underside of the fuselage section; dual landing lights and a taxi light mounted on the nose gear assembly; a recognition light located in the outboard leading edge of each wing; two ice lights, one light flush mounted in each nacelle positioned to illuminate along the leading edge of each outboard wing; and emergency exit lights aft of the escape hatch and aft of the cabin door.

a. Navigation Lights. The navigation lights are protected by the 5-ampere circuit breaker placarded NAV on the overhead circuit breaker panel (fig. 2-7). Control of the lights is provided by the switch placarded NAV - ON, located on the overhead control panel (fig. 2-13).

b. Strobe Beacons. The strobe beacons are dual intensity units. They are protected by the 15-ampere circuit breaker placarded BCN on the overhead circuit breaker panel (fig. 2-7). Control of the lights is provided by a switch located on the overhead control panel placarded BEACON - DAY - NIGHT (fig. 2-13). Placing the switch in the DAY position will activate the high intensity white section of the strobe lights for greater visibility during daylight operation Placing the switch in the NIGHT position activates the lower intensity red portion of the strobe lights.

c. Recognition Lights. The recognition lights are operated by the two-position switch placarded RECOG, located in the pilot's subpanel. The lights provide a very bright, steady illumination. They are protected by a 7.5-ampere circuit breaker, located on the overhead circuit breaker panel (fig. 2-7).

d. Landing/Taxi Lights. Dual landing lights and a single taxi light are mounted on the nose gear assembly. The lights are controlled by the switches placarded LANDING and TAXI, located on the pilot's subpanel. The landing light circuit is protected by the 5-ampere circuit breaker placarded LANDING, located on the overhead circuit breaker panel (fig. 2-7). The taxi light circuit is protected by a 5-ampere circuit breaker placarded TAXI, located on the overhead circuit breaker panel (fig. 2-7). Landing/Taxi lights are automatically turned off when the landing gear is retracted The landing lights and taxi light power circuits are protected by 35-ampere and 15-ampere circuit breakers, respectively, located on the DC power distribution panel beneath the aisleway forward of the wing main spar.

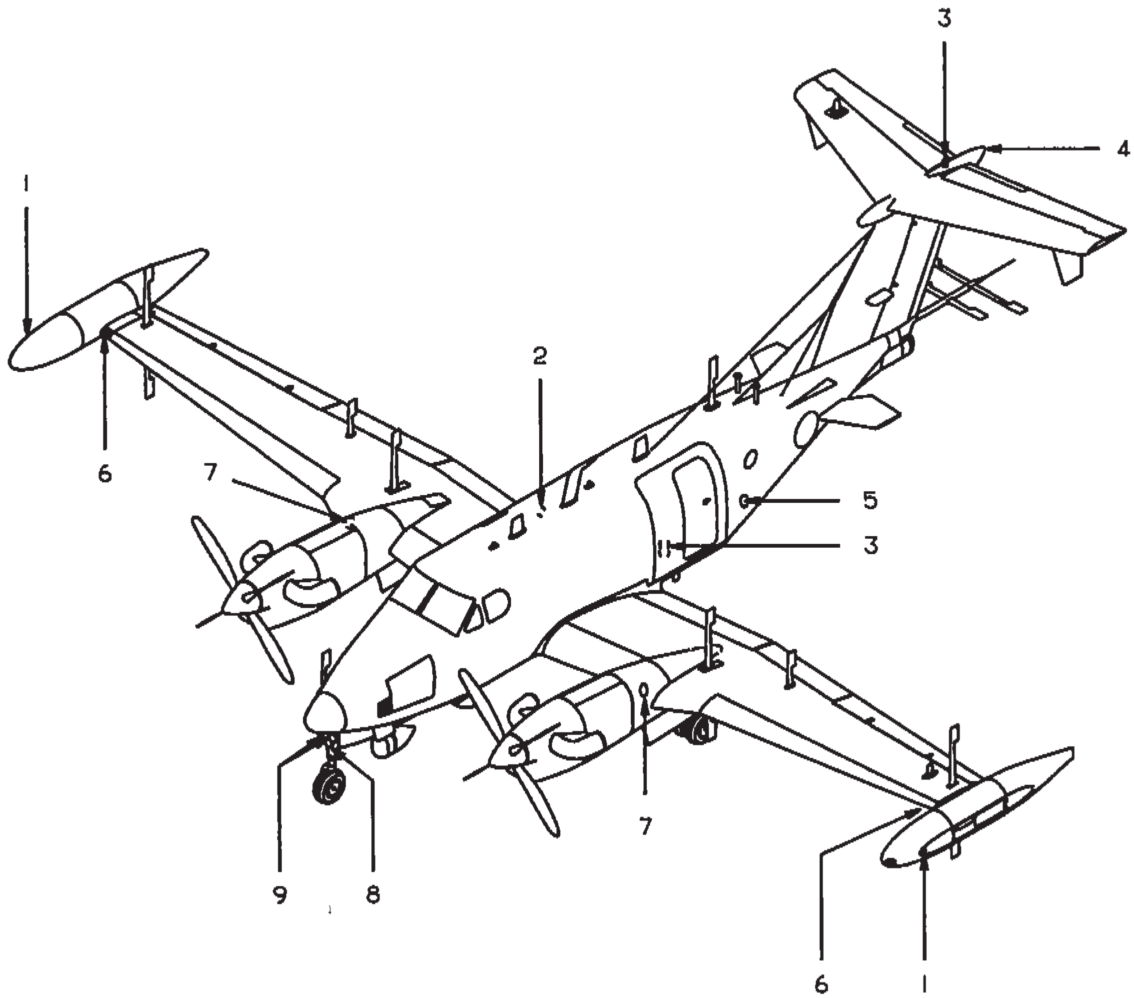
e. Ice Lights. The ice lights circuit is protected by a 5-ampere circuit breaker placarded ICE on the overhead circuit breaker panel (fig. 2-7). Control of the lights is provided by a switch placarded ICE - ON on the overhead control panel (fig. 2-13).

2-76. INTERIOR LIGHTING.

Lighting systems are installed for use by the pilot and copilot The lighting systems in the cockpit are provided with intensity controls on the overhead control panel. A switch placarded MASTER - ON, located on the overhead control panel in the COCKPIT LIGHT section (fig. 2-13), provides overall control for all engine instrument lights, pilot's and copilot's instrument lights, overhead panel lights, and subpanel lights. The switch placarded IR FLOOD ON, located on the overhead control panel (fig. 2-13), provides overall control for instrument panel, glareshield, and pedestal extension/cockpit lights.

a. Cockpit Lighting.

(1) Utility lights. Two utility lights are located on the cockpit overhead to provide additional instrument panel



1. Wing Navigation Light
2. Emergency Light (Right Side)
3. Strobe Beacon
4. Tail Navigation Light
5. Emergency Light (Left Side)
6. Recognition Light
7. Ice Light
8. Taxi Light
9. Landing Lights

Figure 2-32. Exterior Lighting

lighting, as required. The lights are protected by the 7.5-ampere FLT INST circuit breaker, located on the overhead circuit breaker panel (fig. 2-7). Variable light intensity, for both lights is provided through the INSTRUMENT PANEL rheostat, located in the IR FLOOD LIGHTS switch section, on the overhead control panel. Individual intensity control is provided by a switch placarded BRT - DIM - OFF, located on each utility light.

(2) Glareshield lights. Lights are mounted in the glareshield overhang along the top edge of the instrument panel, providing overall instrument panel IR illumination. The circuit is protected by a 5-ampere circuit breaker placarded INST INDIRECT on the overhead circuit breaker panel (fig. 2-7). Control is provided by the rheostat switch placarded GLARESHIELD on the overhead control panel, located in the IR FLOOD LIGHTS switch section (fig. 2-13). Turning the control clockwise from OFF, illuminates the lights and increases their brilliance.

(3) Flood light. A single overhead cockpit flood light is installed. This light provides overall IR illumination of the entire cockpit area. The circuit is protected by a 7.5-ampere circuit breaker placarded FLT INST, located on the overhead circuit breaker panel (fig. 2-7). Control is provided by the rheostat/switch, placarded PED EXT/COCKPIT, located in the IR FLOOD LIGHTS switch section of the overhead control panel (fig. 2-13). Turning the control clockwise from OFF, illuminates the light and increases its brilliance.

(4) Flight instrument lights. Each individual flight instrument contains internal lamps for illumination. The circuit is protected by the 7.5-ampere circuit breaker placarded FLT INST, located on the overhead circuit breaker panel (fig. 2-7). Control is provided by the two rheostat switches placarded PILOT INSTRUMENTS and COPILOT INSTRUMENTS, located on the overhead control panel (fig. 2-13). Turning the control clockwise from OFF, illuminates the lights and increases their brilliance.

(5) Engine instrument lights. Each individual engine instrument contains internal lamps for illumination. The circuit is protected by the 7.5-ampere circuit breaker placarded FLT INST, located on the overhead circuit breaker panel (fig. 2-7). Control is provided by the rheostat switch placarded ENGINE INSTRUMENTS on the overhead control panel (fig. 2-13). Turning the control clockwise from OFF, illuminates the lights and increases their brilliance.

(6) Overhead panel lights. Lamps illuminating the overhead circuit breaker, control, and fuel management panels are protected by the 7.5-ampere circuit breaker, placarded OVHD on the overhead circuit breaker panel (fig. 2-7). Control is provided by the rheostat switch placarded OVERHEAD PANEL, located on the overhead control panel (fig. 2-13). Turning the control clockwise from OFF, illuminates the lights and increases their brilliance.

(7) Subpanel and console lights. Lights on the pilot's and copilot's subpanels, console edge-lighted panels, mission control panel, and pedestal extension panels are protected by the 7.5-ampere circuit breaker, placarded SUBPNL & CONSOLE on the overhead circuit breaker panel (fig. 2-7). Control is provided by two rheostat switches placarded SUBPANEL and CONSOLE on the overhead control panel (fig. 2-13). Turning the controls clockwise from OFF, illuminates the lights and increases their brilliance.

(8) Outside air temperature light. Two post lights are mounted adjacent to the outside air temperature gage on the left cockpit sidewall. The circuit is protected by the 7.5-ampere circuit breaker placarded FLT INST on the overhead circuit breaker panel (fig. 2-7). Control is provided by a pushbutton switch adjacent to the gage. Light intensity is not adjustable.

b. Cabin Lighting.

(1) Threshold and spar cover lights. A threshold light is installed just above floor level on the left side of the cabin, just inside the cabin door. A spar cover light is installed on the left side of the sunken aisle, immediately aft of the main spar cover. Both circuits are protected by a 5-ampere circuit breaker located in the battery box, and are connected to the emergency battery bus. Both lights are controlled by a switch mounted adjacent to the threshold light. If the lights are illuminated, closing the cabin door will automatically extinguish them.

(2) Cabin aisle lights. Three cabin aisle lights are installed in the cabin aisle. Control is provided by the CABIN LIGHTS BRIGHT - DIM switch located on the pilot's subpanel.

(3) Cabin utility lights. A utility light is located adjacent to each overhead flood light in the cabin area. The utility lights are individually controlled by the rheostat-switch placarded OFF - ON - BRT, located on the back of each light. A momentary ON switch is located in the center of the rheostat. The light is capable of producing a red or white spotlight by adjusting a diaphragm, located in front of the light. To remove the light from the stationary position, pull down on the light. The light is connected to the light housing by an 11 inch coiled cord that extends to approximately 50 inches. Power for the utility lights is provided through the 5-ampere circuit breaker placarded

CABIN LIGHTS, in the overhead circuit breaker panel.

(4) Cabin door latching mechanism light. A light is provided to check the cabin door latching mechanism. It is controlled by a red pushbutton switch located adjacent to the round observation window, which is just above the second step.

2-77. EMERGENCY LIGHTING SYSTEM.

An independent battery-operated emergency lighting system is installed. The system is actuated automatically by shock, such as a forced landing. It provides adequate lighting inside and outside the fuselage to permit the occupants to read instruction placards and locate exits. An inertia switch, when subjected to a 2 G (minimum) shock will illuminate the interior lights in the cockpit, forward and aft cabin areas, exterior lights aft of the emergency exit, and aft of the cabin door. The battery power source is automatically recharged by the aircraft electrical system.

a. Emergency Lighting System Operation. An emergency lights override switch, located on the overhead control panel (fig. 2-13), is provided to turn the system off if it is accidentally actuated. The switch is placarded EMERGENCY OFF/RESET - AUTO - TEST. Should the system accidently actuate, the emergency lights will illuminate. Placing the switch in the momentary OFF/RESET position will extinguish the lights. To test the system, place the switch in the momentary TEST position. The lights should illuminate. Moving the switch to the OFF/RESET position will turn the system off and reset it. The switch is normally in the AUTO position.

Section XI. FLIGHT INSTRUMENTS

2-78. PITOT SYSTEM.

The pitot system (fig. 2-33) provides ram air pressure for the airspeed indicators and air data computer. The pitot system consists of two pitot masts (one located on each side of the lower portion of the nose), and associated plumbing. The pitot masts are protected from ice formation by internal electric heating elements.

2-79. STATIC AIR SYSTEM.

a. Description. The static system (fig 2-33) provides static air pressure for the pilot's and copilot's airspeed indicators, copilot's altimeter, air data computer, and pilot's and copilot's vertical speed indicators. The static air pressure ports are located on the right and left sides of the aft fuselage exterior skin.

b. Alternate Static Air Source. An alternate static air line, which terminates just aft of the rear pressure bulkhead, provides a source of static air for the pilot's instruments in the event of source failure from the pilot's static air line. A control on the pilot's subpanel placarded PILOTS STATIC AIR SOURCE, may be actuated to select either the NORMAL or ALTERNATE air source by a two position selector valve. The valve is secured in the NORMAL position by a spring clip.

2-80. TURN-AND-SLIP INDICATOR.

A turn-and-slip indicator is installed on the pilot's side of the instrument panel (fig. 2-16). This indicator is gyroscopically operated and pneumatically powered.

2-81. AIRSPEED INDICATORS.

Two identical airspeed indicators are installed separately on the pilot's and copilot's sides of the instrument panel (fig. 2-16). These indicators require no electrical power for operation. The indicator dials are calibrated in knots from 40 to 300. A striped pointer automatically displays the maximum allowable airspeed at a given aircraft altitude.

2-82. COPILOT'S BAROMETRIC ALTIMETER.

a. Description. The copilot's barometric altimeter (fig. 2-34), provides an indication of the aircraft's pressure altitude above sea level.

b. Controls, Indicators, and Functions.

(1) Deleted.

(2) Altitude indicator needle. Used in conjunction with altitude scale to display aircraft altitude in hundreds of feet.

(3) Barometric pressure counter-drum indicator (millibars). Indicates barometric pressure in millibars that has been set by the barometric pressure setting knob.

(4) Barometric pressure counter-drum indicator (Inches of mercury). Indicates barometric pressure in inches of mercury that has been set by the barometric pressure setting knob.

(5) Barometric pressure setting knob. Used to manually set barometric pressure displayed in the IN HG and MB windows.

(6) Counter-drum altitude display. Indicates aircraft altitude in tens of thousands, thousands, and hundreds of feet above sea level.

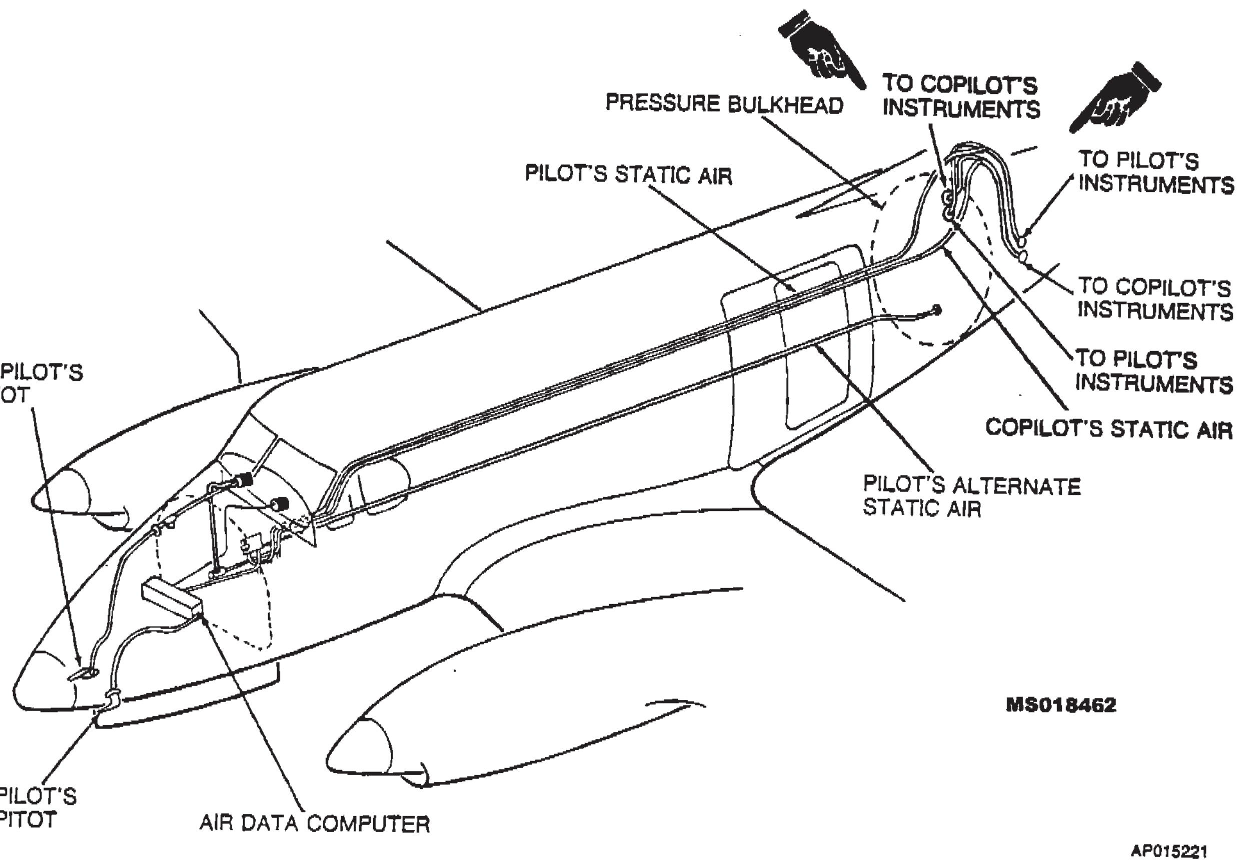


Figure 2-33. Pitot and Static System

(7) Attitude scale. Used in conjunction with altitude indicator needle to indicate aircraft altitude in hundreds of feet. Subdivided into 20 foot increments.

NOTE

If the altimeter does not read within 70 feet of field elevation, when the correct local barometric setting is used, the altimeter needs calibration or internal failure has occurred. An error of greater than 70 feet also nullifies use of the altimeter for IFR flight.

2-83. STANDBY ATTITUDE INDICATOR.

An air-driven standby attitude indicator is located on the pilot's instrument panel (fig. 2-16).

a. Standby Attitude Indicator Controls, Indicators, and Functions.

(1) Bank angle scale and pointer. The moveable bank angle pointer indicates aircraft bank angle by moving around a fixed bank angle scale.

(2) Pitch angle scale. Aircraft pitch angle may be read under the symbolic miniature aircraft on a vertical pitch angle scale located on the attitude sphere.

(3) Horizon bar. The horizon bar displays aircraft pitch and roll attitude with respect to the earth's horizon.

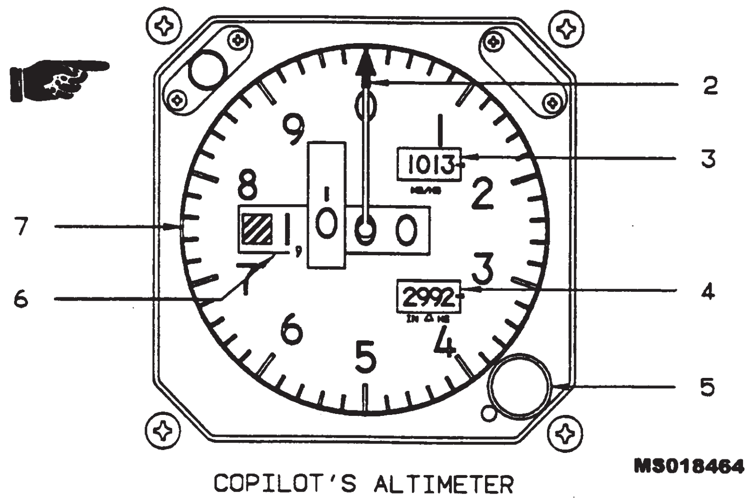
(4) Pitch adjustment knob. This knob is used to vertically adjust the symbolic miniature aircraft for changes in the aircraft's level flight pitch attitude.

(5) Symbolic miniature aircraft. Aircraft pitch and roll attitudes are displayed by the relationship between the fixed miniature aircraft symbol and the movable attitude sphere.

(6) Eyelid display. The eyelid display surrounds the attitude sphere to provide a positive attitude identification. When the aircraft is in an upright position the upper (blue) eyelid is located next to the upper (blue) half of the attitude sphere, while the lower (brown) eyelid display is located next to the lower (brown) half of the attitude sphere. Thus the eyelid display maintains the proper ground-sky relationship, regardless of the position of the sphere, to aid in recovery from unusual attitudes.

2-84. VERTICAL SPEED INDICATORS.

Vertical speed indicators are installed separately on the pilot's and copilot's sides of the instrument panel (fig. 2-16).



1. Deleted
2. Altitude Indicator Needle
3. Barometric Pressure Counter-Drum Indicator Window (Millibars)
4. Barometric Pressure Counter-Drum Indicator Window (Inches of Mercury)
5. Barometric Pressure Setting Knob
6. Counter-Drum Altitude Display
7. Altitude Scale

Figure 2-34. Copilot's Barometric Altimeter

They indicate the rate at which the aircraft ascends or descends based on changes in atmospheric pressure. The indicator is a direct reading pressure instrument requiring no electrical power for operation.

2-85. ACCELEROMETER.

An accelerometer, located on the instrument panel, registers and records positive and negative G loads imposed on the aircraft. One hand moves in the direction of the G load being applied while the other two (one for positive G loads and one for negative g loads), follow the indicating pointer to its maximum travel. The recording pointers remain at the respective maximum travel positions of the G's being applied, providing a record of maximum G loads encountered. Depressing the push-to-reset knob at the lower left corner of the instrument allows the recording pointers to return to the normal position.

2-86. FREE AIR TEMPERATURE (FAT) GAGE.

The free air temperature gage, mounted outboard of the pilot's seat (fig. 2-8), indicates the outside air temperature in degrees celsius.

2-87. STANDBY MAGNETIC COMPASS.

WARNING

Inaccurate indications on the standby magnetic compass will occur while windshield heat, radome anti-ice, air conditioning, or EFIS are being used or the sunvisors are in the front position.

The standby magnetic compass (fig. 2-8), located below the overhead control panel, is used in the event of failure of the compass system, and for instrument cross check. Readings should be taken only during level flight since errors may be introduced by turning or acceleration. A compass correction chart, indicating deviation factors, is located on the magnetic compass.

2-88. MISCELLANEOUS INSTRUMENTS.

a. Warning Annunciator Panel. The warning annunciator panel, located near the center of the instrument panel below the glareshield (fig. 2-37 and 2-36), contains red fault annunciators. Illumination of a red fault annunciator signifies the existence of a hazardous condition requiring pilot attention. Table 2-6 lists the red fault annunciators, and the causes for their illumination.

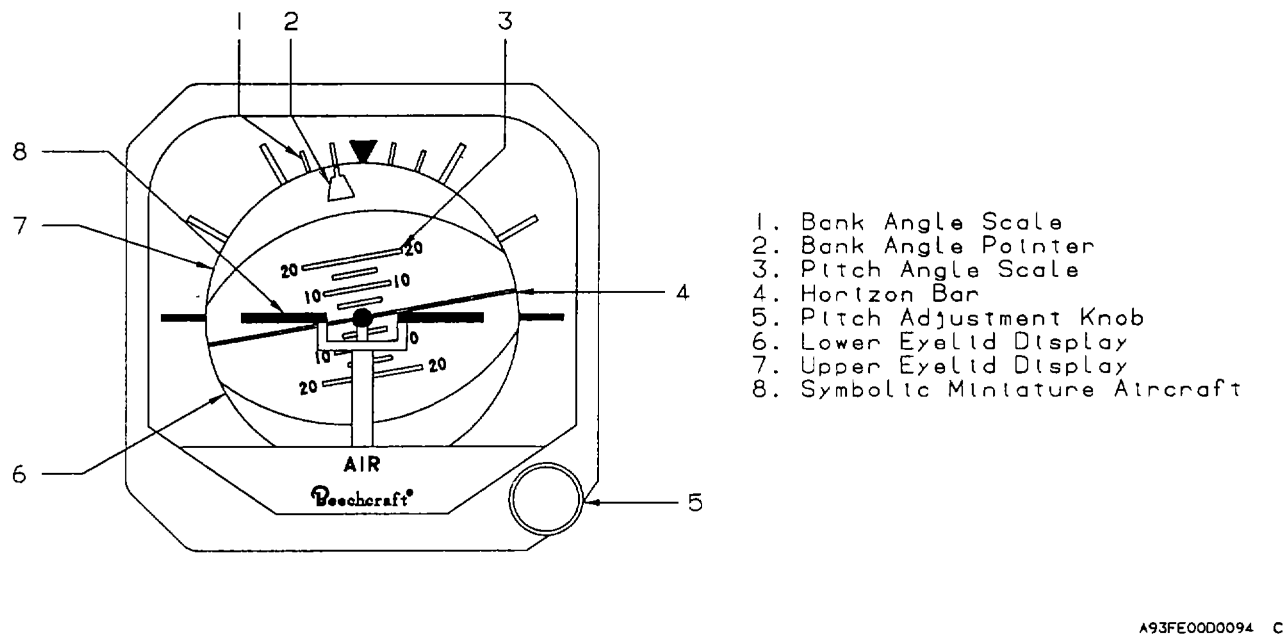


Figure 2-35. Standby Attitude Indicator

b. Caution/Advisory Annunciator Panel. The caution advisory annunciator panel, located on the center subpanel (fig. 2-6 and 2-37), contains the caution/advisory annunciators. The amber caution annunciators signify a condition requiring pilot attention. A green advisory annunciator indicates a functional condition. Table 2-7 lists the caution/advisory annunciators and their cause for illumination.

c. Mission Annunciator Panel. The mission annunciator panel, located on the right cockpit sidewall (fig. 4-1), contains mission equipment annunciators and some annunciators which involve flight operations. Table 2-8 lists the mission annunciators and their cause for illumination.

d. Autopilot/EFISIRudder Boost Remote Annunciator Panel. Two autopilot/EFIS/rudder boost remote annunciator panels are provided (one located above the pilot's and one above the copilot's EADI, fig. 2-38), to advise the pilot and copilot of certain autopilot, EFIS, and rudder boost functions, and to select which EFIS is providing information to the autopilot The functions of this panel are as follows:

(1) EFIS FAN FAIL annunciator light (amber). mumination indicates failure of EFIS cooling fan.

(2) Autopilot EFIS selector switch and indicator. An alternate-action pushbutton switch placarded AP EFIS 1 (green) and AP EFIS 2 (amber) on the pilot's side of the instrument panel and AP EFIS 1 (amber) and AP EFIS 2 (green) on the copilot's side (indicator only), allows selection of information from EFIS # 1 or EFIS #2 for controlling the autopilot

(3) Autopilot/yaw damper annunciator light A split annunciator light (green) placarded AP ENG and YD ENG, illuminates to indicate that the autopilot and/or yaw damper is engaged.

(4) Rudder boost/autopilot trim annunciator. The upper half of this split annunciator, placarded RUDDER BOOST (amber), illuminates to indicate that the rudder boost has failed. The lower half of the annunciator, placarded AP TRIM (amber), illuminates to indicate that the autopilot trim has run longer than 5 to 8 seconds.

e. Annunciator System - General. In the frontal view, the annunciator panels present rows of small opaque rectangular annunciators. Word printing on the respective indicator identifies the monitored function, situation, or fault condition, but it cannot be read until the annunciator is illuminated. Blank annunciators (no word printing) are

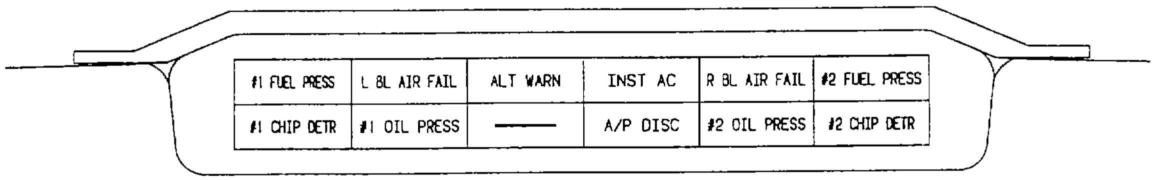


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Figure 2-36. Warning Annunciator Panel

Table 2-6. Warning Annunciator Panel Legend

WARNING ANNUNCIATOR		
NOMENCLATURE	**COLOR**	**CAUSE FOR ILLUMINATION**
#1 FUEL PRESS	RED	Fuel pressure failure on left side
L BL AIR FAIL	RED	Left bleed air warning line has melted or failed, indicating possible leak of No. 1 engine bleed air
ALT WARN	RED	Cabin altitude exceeds 12,500 feet
INST AC	RED	No AC power to engine instruments
R BL AIR FAIL	RED	Right bleed air warning line has melted or failed, indicating possible leak of No. 2 engine bleed air
#2 FUEL PRESS	RED	Fuel pressure failure on right side
#1 CHIP DETR	RED	Contamination of No. 1 engine oil detected
#1 OIL PRESS	RED	Oil pressure failure on left side
ANP DISC	RED	Autopilot has disengaged
#2 OIL PRESS	RED	Oil pressure failure on right side
#2 CHIP DETR	RED	Contamination of No. 2 engine oil detected

non-functioning annunciators. The bulbs of all annunciator panels are tested by activating the ANNUNCIATOR TEST switch, located on the copilot's subpanel near the caution/ advisory panel. The system is protected by the 5-ampere circuit breakers placarded ANN PWR and ANN IND on the overhead circuit breaker panel (fig. 2-7). The annunciator system annunciators are dimmed when the MASTER light switch is ON and the pilot's flight instrument lights are illuminated. The annunciators are automatically reset to maximum brightness if:

(1) Both generators are not producing power (or turned OFF) with MASTER SWITCH ON.

(2) The INSTRUMENT PANEL light switch is rotated clockwise.

(3) The MASTER light switch is off.

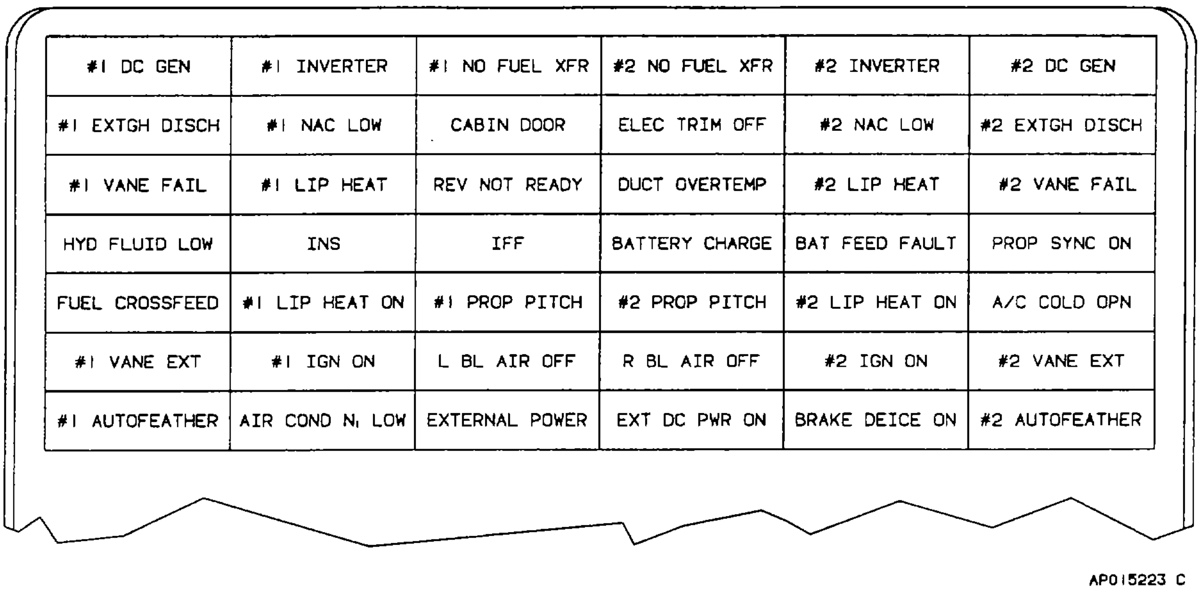

Figure 2-37. Caution/Advisory Annunciator Panel

(4) The MASTER light switch is ON and the PILOT INSTRUMENTS LIGHT switch is OFF.

f. Master Warning Annunciators (red). Two MASTER WARNING annunciators, one located on each side of the glareshield (fig. 2-16), are provided to alert the crew of a hazardous condition. Any time a warning annunciator illuminates, the MASTER WARNING annunciator will flash, and will remain flashing until the MASTER WARNING annunciator is reset If a new condition occurs, the annunciator will be reactivated, and the applicable annunciator panel annunciator(s) will illuminate.

g. Master Caution Annunciators (amber). Two MASTER CAUTION annunciators, one located on each side of the glareshield, adjacent to the MASTER WARNING annunciator (fig. 2-16), are provided to alert the crew of a situation requiring the crews attention. Whenever a caution annunciator illuminates, the MASTER CAUTION annunciator will flash, and remain flashing until the MASTER CAUTION annunciator is reset If a new condition occurs, the annunciator will be reactivated and the appropriate annunciator(s) will illuminate.

h. Clocks.

(1) Description. A digital quartz chronometer is mounted in the center of both control wheels (fig. 2-22). Each quartz chronometer is a five-function clock/timer that is controlled by three pushbutton switches, located directly below the six-digit liquid crystal display.

(2) Operation. The MODE button is pressed to select the desired mode of operation. The mode annunciator is displayed above the mode identifiers, and advances to indicate each of the following modes:

LC - Local Time

ZJ - Zulu or Greenwich Mean Time

FT - Trip or Flight Timer

ET - Elapsed Time

DC - Downcounter with Alarm

(3) Local time mode (LC). Press the MODE button to advance the annunciator to LC To set the hour, press the RST button once, then press and hold the ADV button until the correct hour is displayed. To set minutes, press the RST button again, then press and hold the ADV button until the correct minute is displayed. Press the SET button once to display and hold the selected time. Press the ST - SP button to resume clock operation and/or synchronize the display with a selected time standard.

Table 2-7. Caution/Advisory Annunciator Panel Legend

CAUTION/ADVISORY ANNUNCIATOR		
NOMENCLATURE	**COLOR**	**CAUSE FOR ILLUMINATION**
#1 DC GEN	Yellow	No. 1 engine generator off the line
#1 INVERTER	Yellow	No. 1 inverter inoperative
#1 NO FUEL XFR	Yellow	Auxiliary fuel tank on side of No. 1 engine not transferring fuel into nacelle tank
#2 NO FUEL XFR	Yellow	Auxiliary fuel tank on side of No. 2 engine not transferring fuel into nacelle tank
#2 INVERTER	Yellow	No. 2 Inverter inoperative
#2 DC GEN	Yellow	No, 2 engine generator off the line
#1 EXTGH DISCH	Yellow	No. 1 engine fire extinguisher discharged
#1 NAC LOW	Yellow	No. 1 engine has 30 minutes fuel remaining at sea level, maximum cruise power consumption rate
CABIN DOOR	Yellow	Cabin/cargo door open or not secure
ELEC TRIM OFF	Yellow	Electric trim switch has been turned off, or electric trim monitor has detected a trim fault and turned trim off.
#2 NAC LOW	Yellow	No. 2 engine has 30 minutes fuel remaining at sea level, maximum cruise power consumption rate
#2 EXTGH DISCH	Yellow	No. 2 engine fire extinguisher discharged
#1 VANE FAIL	Yellow	No. 1 engine ice vane malfunction. Ice vane has not attained proper position.
#1 LIP HEAT	Yellow	Failure of No. 1 lip heat valve to conform to selected position or in transit
REV NOT READY	Yellow	Propeller levers are not in the high RPM, low pitch position, with the landing gear extended
DUCT OVERTEMP	Yellow	Excessive bleed air temperature in environmental heat ducts
#2 LIP HEAT	Yellow	Failure of No. 2 lip heat valve to conform to selected position or in transit
#2 VANE FAIL	Yellow	No, 2 engine ice vane malfunction. Ice vane has not attained proper position
HYD FLUID LOW	Yellow	Fluid level in power pack is low
INS	Yellow	Inertial navigation system's cooling fan is off or an INS malfunction that annunciates INS FAIL on MFD.
IFF	Yellow	Transponder fails to reply to a valid mode 4 interrogation
BATTERY CHARGE	Yellow	Charge rate on battery exceeds 7 amps
BAT FEED FAULT	Yellow	Ground fault detected in battery external power line
PROP SYNC ON	Yellow	Synchrophaser turned on with landing gear extended
FUEL CROSSFEED	Green	Crossfeed valve open
#1 LIP HEAT ON	Green	No. 1 engine air scoop heat is on
#1 PROP PITCH	Yellow	No. 1 propeller is below the flight idle stop
#2 PROP PITCH	Yellow	No. 2 propeller is below the flight idle stop
#2 LIP HEAT ON	Green	No. 2 engine air scoop heat is on
A/C COLD OPN	Green	Air conditioner is operating in cold mode, or ambient temperatures require switching to cold mode if air conditioner operation is to be continued
#1 VANE EXT	Green	No. 1 ice vane extended
#1 IGN ON	Green	No. 1 engine ignition/start switch on, No. 1 engine autoignition switch armed and engine torque below 20 percent
L BL AIR OFF	Green	Left environment bleed air valve closed
R BL AIR OFF	Green	Right environmental bleed air valve closed
#2 IGN ON	Green	No. 2 engine ignition/start switch on, No. 2 engine autoignition switch armed and engine torque below 20 percent
#2 VANE EXT	Green	No. 2 ice vane extended
#1 AUTOFEATHER	Green	No. 1 autofeather armed
AIR COND N, LOW	Green	No. 2 engine RPM too low for air conditioning load
EXTERNAL POWER	Green	External power connector plugged in

Table 2-8. Mission Control Panel Annunciator Legend

MISSION ANNUNCIATOR		
NOMENCLATURE	**COLOR**	**CAUSE FOR ILLUMINATION**
MSN OVERTEMP	Yellow	Overtemp condition in mission equipment.
CRYPTO ALERT	Yellow	Security equipment Is holding cipher key when aircraft's wheels are down and TWTA INTLK DEFEAT toggle switch on mission status panel is set to OFF position.
PWR SPLY FAULT	Yellow	Failure in mission equipment power supply.
CALL	Yellow	A request for VOW communication is being received by mission equipment.
3 0 AC OFF	Yellow	Loss of three-phase AC power from either mission inverter if 3 0 AC CONTROL BUS CROSS TIE switch is set to OFF. Indicates a loss of three-phase AC power from both mission inverters if 3 0 AC CONTROL BUS CROSS TIE switch is set to ON.
CABIN OVERTEMP	Yellow	Cabin area containing mission equipment is overheating.
MISSION POWER	Yellow	No power to mission equipment.
LINK MODE	Yellow	ANT STEERING switch is in either MANUAL or GROUND position, or ANT SELECT switch is in either NOSE or TAIL position.
RADOME HOT	Yellow	Overtemperature condition inside IDL nose radome.
LINK SYNC	Yellow	CMD LINK, CMD SYNC, DATA LINK, DATA SYNC, or PHASE LED on mission status panel is illuminated.
SPCL EQPT OVRD	Yellow	Aircraft's normal +28 VDC source has been overridden to provide remaining +28 VDC power sources to mission equipment. Enabled when MISSION CONTROL switch is set to ORIDE position.
TWTA STANDBY	Yellow	TWTA/upconverter is in STANDBY mode.
ANT MALF	Yellow	Tail boom antenna is not in proper position as set by ANT ORIDE switch or landing gear uplock switch.
NO INS UPDATE	Yellow	No INS update data from either TACAN, data link, or GPS to aircraft's INS equipment.
TDOA OVERTEMP	Yellow	Overtemperature condition in processor/power supply.
LB PS OVERTEMP	Yellow	Overtemperature condition in low band receiver power supply.
ASE SILENT	Yellow	Transmitting elements of ASE are in passive mode.
TDOA FAULT	Yellow	Failure in TDOA system equipment. Also illuminates during BIT mode for TDOA system equipment. If it remains lit for mode than 10 minutes during BIT mode, indicates a failure in TDOA system equipment.
LB PS FAULT	Yellow	Failure in low band receiver power supply.
ELINT FAULT	Yellow	Power failure in ELINT system equipment.
ANT STOWED	Green	Tail boom antenna is in horizontal stowed position.
ANT OPERATE	Green	Tail boom antenna is in vertical operating position.
RADOME HEAT	Green	IDL nose radome deicer is on. Enabled by RADOME anti-ice switch on overhead control panel.
MISSION AC ON	Green	Three-phase AC power is being applied to mission inverter #2 AC bus. Enabled when 3 O AC CONTROL #2 INV switch is in ON position, or when #2 INV switch Is In OFF position and BUS CROSS TIE switch is in ON/AUTO position and #1 INV switch is in ON position.
INS UPDATE	Green	INS update is received by aircraft's INS equipment from either TACAN, data link, or GPS.
TDOA PWR ON	Green	115 VAC power is applied to TDOA system equipment. Enabled by TDOA SYSTEM.
MISSION DC ON	Green	+28 VDC power is applied to mission equipment. Enabled by MISSION CONTROL switch.
WAVE GUIDE	Green	IDL waveguides are pressurized.
EXT AC PWR ON	Green	AC power source is connected and applied to aircraft.

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(4) Zulu or Greenwich mean time mode (ZU).

Press the MODE button to advance the annunciator to ZU and set time as for local time shown above. Minutes and seconds do not need to be reset if local time is correctly set Press the RST button to display minutes/seconds, then press again to activate the complete display.

When changing time zones, the hour may be changed as

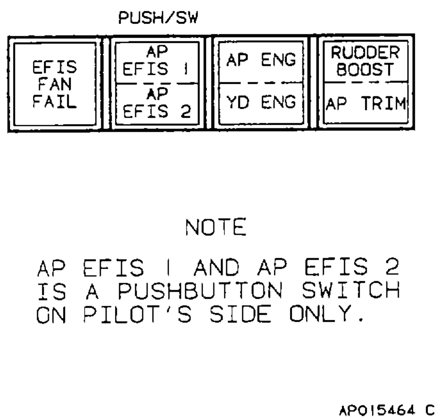

Figure 2-38. AutopiloEFIS/Rudder Boost Remote Annun. cia tor Panel

above. It is not necessary to change the minutes/seconds. Press the RST button twice to return to the full time display.

(5) Trip/flight timer mode (FT). Press the MODE button to advance the annunciator to FT. Press the ST-SP button and verify that the display shows zero. The timer will activate at takeoff and stop at touchdown. To prevent an accidental reset of flight time, the clock cannot be manually reset during flight

(6) Elapsed time mode (ET). Press the MODE button to advance the annunciator to ET. Press the RST button to set the time display to zero. Press the ST-SP button one time. To stop the counting, press the ST-SP button a second time. Ending time will be displayed until the RST button is pressed to clear the display. The clock may be used in other modes and the elapsed time display will remain until cleared by pressing the RST button. If the timer is counting when the RST button is pressed, the display will reset to zero and the count will begin again from zero.

(7) Downcounter mode (DC). Press the MODE button to advance the annunciator to DC. Press the SET button twice to reset the hour display to zero. Press and hold the ADV button until the desired hour is displayed. Press the SET button, again, to reset the minute display to zero. Press and hold the ADV button until the desired minute is displayed. Press the SET button, again, to reset the seconds display to zero. Press and hold the ADV button until the desired second is displayed. Press the SET button, again, to arm the counter. Press the ST - SP button to begin countdown. When the countdown reaches zero, the display will flash for approximately one minute and then reset The countdown may also be reset at any time by pressing the ST - SP button.

Section XII. SERVICING, PARKING, AND MOORING

2-89. GENERAL.

The following paragraphs include the procedures necessary to service the aircraft except lubrication. The lubrication requirements of the aircraft are covered in the aircraft maintenance manual. Tables 2-9, 2-10, 2-11, and 2-12 are used for identification of fuel, oil, etc. used to service the aircraft The servicing instructions provide procedures and precautions necessary to service the aircraft Figure 2-39 shows servicing location points.

2-90. FUEL HANDLING PRECAUTIONS.

Table 2-2, Fuel Quantity Data, lists the capacity of the fuel tanks in the aircraft Service the fuel tanks after each flight to keep moisture out of the tanks and to keep the bladder type cells from drying out.

WARNING

During warm weather, open fuel caps slowly to prevent being sprayed with fuel.

Care should be taken to prevent cuts or abrasions while inspecting the exhaust or turbine area of engines that have been operated on aviation gasoline. The exhaust deposits can cause lead poisoning.

Table 2-9. Approved Military Fuels, Oil, Fluids, and Unit Capacities

SYSTEM	SPECIFICATION	CAPACITY
Fuel	MIL-T-5624 (JP-4 and JP-5)	540 U.S. Gals. Usable
Engine Oil	MIL-L-23699	10 U.S. Quarts per engine
Hydraulic Brake System	MIL-H-5606	1 U.S. Pint
Oxygen System	MIL-0-27210	140 Cubic Feet
Toilet Chemical	Monogram DG-19	3 Ounces

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CAUTION

Proper procedures for handling aircraft fuels cannot be over stressed Clean, fresh fuel shall be used and the entrance of water into the fuel storage or aircraft fuel system must be kept to a minimum.

When conditions permit, the aircraft shall be positioned so that the wind will carry the fuel vapors away from all possible sources of ignition The fueling vehicle shall be positioned to maintain a minimum distance of 10 feet from any part of the aircraft, while maintaining a minimum distance of 20 feet between the fueling vehicle and the fuel filler point

a. Shut off unnecessary electrical equipment in the aircraft, including radar and radar equipment The master switch may be left on, to monitor fuel quantity gages, but shall not be moved during the fueling operation. Do not allow operation of any electrical tools, such as drills or buffers, in or near the aircraft during fueling.

b. Keep fuel servicing nozzles free of snow, water, and mud at all times.

c. Carefully remove snow, water, and ice from the aircraft fuel filler cap area before removing the filler cap (fig. 2-39). Remove only one aircraft tank filler cap at any one time, and replace each one immediately after the servicing operation is completed.

d. Wipe all frost from fuel filler necks before servicing the aircraft

e. Drain water from fuel tanks, filter cases, and pumps prior to first flight of the day. Preheat, when required, to ensure free fuel drainage.

f. Avoid dragging the fueling hose where it can damage the soft, flexible surface of the deice boots.

g. Observe NO SMOKING precautions.

h. Prior to transferring fuel, ensure that the hose is grounded to the aircraft.

i. Wash off spilled fuel immediately.

j. Handle the fuel hose and nozzle cautiously to avoid damaging the wing skin.

k. Do not conduct fueling operations within 100 feet of energized airborne radar equipment or within 300 feet of energized ground radar equipment installations.

l. Wear only nonsparlking shoes near aircraft or fueling equipment, as shoes with nailed soles or metal heel plates can be a source of sparks.

WARNING

Prior to removing the fuel tank filler cap, the hose nozzle static ground wire shall be attached to the grounding sockets located adjacent to the filler opening.

2-91. FILLING FUEL TANKS.

Fill tanks as follows:

1. Attach bonding cables to aircraft
2. Attach bonding cable from hose nozzle to ground socket adjacent to fuel tank being filled.

CAUTION

Do not insert fuel nozzle completely into fuel cell due to possible damage to bottom of fuel cell. Nozzle should be supported and inserted straight down to prevent damage to the antisiphon valve.

3. Remove fuel tank filler cap and fill main tank before filling corresponding auxiliary tanks.

Table 2-10. Approved Fuels

SOURCE	PRIMARY OR STANDARD FUEL	ALTERNATE FUEL	
US MILITARY FUEL NATO Code No.	JP-8 (MIL-T-83133) NATO F-34	JP-5 (MIL-T-5624) NATO F-44 (High Flash Type)	JP-4 (MIL-T-5624) NATO F-40 (Wide Cut Type)
COMMERCIAL FUEL	JET A-1	JET A	JET B
(ASTM-D-1655)		American Type A	American
American Oil Co.		American Type A	American JP-4
Atlantic Richfield	Arcojet A-1	Arcojet A	Arcojet B
Richfield Div.		Richfield A-1	Richfield A
B.P. Trading		B.P.A.T.K.	B.P.A.T.G‘.
Caltex Petroleum Corp.		Caltex Jet A-1	Caltex Jet B
Cities Service Co.			CITGO A
Continental Oil Co.	Conoco Jet-60	Conoco Jet-50	Conoco JP-4
Gulf Oil	Gulf Jet A-1	Gulf Jet A	Gulf Jet B
EXXON Co. USA	EXXON A-1	EXXON A	EXXON Turbo Fuel B
Mobil Oil	Mobil Jet A-1	Mobil Jet A	Mobil Jet B
Phillips Petroleum		Philjet A-50	Philjet JP-4
Shell Oil	Aeroshell 650	Aeroshell 640	Aeroshell JP-4
Sinclair		Superjet A-1	Superjet A
Standard Oil Co.	Kerosene	Jet A-1	Jet A Kerosene
Chevron	Chevron A-1	Chevron A-50	Chevron B
Texaco	Avjet A-1	Avjet B	Texaco Avjet B
Union Oil		76 Turbine Fuel 140, 130, 234	Union JP-4
FOREIGN FUEL		NATO F-44	NATO F-40
Belgium			BA-PF-2B
Canada		3-6P-24e	3GP-22F
Denmark			JP-4 MIL-T-5624
France			Air 3407A
Germany		UTL-9130-007/UTL9130-010	VTL-9130-006
Greece			JP-4 MIL-T-5624
Italy		AMC-143	AA-M-C-1421
Netherlands		D. Eng RD 2493	JP-4 MIL-T-5624
Norway			JP-4 MIL-T-5624
Portugal			JP-4 MIL-T-5624
Turkey			JP-4 MIL-T-5624
United Kingdom (Britain)		D. Eng RD 2498	D. Eng RD 2454

NOTE

Anti-icing and Biocidal Additive for Commercial Turbine Engine Fuel - The fuel system icing inhibitor shall conform to MIL-L-27686. The additive provides anti-icing protection and also functions as a biocide to kill microbial growths in aircraft fuel systems. Icing inhibitor conforming to MIL-L-27686 shall be added to commercial fuel, not containing an icing inhibitor, during refueling operations, regardless of ambient temperatures. Refueling operations shall be accomplished in accordance with accepted commercial procedures.

4. Secure applicable fuel tank filler cap. Make sure latch tab on cap is pointed aft.
5. Disconnect bonding cables from aircraft.

2-92. DRAINING MOISTURE FROM FUEL SYSTEM.

Twelve (12) fuel drains are installed (plus two drains for the ferry fuel system, when installed) to remove sediment from the fuel system.

Table 2-11. Standard, Alternate, and Emergency Fuels

ENGINE	ARMY STANDARD FUEL	ALTERNATE TYPE	EMERGENCY FUEL	
			TYPE	*MAX HOURS
PT6A	MIL-T-83133 Grade JP-8	MIL-T-5624 Grade JP-4/5	MIL-G-5572 Any AV Gas	150
* Maximum operating hours with indicated fuel between engine overhauls (TBO).				

Table 2-12. Recommended Fluid Dilution Chart

AMBIENT TEMPERATURE (˚F)	PERCENT DEFROSTING FLUID BY VOLUME	PERCENT WATER BY VOLUME	FREEZING POINT OF MIXTURE (˚F) (APPROXIMATE)
30˚ and above	20	80	10˚
20˚	30	70	0˚
10˚	40	60	-15˚
0˚	45	55	-25˚
10˚	50	50	-35˚
-20˚	55	45	-45˚
-30˚	60	40	-55˚

1. Use anti-icing and deicing fluid (MIL-A-8243 or commercial fluids).
2. Heat Mixture to a temperature of 82˚ to 93˚C (180˚ to 200˚F).

2-93. FUEL TYPES.

a. Approved fuel types are as follows: Army Standard Fuels. Army standard fuel is JP-8.

b. Alternate Fuels, Army Alternate fuels are JP-5 and JP-8.

c. Emergency Fuel. Avgas is an emergency fuel and subject to a 150 hour time limit.

2-94. USE OF FUELS.

Fuel is used as follows:

a. Fuel limitations. Fuel limitations are outlined in Chapter 5. For the purpose of recording, fuel mixtures shall be identified as to the major component of the mixture, except when the mixture contains leaded gasoline. The use of any fuels other than standard will be entered in the FAULTS/REMARKS column of DA Form 2408-13, Aircraft Maintenance and Inspection Record, noting the type of fuel, additives, and duration of operation.

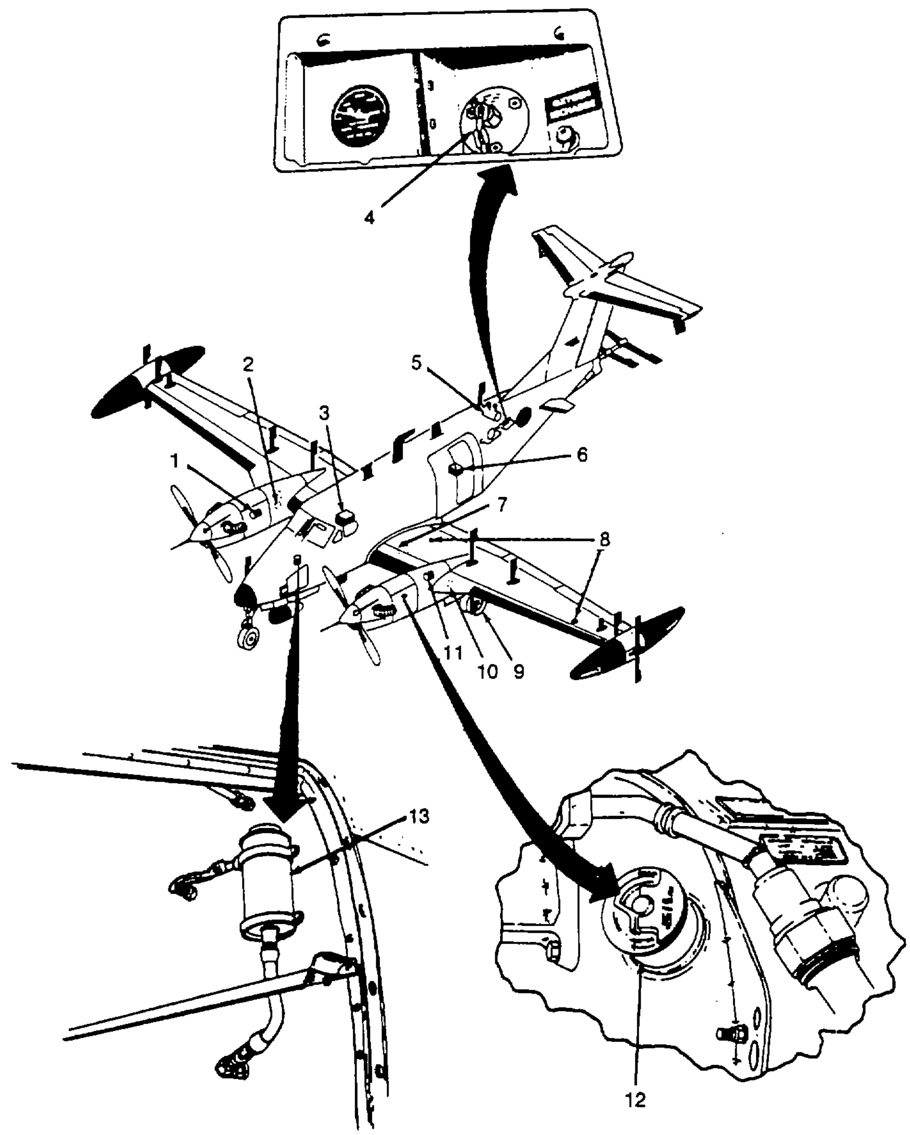
b. Use of Kerosene Fuels. The use of kerosene fuels (JP-5 type) in turbine engines dictates the need for observance of special precautions. Both ground starts and air restarts at low temperature may be more difficult due to low vapor pressure. Kerosene fuels having a freezing point of -40˚C (-40˚F), limit the maximum altitude of a mission to 28,000 feet under standard day conditions.

c. Mixing of Fuels in Aircraft Tanks. When changing from one type of authorized fuel to another, for example JP-4 to JP-5, it is not necessary to drain the aircraft fuel system before adding the new fuel.

d. Fuel Specifications. Fuels having the same NATO code number are interchangeable. Jet fuels conforming to ASTM D-1655 specification may be used when MIL-T-5624 fuels are not available. This usually occurs during cross-country flights where aircraft using NATO F-44 (JP-5) are refueling with NATO F-40 (JP-4) or commercial ASTM type B fuels. Whenever this condition occurs, the engine operating characteristics may change in that lower operating temperature, slower acceleration, lower engine speed, easier starting, and shorter range may be experienced. The reverse is true when changing from F-40 (JP-4) fuel to F-44 (JP-5) or Commercial ASTM Type A-1 fuels. Most commercial turbine engines will operate satisfactorily on either kerosene or JP-4 type fuel. The difference in specific gravity may possibly require fuel control adjustments; if so, the recommendations of the manufacturers of the engine and airframe are to be followed.

2-95. SERVICING OIL SYSTEM.

An integral oil tank occupies the cavity formed between the accessory gearbox housing and the compressor inlet



1. Air Conditioning Compressor
2. DC External Power Receptacle
3. Battery 24 VDC
4. Oxygen System Filler
5. Oxygen Cylinders 2 (70 Cu Ft Bottles)
6. Chemical Toilet
7. Landing Gear Hydraulic Reservoir
8. Fuel Filler Caps (Typical Left and Right)
9. Landing Gear Tires (Typical Left, Right, and Nose Gear)
10. AC External Power Receptacle
11. Engine Fire Extinguisher (Typical Left and Right)
12. Engine Oil Filler Cap (Typical Left and Right)
13. Wheel Brake Fluid Reservoir

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Figure 2-39. Servicing Locations

case on the engine. The tank has a calibrated oil dipstick and an oil drain plug. Avoid spilling oil Any oil spilled must be removed immediately. Use a cloth moistened in solvent to remove oil. Overfilling may cause a discharge of oil through the accessory gearbox breather during engine operation, until a satisfactory level is reached. Service oil system as follows:

1. Open access door on upper cowling to gain access to oil filler cap and dipstick.

CAUTION

A cold oil check is unreliable. If possible, check oil within 10 minutes after engine shutdown. If over 10 minutes have elapsed, motor the engine for 40 seconds, then check If over 10 hours have elapsed, start the engine and run for 2 minutes, then check. Add oil as required. Do not overfill.

2. If oil level is over 2 quarts low, motor or run engine as required, and service as necessary.
3. Remove oil filler cap.
4. Insert clean funnel, with screen incorporated, into filler neck
5. Replenish with oil to within 1 quart below MAX mark or MAX COLD on dipstick (cold engine). Fill to MAX or MAX HOT (hot engine).
6. Check oil filler cap for damaged preformed packing, general condition and locking.

CAUTION

Ensure that oil filler cap is correctly installed and securely locked to prevent loss of oil and possible engine failure.

7. Install and secure oil filler cap.
8. Check for any oil leaks.

2-96. SERVICING THE HYDRAULIC SYSTEM.

a. Servicing Hydraulic Brake System Reservoir.

1. Gain access to brake hydraulic system reservoir.
2. Remove brake reservoir cap and fill reservoir to washer on dipstick with hydraulic fluid.
3. Install brake reservoir cap.

b. Servicing Hydraulic Landing Gear System. Servicing the hydraulic landing gear extension/ retraction system consists of maintaining the correct fluid level and maintaining the correct accumulator precharge. The accumulator is located in the reservoir access area and is charged to 800 +50 PSI using bottled nitrogen. A charging gage is mounted on the accumulator. A reservoir, located just inboard of the left nacelle and forward of the main spar, has a lid with a dipstick attached marked FLUID TEMP 0°F, 50°F, 100°F Add MILH-5606 hydraulic fluid (consumable materials list) as required to fill the system, corrected for temperature.

2-97. INFLATING TIRES.

Inflate tires as follows:

a. Inflate nose wheel tires to a pressure between 55 and 60 PSI.

b. Inflate main wheel tires to a pressure between 73 and 77 PSI.

2-98. SERVICING THE CHEMICAL TOILET.

The toilet should be serviced during routine ground maintenance of the aircraft following every usage. The waste storage container should be removed, emptied, its disposable plastic liner replaced, and the container replaced in the toilet cabinet Toilet paper, waste container plastic liners, and dry chemical deodorant packets should also be resupplied within the toilet cabinet as needed.

2-99. SERVICING THE AIR CONDITIONING SYSTEM.

Servicing the air conditioning system consists of checking and maintaining the correct refrigerant level, compressor oil level, belt tension and condition, system leak detection, and replacement of the evaporator air filters. It is imperative that maintenance of the air conditioning system, except for filter replacement, be accomplished only by qualified refrigerant system technicians.

2-100. ANTI-ICING, DEICING, AND DEFROSTING TREATMENT.

NOTE

Do not apply anti-icing, deicing, and defrosting fluid to exposed aircraft surfaces if snow is expected. Melting snow will dilute the defrosting fluid and form a slush mixture which will freeze in place and become difficult to remove.

The aircraft is protected in subfreezing weather by spraying the surfaces (to be covered with protective covers) with defrosting fluid. Spraying defrosting fluid on aircraft surfaces before installing protective covers will permit protective covers to be removed with a minimum of sticking. To prevent freezing rain and snow from blowing under protective covers and diluting the fluid, ensure that protective covers are fitted tightly. As a deicing measure, keep exposed aircraft surface wet with fluid for protection against frost.

Use undiluted anti-icing, deicing, and defrosting fluid (MILA-8243) to treat aircraft surfaces for protection against freezing rain and frost Spray aircraft surface sufficiently to wet area, but without excessive drainage. A fine spray is recommended to prevent waste. Use diluted, hot fluid to remove ice accumulations.

a. Remove frost or ice accumulations from aircraft surfaces by spraying with diluted anti-icing, deicing, and defrosting fluid mixed in accordance with Table 2-12.

b. Spray diluted, hot fluid in a solid stream (not over 15 gallons per minute). Thoroughly saturate aircraft surface and remove loose ice. Keep a sufficient quantity of diluted, hot fluid on aircraft surface coated with ice, to prevent liquid layer from freezing. Diluted, hot fluid should be sprayed at a high pressure, but not exceeding 300 PSL

c. When facilities for heating are not available and it is deemed necessary to remove ice accumulations from aircraft surfaces, undiluted defrosting fluid may be used. Spray undiluted defrosting fluid at 15 minute intervals to assure complete coverage Removal of ice accumulations using undiluted defrosting fluid is expensive and slow.

d. If tires are frozen to ground, use undiluted defrosting fluid to melt ice around tire. Move aircraft as soon as tires are free.

2-101. APPLICATION OF EXTERNAL POWER.

CAUTION

Before connecting the power cables from the external power source to the aircraft, ensure that the GPU is not touching the aircraft at any point Due to the voltage drop in the cables, the two ground systems will be of different potentials. Should they come in contact while the GPU is operating, arcing could occur. Turn off all external power while connecting the power cable to, or removing it from, the external power supply receptacle. Be certain that polarity of the external power source is the same as that of the aircraft before it is connected. Minimum GPU requirements are as follows: 400-amperes, 28V continuous output DC and 115V, 3 phase, 400 cycle, 3 KVA continuous output AC.

An external power source is often needed to supply. The electric current required to properly ground service the aircraft electrical equipment and to facilitate starting the aircraft's engines. An external DC power receptacle is installed on the underside of the right wing, just outboard of the engine nacelle. An external AC power receptacle is installed on the underside of the left wing, just outboard of the engine nacelle.

2-102. SERVICING OXYGEN SYSTEM.

The oxygen system furnishes breathing oxygen to the pilot, copilot, and first aid position. The oxygen cylinder location is shown in figure 2-24.

a. Oxygen System Safety Precautions.

WARNING

Keep fire and heat away from oxygen equipment Do not smoke while working with or near oxygen equipment, and take care not to generate sparks with carelessly handled tools when working on the oxygen system.

(1) Keep oxygen regulators, cylinders, gages, valves, fittings, masks, and all other components of the oxygen system free of oil, grease, gasoline, and all other readily combustible substances. The utmost care shall be exercised in servicing, handling, and inspecting the oxygen system.

(2) Do not allow foreign matter to enter oxygen lines.

(3) Never allow electrical equipment to come into contact with the oxygen cylinder.

(4) Never use oxygen from a cylinder without first reducing its pressure through a regulator.

b. Replenishing Oxygen System.

1. Remove oxygen access door on outside of aircraft (fig. 2-24).
2. Remove protective cap on oxygen system filler valve.
3. Attach oxygen hose from oxygen servicing unit to filler valve.

WARNING

If the oxygen system pressure is below 200 PSI, do not attempt to service system Make an entry on DA Form 240813

.

4. Ensure that supply cylinder shutoff valves on aircraft are open.

5. Slowly adjust valve position so that pressure increases at a rate not to exceed 200 PSIG per minute.

6. Close pressure regulating valve on oxygen servicing unit when pressure gage on oxygen system indicates pressure obtained using the Oxygen System Servicing Pressure Chart (fig. 2-40).

NOTE

To compensate for loss of aircraft cylinder pressure as the oxygen cools to ambient temperature after recharging, the cylinder should be charged initially to approximately 10% over prescribed pressure. Experience will determine what initial pressure should be used to compensate for the subsequent pressure loss upon cooling. A complete recharge will create substantial heating.

The final stabilized cylinder pressure should be adjusted for ambient temperature per figure 2-40.

7. Disconnect oxygen hose from oxygen servicing unit and filler valve.

8. Install protective cap on oxygen filler valve

9. Install oxygen access door.

2-103. GROUND HANDLING.

Ground handling covers all the essential information concerning movement and handling of the aircraft while on the ground. The following paragraphs give, in detail, the instructions and precautions necessary to accomplish ground handling functions. Parking, covers, ground handling, and towing equipment are shown in figure 2-41.

a. General Ground Handling Procedure. Accidents resulting in injury to personnel and damage to equipment can be avoided or minimized by close observance of existing safety standards and recognized ground handling procedures. Carelessness or insufficient knowledge of the aircraft or equipment being handled can be fatal. The applicable technical manuals and pertinent directives should be studied for familiarization with the aircraft, its components, and the ground handling procedures applicable to it, before attempting to accomplish ground handling.

b. Ground Handling Safety Practices. Aircraft equipped with turboprop engines require additional maintenance safety practices. The following list of safety practices should be observed at all times to prevent possible injury to personnel and/or damaged or destroyed aircraft:

(1) Keep intake air ducts free of loose articles such as rags, tools, etc.

(2) Stay clear of exhaust outlet areas.

(3) During ground runup, ensure the brakes are firmly set

(4) Keep area fore and aft of propellers clear of maintenance equipment

(5) Do not operate engines with flight control surfaces in the locked position.

(6) Do not attempt towing or taxiing of the aircraft with flight control surfaces in the locked position.

(7) When high winds are present, do not unlock the control surfaces until prepared to properly operate them.

(8) Do not operate engines while towing equipment is attached to the aircraft, or while the aircraft is tied down.

(9) Check the nose wheel position. Unless it is in the centered position, avoid operating the engines at high power settings.

(10) Hold control surfaces in the neutral position when the engines are being operated at high power settings.

(11) When moving the aircraft, do not push on propeller deicing boots. Damage to the heating elements may result

c. Moving Aircraft on Ground. Aircraft on the ground shall be moved in accordance with the following:

(1) Taxiing. Taxiing shall be in accordance with chapter 8.

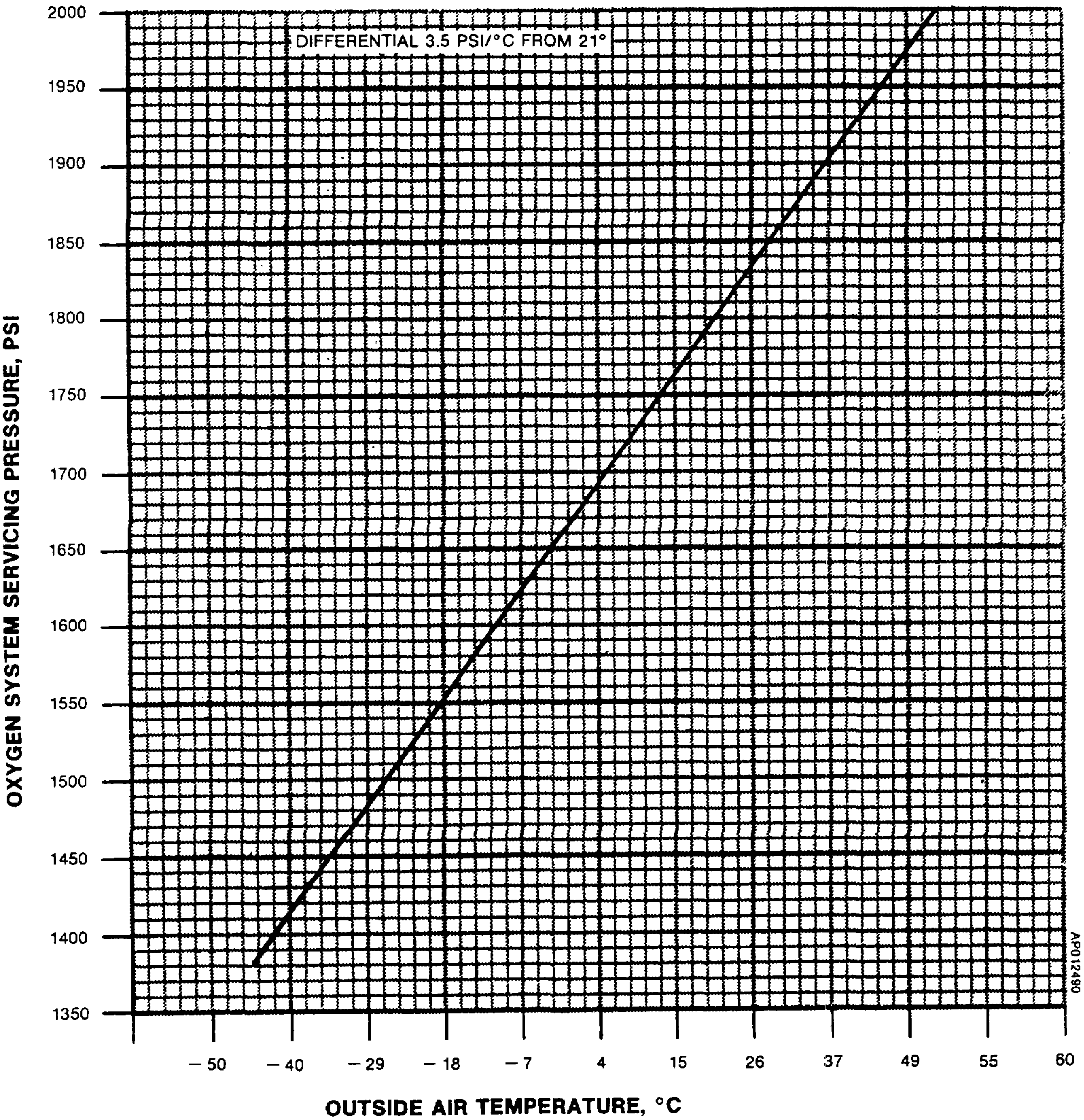
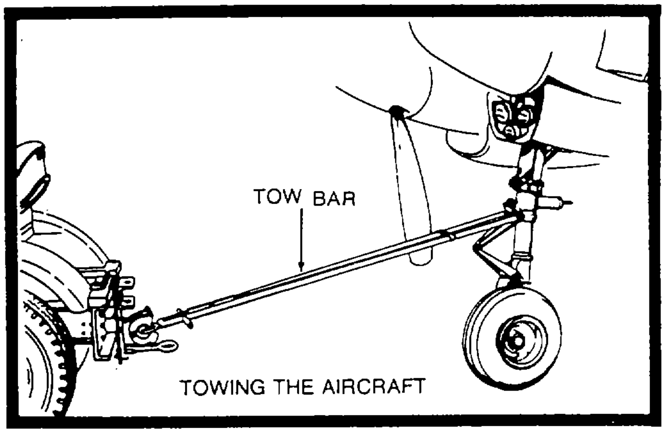


Figure 2-40. Oxygen System Serving Pressure



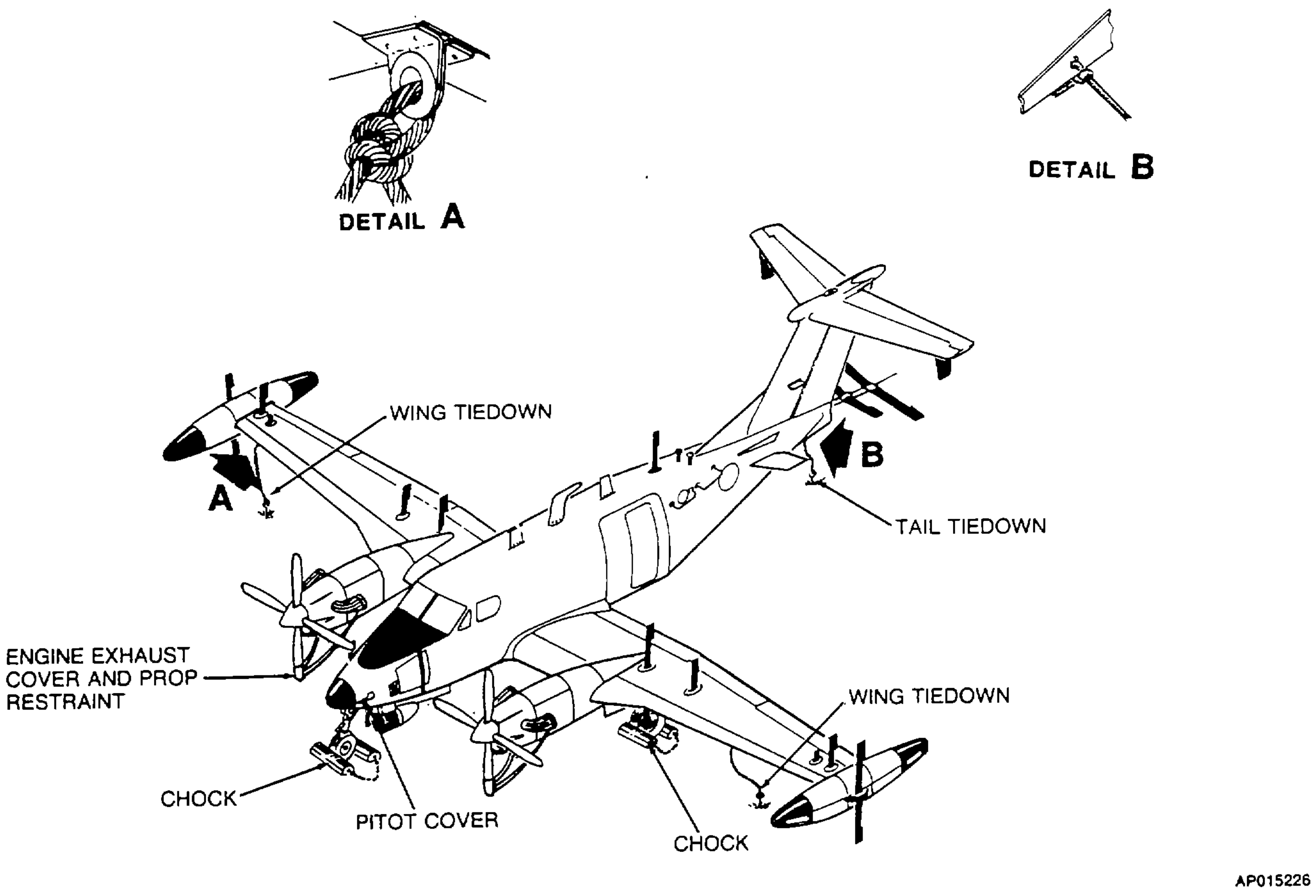


Figure 2-41. Parking, Covers, Ground Handling, and Towing Equipment

CAUTION

When the aircraft is being towed, a qualified person must be in the pilot's seat to maintain control by use of the brakes. When towing, do not exceed nose gear turn limits (fig. 2-42). Avoid short radius turns, and always keep the inside or pivot wheel turning during the operation. Do not tow aircraft with rudder locks installed, as severe damage to the nose steering linkage can result When moving the aircraft backwards, do not apply the brakes abruptly. Tow the aircraft slowly, avoiding sudden stops, especially over snowy, icy, rough, soggy, or muddy terrain. In arctic climates, the aircraft must be towed by the main gears, as an immense breakaway load, resulting from ice, frozen tires, and stiffened grease in the wheel bearings may damage the nose gear.

Do not tow or taxi aircraft with deflated shock struts.

(2) Towing. Towing lugs are provided on the upper torque knee fitting of the nose strut. When it is necessary to tow the aircraft with a vehicle, use the vehicle tow bar. Never exceed the turn limit arrows displayed on the placard located on the nose gear assembly (fig. 2-42). In the event towing lines are necessary, use towing lugs on the main landing gear. Use towing lines long enough to clear nose and/or tail by at least 15 feet. This length is required to prevent the aircraft from overrunning the towing vehicle or fouling the nose gear.

d. Ground Handling Under Extreme Weather Conditions. Extreme weather conditions necessitate particular care in ground handling of the aircraft. In hot, dry, sandy, desert conditions, special attention must be devoted to finding a firmly packed parking and towing area. If such areas are not available, steel mats or an equivalent solid base must be provided for these purposes. In wet, swampy areas, care must be taken to avoid bogging down the aircraft. Under cold, icy, arctic conditions, additional mooring is required, and added precautions must be taken to avoid skidding during towing operations.

2-104. PARKING.

Parking is defined as the normal condition under which the aircraft will be secured while on the ground. This condition may vary from the temporary expedient of setting the parking brake and chocking the wheels to the more elaborate mooring procedures described under Mooring. The proper steps for securing the aircraft must be based on the time the aircraft will be left unattended, the aircraft weight, the expected wind direction and velocity, and the anticipated availability of ground and air crews for mooring and/or evacuation. When practical, head the aircraft into the wind, especially if strong winds are forecast or if it will be necessary to leave the aircraft overnight. Set the parking brake and chock the wheels securely. Following engine shutdown, position and engage the control locks.

NOTE

Cowlings and loose equipment will be suitably secured at all times when left in an unattended condition.

a. The parking brake system for the aircraft incorporates two lever-type valves, one for each wheel brake. Both valves are closed simultaneously by pulling out the parking brake handle. Operate the parking brake as follows:

1. Depress both brakes.
2. Pull parking brake handle out. This will cause the parking brake valves to lock the hydraulic fluid under pressure in the parking brake system, thereby retaining braking action.
3. Release brake pedals.

CAUTION

Do not set parking brakes when the brakes are hot, during freezing ambient temperatures. Allow brakes to cool before setting parking brakes.

4. To release the parking brakes push in on the parking brake handle.

b. The control lock (fig. 2-23) holds the engine and propeller control levers in a secure position. The elevator, rudder, and ailerons are secured in a neutral position. Install the control locks as follows:

1. With engine and propeller control levers in secure position, slide lock around the aligned control levers.
2. Install elevator and aileron lockpin through the pilot's control column to lock control wheel
3. Install rudder lock pin through floor mounted door, forward of pilot's seat, making sure rudder is in neutral position
4. Reverse steps 1 through 3 above to remove control lock. Store control lock.

2-105. INSTALLATION OF PROTECTIVE COVERS.

The crew will ensure that the aircraft protective covers are installed when leaving the aircraft.

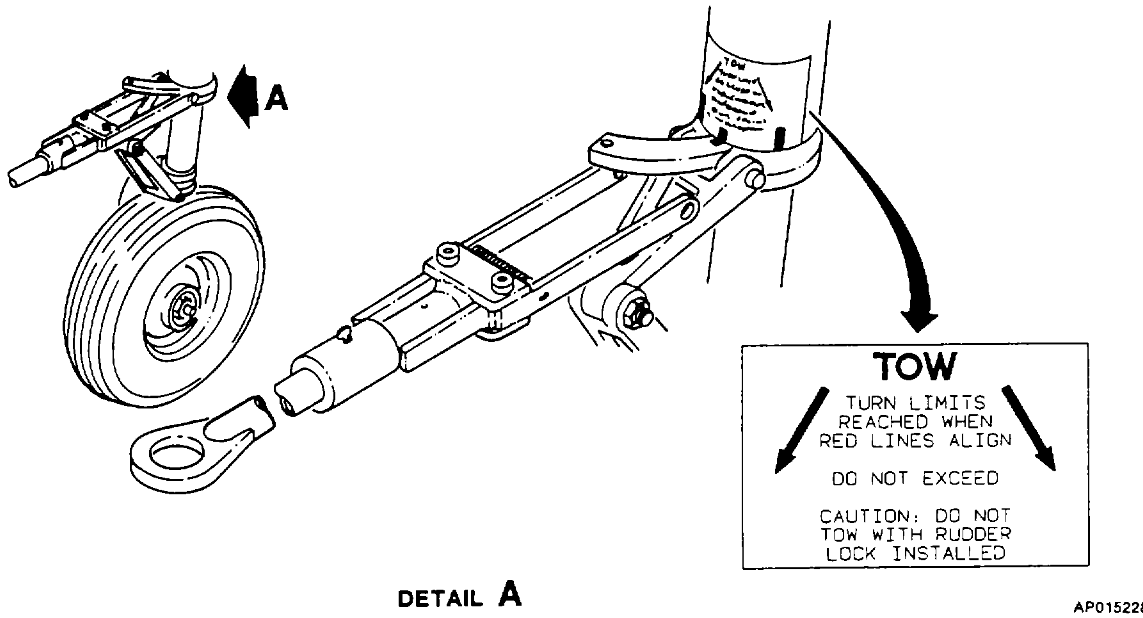


Figure 2-42. Towing Turn Limits

2-106. MOORING.

The aircraft is moored to ensure its immovability, protection, and security under various weather conditions. The following paragraphs give, in detail, the instructions for proper mooring of the aircraft

a. Mooring Provisions. Mooring points (fig. 2-43) are provided beneath the wings and tail. Additional mooring cables may be attached to each landing gear. General mooring equipment and procedures necessary to moor the aircraft, in addition to the following, are given in TM 55-1500-204-25/1.

(1) Use mooring cables of 1/4 inch diameter air-craft cable and clamp (clip-wire rope), chain, or rope (3/4 inch diameter or larger). Length of the cable or rope will be dependent upon existing circumstances. Allow sufficient slack in ropes, chains, or cable to compensate for tightening action due to moisture absorption of rope or thermal contraction of cable or chain. Do not use slip knots. Use bowline knots to secure aircraft to mooring stakes.

(2) Chock the wheels.

b. Mooring Procedures for High Winds. Structural damage can occur from high velocity winds; therefore, if at all possible, the aircraft should be moved to a safe weather area when winds above 75 knots are expected. Moored air- craft condition is shown in figure 2-43. If aircraft must be secured, use the following steps:

1. After aircraft is properly located, place nose wheel in centered position. Point the aircraft into the wind, or as nearly so as is possible within limits determined by locations of fixed mooring rings. When necessary, a 45 degree variation of direction is considered to be satisfactory. Locate each aircraft at slightly more than one wing span distance from all other air- craft Position nose mooring point approximately 3 to 5 feet downwind from ground mooring anchors.

2. Deflate nose wheel shock strut to within 3/4 inch of its fully deflated position

3. Fill all fuel tanks to capacity, if time permits.

4. Place wheel chocks fore and aft of main gear wheels and nose wheel. Tie each pair of chocks together with rope or join together with wooden cleats nailed to chocks on either side of wheels. Tie ice grip chocks together with rope. Use sandbags in lieu of chocks when air- craft is moored on steel mats. Set parking brake as applicable.

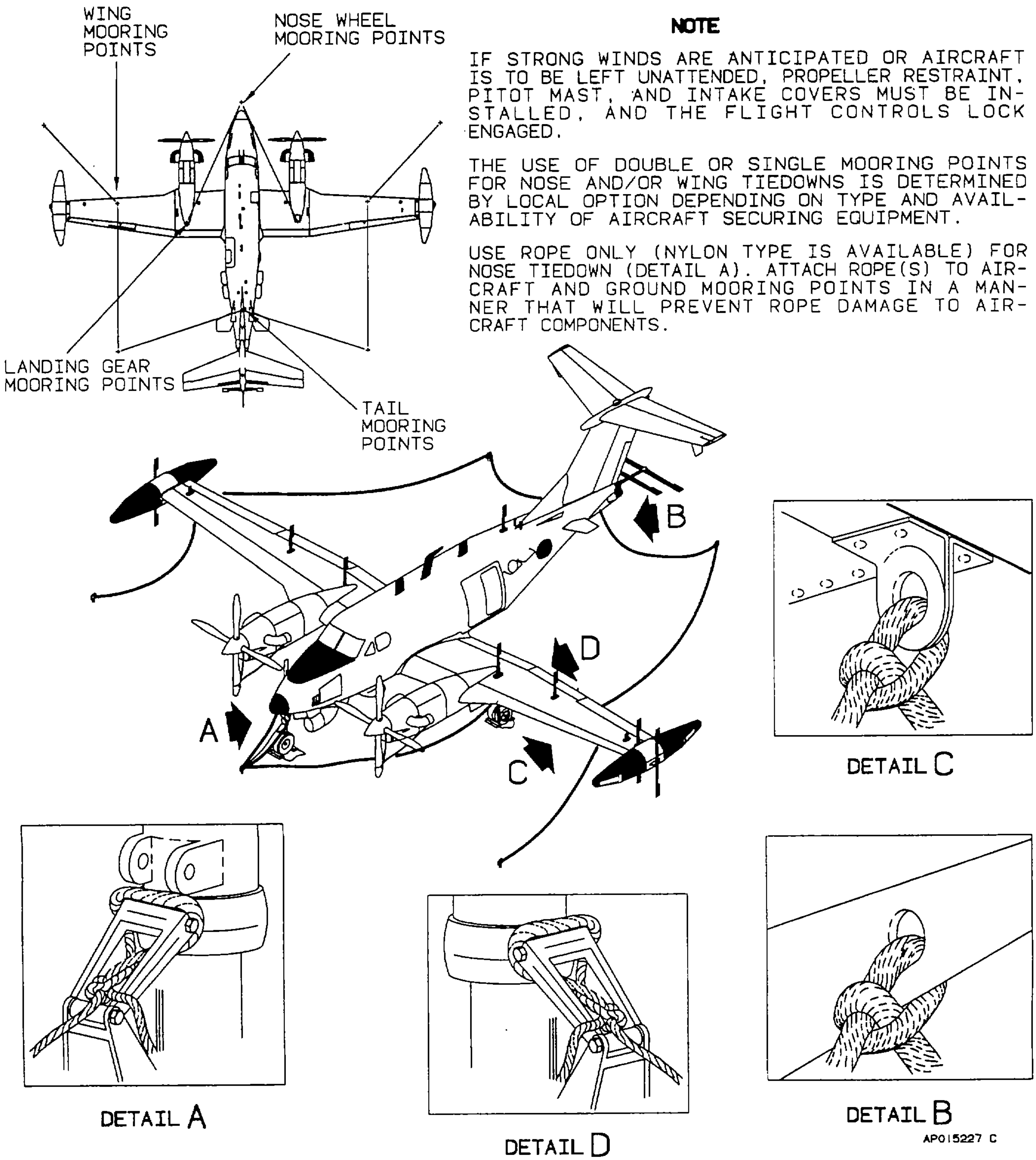


Figure 2-43. Mooring the Aircraft

5. Tie aircraft down by utilizing mooring points shown in figure 2-43. Make tiedown with 1/4 inch aircraft cable using two wire rope clips, or bolts and a chain tested for a 3000 pound pull Attach tiedowns so as to remove all slack. Use a 3/4-inch or larger manila rope if cable or chain tiedown is not available. If rope is used for tiedown, use anti-slip knots (such as bow- line knot) rather than slip knots. In the event tiedown rings are not available on hard surfaced areas, move aircraft to an area where portable tiedowns can be used. Locate anchor rods at point shown in figure 2-43. When anchor kits are not available, use metal stakes or dead- man type anchors, providing they can success- fully sustain a minimum pull of 3000 pounds.

6. In event nose position tiedown is considered to be of doubtful security due to existing soil condition, drive additional anchor rods at nose tiedown position. Place padded work stand or other suitable support under the aft fuselage tiedown position and secure.

7. Place control surfaces in locked position and trim tab controls in neutral position. Place wing flaps in up position.

8. The requirements for dust excluders, protective covers, and taping of openings will be left to the discretion of the responsible maintenance officer or the pilot of the transient aircraft (fig. 2-41).

9. Secure propellers to prevent windmilling (fig. 2-41).

10. Disconnect battery.

11. During typhoon or hurricane wind conditions, mooring security can be further increased by placing sandbags along the wings to break up the aerodynamic flow of air over the wing, thereby reducing the lift being applied against the mooring by the wind. The storm appears to pass two times, each time with a different wind direction. This will necessitate turning the air- craft after the first passing.

12. After high winds, inspect aircraft for visible signs of structural damage and for evidence of damage from flying objects. Service nose shock strut and reconnect battery.

CHAPTER 3

AVIONICS

Section I. GENERAL

3-1. INTRODUCTION.

Except for mission avionics, this chapter covers all avionics equipment installed in the RC-12N aircraft. It provides a brief description of the equipment, the technical characteristics, and locations. It covers systems and controls, and provides the proper techniques and procedures to be employed when operating the equipment. For more detailed operational information consult the vendor manuals that accompany the aircraft loose tools.

3-2. AVIONICS EQUIPMENT CONFIGURATION.

The aircraft avionics covered consists of three groups of electronic equipment The communication group consists of the intercom system, UHF transceivers (2, HAVE QUICK), VHF-FM transceiver (SINCGARS), VHF-AM transceivers (2), HF transceiver, and an emergency locator transmitter (ELT). The navigation group consists of VOWR localizer/glideslope/marker beacon receivers (2), automatic direction finder receiver (ADF), inertial navigation system (INS), TACAN receiver, a global positioning system (GPS), a radio altimeter system, a gyromagnetic compass system, an electronic flight instrument system (EFIS), and a digital integrated flight control system. The transponder and radar group consists of a weather radar, lightning sensor system, transponder, and a served encoding altimeter indicator. The transponder and radar group includes an identification, position, emergency tracking system, and a radar and lightning sensor system to locate potentially dangerous weather areas. For additional operational details to operate equipment controlled by ASE/ACS refer to Chapter 4.

3-3. POWER SOURCE.

a. DC Power. DC power for the avionics equipment is provided from four sources: the aircraft battery, left and right generators, and external power. Power is routed through two 50-ampere circuit breakers to the avionics power relay, which is controlled by the AVIONICS MASTER POWER switch, located on the overhead control panel (fig. 2-13). Individual system circuit breakers and the associated avionics buses are shown in figure 2-7.

(1) AVIONICS MASTER POWER switch. A switch placarded AVIONICS MASTER POWER - ON - EXT PWR, located on the overhead control panel controls power to the #1 and #2 avionics buses.

(a) Off. In the aft (off) position, power from the 5-ampere circuit breaker placarded AVIONICS MASTER PWR, located on the overhead circuit breaker panel (fig. 2-7), energizes the avionics relay, removing power from the avionics buses.

(b) ON. With the switch in the ON (center) position, the avionics power relay is de-energized and power is applied through the 35-ampere AVIONICS MAS- TER PWR # 1 and #2 circuit breakers to the individual avionics circuit breakers on the overhead circuit breaker panel (fig. 2-7).

NOTE

If the AVIONICS MASTER POWER switch fails to operate, power to the individual avionics circuit breakers can be provided by pulling the 5-ampere circuit breaker, placarded AVIONICS MASTER CONTR, located on the overhead circuit breaker panel (fig. 2-7).

(c) External power (EXT PWR). When the switch is in the EXT PWR (forward) position, external power may be applied to the avionics buses. The avionics system is automatically isolated from DC GPU power. Setting the AVIONICS MASTER POWER switch to the EXT PWR position allows avionics isolation from DC GPU power to be overridden, de-energizing the avionics power relay, and applying power to the avionics equipment from the DC GPU.

b. Single-Phase AC Power. Two static inverters supply 400 Hz single-phase 115 volt and 26 volt AC electrical power to the avionics equipment. During normal operation, the # 1 inverter supplies 115 volts AC and 26 volts AC power to the # 1 avionics systems and the #2 inverter supplies AC power to the #2 avionics system.

If either inverter fails, the total single-phase AC electrical load is shifted to the remaining inverter automatically unless a ground fault exists. Either inverter is capable of supplying the entire AC electrical load. AC power from the inverters is routed through fuses located in the nose avionics compartment. The single phase inverters are controlled by two switches placarded #1 and #2 1li INVERTER - ON, located on the overhead control panel (fig. 2-13).

c. Three-Phase AC Power. Three phase AC electrical power for operation of the inertial navigation system and mission avionics is supplied by two 3000 volt-ampere, solid state, three phase inverters. The three phase inverters are controlled by two three-position switches placarded 3Ø AC CONTROL, #1 and #2 INV, RESET - ON - OFF, located on the mission control panel (fig. 4-1).

Section II. COMMUNICATIONS

3-4. COMMUNICATIONS EQUIPMENT GROUP DESCRIPTION.

The communications equipment group consists of an intercom system connected to individual audio control panels for the pilot and copilot which interface with VHF, UHF, BU VOW, VHF-FM, and HF transceivers, and provide reception of audio from VOR, localizer, marker beacon, TACAN/DME, and ADF receivers.

3-5. MICROPHONES, SWITCHES, AND JACKS.

Boom and oxygen mask microphones can be utilized in the aircraft

a. Control Wheel Microphone Switches. The pilot and copilot are each provided with bi-level microphone switches placarded MIC, INTPH - XM1T, located behind the outboard handgrip of their respective control wheels (fig. 2-22). When the control wheel microphone switches are depressed to the first level (INTPH position), voice audio signals from the respective microphone are routed to the intercom system (the position of the transmitter- intercom selector switch is disregarded).

When the control wheel microphone switches are depressed to the second level (XMIT position), voice audio signals from the respective microphone are routed to the transmitter selected by the transmitter-intercom selector switch (located on the respective audio control panel, fig. 3-1).

b. Cockpit Floor Foot-Operated Microphone Switches. The pilot and copilot are each provided with a foot-operated microphone switch, placarded MIC, located on the cockpit floor, forward of their respective seat positions.

Depressing the foot-operated microphone switches routes audio signals to the device selected by the transmitter-intercom selector switch located on the respective audio control panel (fig. 3-1)

c. Microphone Jack Selector Switches. Two switches, placarded MIC, HEADSET - OXYGEN MASK, located on the left and right sides of the instrument panel (fig. 2-16), provide a means of selecting which microphone jack is connected to the audio system. When the pilot's or copilot's switch is set to the HEADSET position, the head- set jack is connected to the respective audio system. When set to the OXYGEN MASK position, the oxygen mask jack is connected to the respective audio system.

3-6. AUDIO CONTROL PANELS.

a. Description. Separate identical audio control panels (fig. 3-1), located on the left and right subpanels (fig. 2-6), are provided for the pilot and copilot. Each audio control panel is powered by its respective 2-ampere circuit breaker placarded AUDIO PILOT or AUDIO COPI located on the overhead circuit breaker panel (fig. 2-7).

b. VHF-FM/VHF-AM Alternate Communication Switch Panel. An alternate communication switch panel with three alternate-action (push on, push off) switches, located on the pedestal extension (fig. 3-2), allows position 2 of the audio control panel transmitter-selector switch to be connected to an alternate transceiver.

(1) VHF-FM/VHF-AM alternate communication selector switch. The center alternate-action (push on, push off) alternate communication switch is placarded FM, AM. When the switch is depressed, either FM or AM will be illuminated. When the switch is set to the FM position, position number 2 of the transmitter selector switch (audio control panel, fig. 3-1) and number 2 radio monitor control will be connected to the VHF-FM (SINCGARS) transceiver for both transmit and receive functions. When the switch is set to the AM position, position number 2 of the transmitter selector switch (audio control panel, fig. 3-1) and the number 2 radio monitor control will be connected to the VHF-AM number 2 transceiver for both transmit and receive functions.

(2) Pilot's and copilot's alternate communication monitor switch. The pilot and copilot are each provided with an alternate action (push on, pull off) alternate communication monitor switch, located on the left side (pilot's switch) or right side (copilot's switch), of the alternate communication switch panel (pedestal extension, fig. 2-12). Both switches have illuminated placarding which reads MON, ON - OFF. When the switch is depressed, either ON or OFF will be illuminated. When either of the switches is set to ON and the center switch is set to FM, the VHF-AM number 2 audio will be heard in addition to the FM audio. The FM audio cannot be monitored when the center switch is set to AM. The monitored audio volume will not be controlled by the number two radio monitor control.

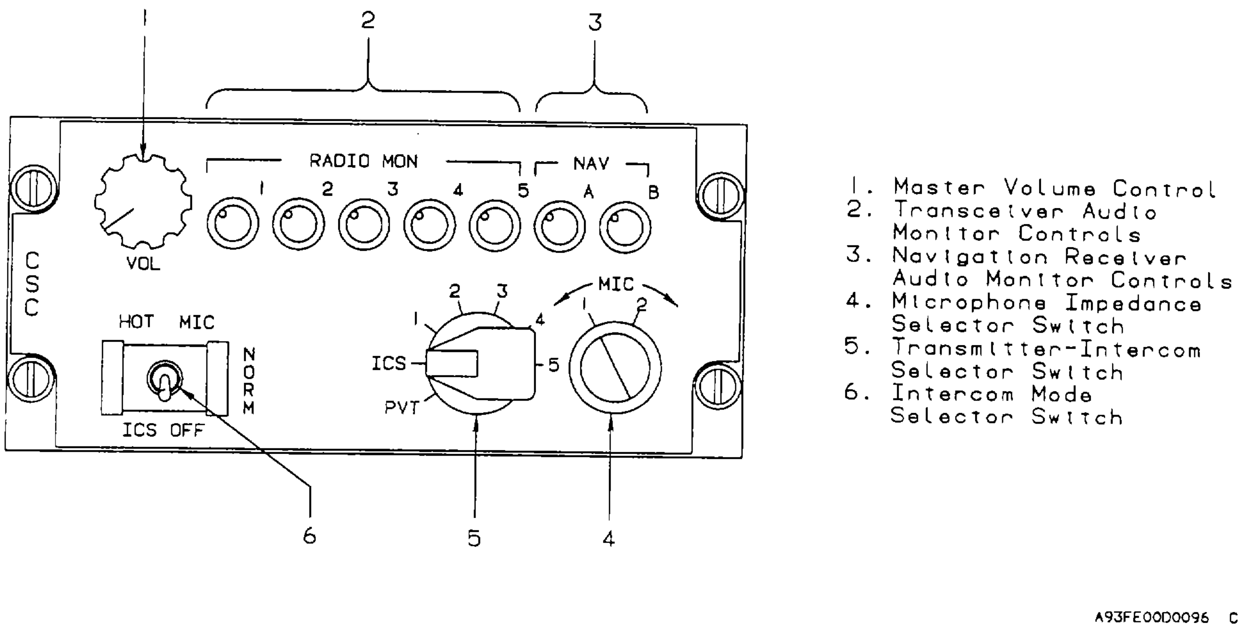


Figure 3-1. Audio Control Panel

c. *Audio Control Panel (fig. 3-1), Controls and Functions*.

(1) *Master volume control*. The master volume control, placarded VOL, controls audio volume to individual headsets.

(2) *Transceiver audio monitor controls.* The transceiver audio monitor controls, placarded RADIO MON, 1 through 5, are used to select which transceiver's received audio will be heard in the pilot's or copilot's respective headset, and its volume. These controls are of the push on, pull off type. Clockwise rotation of a control increases audio volume to headset.

(a) *RADIO MON 1*. Connects user's headset to audio from VHF-AM transceiver number 1.

(b) *RADIO MON 2*. Connects user's headset to audio from VHF-AM transceiver number 2, or VHF-FM (SINCGARS) transceiver, as selected by the FM/AM alternate communication selector switch.

(c) *RADIO MON 3.* Connects user's headset to audio from # 1 UHF transceiver.

(d) *RADIO MON 4.* Connects user's headset to audio from HF or VOW transceivers.

(e) *RADIO MON 5*. Connects user's headset to audio from #2 UHF transceiver (BU VOW).

(3) *Navigation receiver audio monitor controls*. The navigation receiver audio monitor controls, placarded RADIO MON, A and B, are used to select which navigation receiver's audio will be heard in the pilot's or copilot's respective headset, and its volume. These controls are of the push on, pull off type. Clockwise rotation of a control increases audio output to headset

(a) *NAV A*. Connects user's headset to audio from VOR #1, VOR #2, and marker beacon number 1.

(b) *NAV B.* Connects user's headset to audio from TACAN, marker beacon #2, and ADF receivers.

(4) *Microphone impedance selector switch*.

The microphone impedance selector switch, placarded MIC, 1, 2, allows selection of impedance to match micro- phone being used. Select MIC 1 position for 5 ohm micro- phones, and MIC 2 position for 150 ohm microphones.

(5) *Transmitter-intercom selector switch*. The transmitter-intercom selector switch, placarded PVT, ICS, 1 - 5, is used to select which transceiver the microphone is connected to when the user's control wheel microphone.

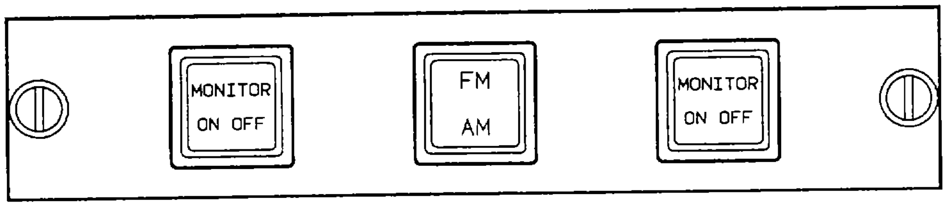


Figure 3-2. VHF-FM IF/AM Alternate Communication Switch Panel

switch is depressed to the second level or the respective cockpit floor microphone switch is depressed, and routes the selected transceiver's received audio to the headset, regardless of the whether transceiver audio monitor control is on or off.

(a) PVT. This position is not used in this installation.

(b) ICS. Selects intercom system. Intercom will be activated when control wheel microphone switch is depressed to the first or second level, or when cockpit floor microphone switch is depressed.

(c) Position 1. Selects VHF-AM #1 transceiver.

(d) Position 2. Selects VHF-FM (SINC-GARS) transceiver or VHF-AM #2 transceiver depending upon the position of the AM/FM alternate communication selector switch (pedestal extension, fig. 2-12).

(e) Position 3. Selects #1 UHF transceiver.

(f) Position 4. Selects HF transceiver or VOW transceiver.

(g) Position 5. Selects #2 UHF transceiver (BU VOW).

(6) Intercom mode selector switch. The three-position intercom mode selector switch, placarded HOT MIC, NORM, ICS OFF, controls the operating mode of the intercom system.

(a) HOT MIC. Microphone will be continuously connected to intercom system except when transmitter-intercom selector switch is set to a transceiver, and control wheel microphone switch is depressed to the second level, or cockpit floor microphone switch is depressed.

(b) NORM. Microphone will be connected to intercom system only when the control wheel microphone switch is depressed to the first level. If the transmitter- selector switch is set to the ICS position, the intercom will also be activated when the control wheel microphone switch is depressed to the second level.

(c) ICS OFF. Deactivates intercom system.

d. Normal Operation.

(1) Turn-on procedure:

1. BATTERY switch (overhead control panel, fig. 2-13) - ON.

2. AVIONICS MASTER POWER switch (overhead control panel fig. 2-13) - ON.

(2) *Receiver operating procedure*:

1. Master VOL control - Adjust as required.

2. Receiver RADIO MON controls (audio control panel, fig. 3-1) - ON and adjust as required.

(3) *Transceiver operating procedure*:

1. Transmitter-intercom selector switch - Set to desired transceiver.

2. MIC selector switch (instrument panel, fig. 2-16) - HEADSET or OXYGEN MASK

3. Control wheel microphone switch - Depress to XM1T (second level), or depress cockpit floor MIC switch to transmit.

(4) *Intercommunication procedure*:

1. MIC selector switch (instrument panel, fig. 2-16) - HEADSET or OXYGEN MASK

2. Intercom mode selector switch (fig. 3-1) - NORM or HOT MIC.

3. If HOT MIC is selected - Speak into microphone.

4. If NORM is selected - Depress control wheel microphone switch to first level (XMIT) and speak into microphone.

e. Shutdown Procedure. AVIONICS MASTER POWER switch - Off.

3-7. UHF TRANSCEIVER (AN/ARC-164, HAVE QUICK II).

a. Description. The UHF transceiver, located on the left equipment rack, is a line-of-sight radio transceiver which provides transmission and reception of amplitude modulated (AM) signals in the ultra high frequency range of 225.000 to 399.975 MHz for a distance range of up to 100 miles. Channel selection is spaced at 0.025 MHz. A separate receiver is incorporated to provide monitoring capability for the UHF guard frequency (243.0 MHz). UHF audio output is applied to the audio panel where it is routed to the headsets. This system provides for secure communications through interfacing with a voice security system. A frequency hopping, or anti-jam mode is also available. The UHF transceiver is powered through a 7.5-ampere circuit breaker placarded UHF, located on the overhead circuit breaker panel (fig. 2-7). The UHF radio can be controlled in either of two ways. Control is selected by means of the 164 STBY/NORMAL switch (pedestal extension, fig. 2-12). When NORMAL is selected, control is by means of the aircraft survivability equipment/avionics control system (ASE/ACS). When STBY is selected, control is by means of the UHF transceiver control panel (fig. 3-3) located on the pedestal extension.

NOTE

The preset channel selector and manual frequency selectors are inoperative when the mode selector switch is set to the GD position. The receiver-transmitter will be set to the emergency frequency only.

b. Standby UHF Control Panel (fig. 3-3), Controls and Functions. This unit provides standby control, when the 164 STBY/NORMAL switch located on the pedestal extension (fig. 2-12) is set to the STBY position.

(1) *T-2-3-A switch*.

(a) *Position T*. The T position is a momentary spring-return position enabling input of time of day (TOD), or for an emergency clock start

(b) *2,3*. The 2 or 3 position may be used to select the 100's digit of the desired frequency in the normal mode, or the 100's digit of the word of day (WOD) element for the anti-jam (AJ) mode, and indicates units digit of frequency (0 through 9) in MHz.

(c) *A*. The A position is used to select the AJ mode of operation.

(2) *Preset channel selector switch*. Selects one of 20 preset channels when mode selector switch is set to PRE

(3) *Tens digit frequency selector knob and indicator.* Selects tens digit of frequency (0 through 9).

(4) *CHAN indicator*. Displays selected preset channel number.

(5) *Units digit frequency selector knob and indicator.* Selects units digit of frequency (0 through 9).

(6) *SET switch*. Activates the circuitry to store the selected frequency in the selected preset channel memory.

(7) *Tenths digit frequency selector knob and indicator.* Selects tenths digit of frequency (0 through 9).

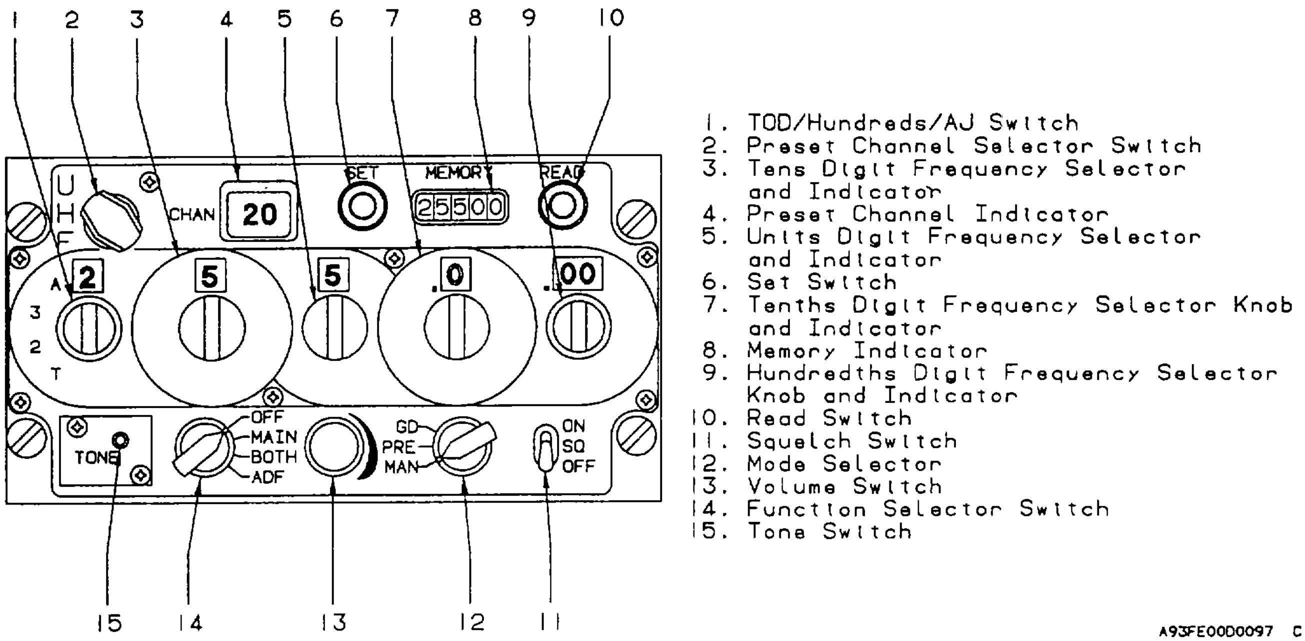


Figure 3-3. UHF Transceiver

(8) MEMORY indicator. Displays the operating frequency when READ switch is depressed.

(9) Hundredths digit frequency selector knob and indicator. Selects hundredths digit of frequency (0 through 9).

(10) READ switch. When depressed, MEMORY indicator will display operating frequency.

(11) Squelch switch. The squelch switch, placarded ON - SQ - OFF, enables and disables squelch circuits of the main receiver.

(12) Mode selector switch. Selects mode of frequency selection.

(a) GD. The main receiver and transmitter are automatically tuned to the guard frequency, and the guard receiver is disabled

(b) PRE. Frequency is selected using the preset channel selector switch. Also used when programming the preset channels.

(c) MAN. Frequency is manually selected using the frequency selector switches.

(13) Volume control. Adjusts audio output volume to headsets.

(14) Function selector switch. Selects operating mode.

(a) OFF. Shuts down equipment

(b) MAIN. Enables main receiver and main transmitter.

(c) BOTH. Enables main receiver, main transmitter, and guard receiver.

(d) ADF. Not used in this installation

(15) TONE switch. Transmits time of day (MOD), followed by a 1020 Hz tone on the selected frequency. When used in conjunction with the T-2-3-A switch, starts the TOD clock When not in the AJ mode, operates as a tone transmission switch only.

c. Standby Operation. Normal operation using the aircraft survivability equipment/ avionics control system (ASE/ACS) is described in chapter 4.

(1) Turn on procedure:

1. AVIONICS MASTER POWER switch (overhead control panel, fig. 2-13) - ON.

2. UHF transceiver 164 STBY/NORMAL switch (pedestal extension, fig. 2-12) - STBY.

3. Function select switch - MAIN or BOTH position, as required.

NOTE

If function selector is at MAIN setting, only the normal UHF communications will be received. If selector is at. BOTH position, emergency communications on the guard channel and normal UHF communications will both be received.

(2) Transceiver operating procedure.

1. Transmitter-intercom selector switch (audio control panel, fig. 3-1) - 3.

2. Microphone switch - Depress to transmit

(3) Preset channel selection.

1. Function selector switch - MAIN.

2. Mode selector switch - PRE

3. Manual frequency selector switches - Set frequency to be placed into memory.

4. Preset channel selector switch - Set desired channel number.

5. SET switch - Depress.

3-8. VOICE SECURITY SYSTEM TSEC/KY-58 (COMPLETE PROVISIONS ONLY).

Complete provisions only are provided for a TSEC/ KY-58 voice security system. This system provides secure (ciphered) two-way voice communications for the pilot and copilot in conjunction with the #1 UHF, VHF-FM (SINC- GARS), and #2 (BU VOW) transceivers. The system will be located in the left equipment rack behind the pilot System circuits are protected by the UHF, VHF-FM, and BU VOW circuit breakers on the overhead circuit breaker panel (fig. 2-7).

3-9. BACK-UP VOICE ORDER WIRE (BU VOW) (AN/ARC-164).

A transceiver identical in type and performance to the UHF transceiver (fig. 3-3) is located on the left equipment rack, to serve as a back-up voice order wire. The transceiver can only be controlled by the ASF/ACS. Standby control is not available. The transceiver is selected on the audio control panel (fig. 3-1) by transmitter-intercom selector switch position number 5 and by radio audio monitor control number 5. This set provides for secure communications through interfacing with a voice security system. The back-up voice order wire set is protected by the 7 1/2- ampere BU VOW circuit breaker in the overhead circuit breaker panel (fig. 2-6). The back-up voice order wire shares an antenna mounted on the aircraft belly with the transponder (fig. 2-1).

3-10. VHF COMMUNICATIONS TRANSCEIVERS (VHF-22B).

a. Introduction. The VHF communications transceivers (fig. 3-4), provide airborne VHF communications on 1360 channels from 118.00 through 151.975 MHz, and are operated by two CIL_22 transceiver control units, located on the pedestal extension (fig. 2-12).

The solid-state transceiver includes capture-effect automatic squelch to help prevent missed radio calls, plus audio leveling and response shaping to insure audio quality. Transmitter sidetone comes from detected transmitter signal, and is therefore a reliable check of transmission quality. Each VHF transceiver is powered through its respective circuit breaker, placarded VHF # 1 or VHF # 2, located on the overhead circuit breaker panel (fig. 2-7).

b. VHF Transceiver Operating Controls (VHF- 22B). All operating controls for the transceivers are located on the CTL22 transceiver control units and on the FMN/AM alternate communication switch panel (pedestal extension, fig. 2-12).

(1) Active frequency display. Displays the active frequency (frequency to which the transceiver is tuned) and diagnostic messages.

(2) Transfer/memory switch. This switch is a three-position spring-loaded toggle switch placarded XFR/ MEM, which when held to the XFR position, causes the preset frequency to be transferred up to the active display and the transceiver to be returned. The previously active frequency will become the new preset frequency and will be displayed in the lower window. When this switch is held to the MEM position, one of the six stacked memory frequencies will be loaded into the preset display. Successive pushes will cycle the six memory frequencies through the display (...2,3,4,5,6,1,2,3...).

(3) Store switch. This switch, placarded STO, allows up to six preset frequencies to be selected and entered into the control unit's memory. After presetting the frequency to be stored, push the STO switch The upper window displays the channel number of available memory (CH 1 through CH 6) while the lower window continues to display the frequency to be stored. For approximately 5 seconds, the MEM switch may be used to advance through

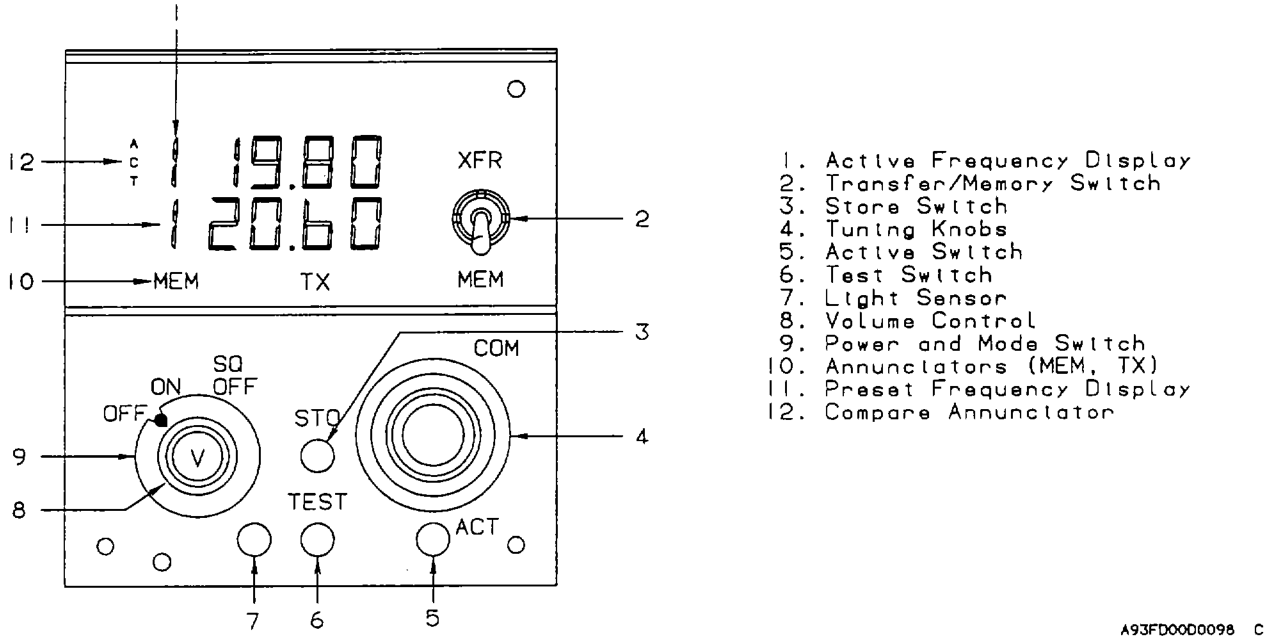


Figure 3-4. VHF Communications Transceiver Control Unit

the channel numbers without changing the preset display. Push the STO switch a second time to commit the preset frequency to memory in the selected location. After approximately 5 seconds, the control will return to normal operation.

(4) Tuning knobs. Two concentric tuning knobs control the preset or active frequency displays. The larger knob changes the three digits to the left of the decimal point in 1-MHz steps. The smaller knob changes the two digits to the right of the decimal point in 50-IkH steps (or in 25-kHz steps for the first two steps after the direction of rotation has been reversed). The numbers will roll over at the upper and lower frequency limits.

(5) Active switch. The active switch, placarded ACT, enables the tuning knobs to directly tune the VHF transceiver, when depressed and held for two seconds. The bottom window will display dashes and the upper window will continue to display the active frequency. Pushing the ACT switch a second time will return the control unit to the normal two-display mode.

(6) Test switch. This switch placarded TEST initiates the transceiver self-test diagnostic routine. (Self-test is active only when the TEST switch is pressed.)

(7) Light sensor. This built-in light sensor automatically controls display brightness.

(8) Volume control. The volume control is concentric with the power and mode switch

(9) Power and mode switch. The power and mode switch contains three detented positions. The ON and OFF positions switch system power. The SQ OFF position disables the receiver squelch circuits.

(10) Annunciators. The transceiver control unit contains a MEM (memory) and a TX (transmit) annunciator. The MEM annunciator illuminates whenever a preset frequency is being displayed in the lower window. The TX annunciator illuminates whenever the transceiver is transmitting.

(11) Preset frequency display. Displays the preset (inactive) frequency and diagnostic messages.

(12) Compare annunciator. An annunciator placarded ACT momentarily illuminates when frequencies are being changed. The ACT annunciator flashes if the actual radio frequency to which the transceiver is tuned is not identical to the frequency shown in the active frequency display.

c. Operating Procedures. The frequencies displayed on the transceiver control unit show only five of the six digits. The sixth digit is always a zero (when the fifth digit is a 0 or 5) or a 5 (when the fifth digit is a 2 or 7), therefore, the sixth digit does not need to be displayed.

NOTE

It is possible that erroneous operation could occur without a fault indication. It is the responsibility of the pilot to detect such an occurrence by continually assessing the reasonableness of operation as displayed on the associated transceiver control unit and by the quality of received signals and transmissions.

(1) Equipment turn-on. The transceiver and the control unit are turned on by rotating the power and mode switch on the transceiver control unit to the ON position. When the transceiver is first turned on it sounds a brief tone while the microprocessor checks its own memory. If there is a memory defect the tone continues, indicating that the transceiver can neither receive nor transmit. After the memory check, the transceiver control unit will display the same active and preset frequencies that were present when the equipment was last turned off.

NOTE

If two short 800-Hz tones are heard, the transceiver has detected an internal fault. Push the TEST switch on the transceiver control unit to initiate self-test and display the fault code.

Adjust the volume and perform a quick squelch test by setting the power and mode switch on the transceiver control unit to SQ OFF and adjusting the volume level with background noise. After a comfortable listening level has been established, return the power and mode switch to the ON position. AU background noise should disappear unless a station or aircraft is transmitting on the active frequency.

(2) Frequency selection. Frequency selection is made using either the frequency select knobs, or the XFRI MEM (transfer/memory recall) switch Rotation of either frequency select knob increases or decreases the frequency in the preset frequency display. The larger, outer knob changes the frequency in 1-MHz increments (the number to the left of decimal point). The smaller, inner knob changes the frequency in 50-kHz increments when first rotated, or in 25-kHz increments for the first two increments after the direction of rotation is reversed.

After the desired frequency is set into the preset frequency display, it can be transferred to the active frequency display by momentarily setting the XFR/MEM switch to XFR. At the same time that the preset frequency is transferred to the active display, the previously active frequency is transferred to the preset display. A short audio tone is applied to the audio system to indicate that the active frequency has been changed, and the active (ACT) annunciator on the control will flash while the transceiver is tuning to the new frequency.

NOTE

The active (ACT) annunciator continuing to flash indicates that the transceiver is not tuned to the frequency displayed in the active display.

The transceiver control unit's memory permits storing up to six preset frequencies. Once stored, these frequencies can be recalled to the preset display by positioning the XFHRMEM switch to the MEM position. The storage location (CH 1 through CH 6) for the recalled frequency is displayed in the active frequency display while the XFR/ MEM switch is held in the MEM position. All six stored frequencies can be displayed one at a time in the preset display by repeatedly positioning the XFRMEM switch to the MEM position. After the desired stored frequency has been recalled to the preset display, it can be transferred to the active display by momentarily positioning the XFR/ MEM switch to the XFR position.

During normal operation, all frequency selections and revisions are done in the preset frequency display. However, the active frequency can be selected directly as described in the following paragraph.

(3) Direct active frequency selection. The active frequency can be selected directly with the frequency select knobs by pushing the ACT switch for about 2 seconds. The active frequency selection mode is indicated by dashes appearing in the preset display. Also, the ACT annunciator will flash as the frequency select knobs are turned to indicate that the transceiver is being returned.

NOTE

The ACT annunciator continuing to flash after the frequency has been selected indicates that the transceiver is not tuned to the frequency displayed in the active display.

To return to the preset frequency selection mode, push the ACT switch again for about 2 seconds. As a safety feature, the transceiver control unit switches to the active frequency selection mode when a frequency select knob is operated while the STO, TEST, or XFR/MEM switches are actuated.

(4) Frequency storage. To program the memory, select the frequency in the preset frequency display using the frequency select knobs and push the STO switch once. One of the channel numbers (CH 1 through CH 6) will; appear in the active display for approximately 5 seconds. During this time the channel number can be changed with- out changing the preset frequency by momentarily positioning the XFR/MEM switch to the MEM position. After

the desired channel number has been selected, push the STO switch again to store the frequency.

NOTE

When storing a frequency, the second actuation of the STO switch must be done within 5 seconds after selecting the channel number or the first actuation of the STO switch. If more than 5 seconds elapse, the control will revert to the normal modes of operation and the second store command will be interpreted as the first store command.

After a frequency has been stored in memory, it will remain there until changed by using the STO switch Memory is retained even when the unit is turned off for an extended period of time.

(5) Stuck microphone switch. Each time the push-to-talk switch is depressed, the microprocessor in the transceiver starts a 2-minute timer. (The TX annunciator on the transceiver control unit will be illuminated whenever the transmitter is transmitting.) If the transmitter is still transmitting at the end of 2 minutes, the microprocessor turns it off. Most intentional transmissions last much less than 1 minute;, a 2-minute transmission is most likely the result of a stuck microphone switch. This timing feature protects the ATC channel from long-term interference.

When it turns off the transmitter, the microprocessor switches the transceiver to receive operation. A stuck microphone switch will prevent you from hearing received signals, or the two warning beeps. The microprocessor then waits until the push-to-talk switch opens to sound the two beeps.

To transmit for more than 2 minutes, release the micro- phone switch briefly and then press it again. The 2-minute timer resets and starts a new count each time the micro- phone switch is pressed.

(6) Over-temperature protection. The microprocessor regularly monitors the temperature of the transmitter. If the transmitter gets too hot during a transmission, the microprocessor will stop the transmission, and the sidetone will cease. When the microphone switch is released, you will hear two beeps. (Press the TEST switch on the transceiver control unit to observe the fault code.) As long as the temperature remains above the limit, the microprocessor will not respond to a normal push of the microphone switch. If you must transmit, however, you can override the protection by rapidly keying the microphone switch twice, holding it on the second push. The shutdown temperature is 160°C (320°F).

(7) Self-test. An extensive self-test diagnostic routine can be initiated in the transceiver by pushing the TEST switch on the transceiver control unit. The control unit will modulate the active and preset display intensity from minimum to maximum to annunciate that self-test is in progress. Several audio tones will be heard from the audio system while the self-test routine is being executed. At the completion of the self-test program, the transceiver control unit will usually display dashes in the active display, and 00 in the preset display. This indicates normal operation. If any out-of-limit condition is found, transceiver control unit will display DIAG (diagnostic) in the active display and a 2-digit fault code in the preset display. Record any fault codes displayed to help the service technician locate the problem. Refer to table 3-1 for a description of the self-test fault codes that can be displayed on the transceiver control unit (The TEST switch must be pushed before any fault code can be displayed.)

3-11. HF COMMUNICATIONS TRANSCEIVER (KHF-950).

a. Description. The HF communications transceiver (fig. 3-5), provides long-range voice communications within the frequency range of 2.0000 to 29.9999 MHz (280,000 possible frequencies). The unit can employ either amplitude modulation (AM) or upper sideband (USB) modulation. (Lower sideband (LSB) modulation has not been enabled in this installation.) The HF system consists of a control display unit located on the pedestal extension, a receiver/exciter, a power amplifier/antenna coupler, a bus adapter, and an antenna. The system is powered through a 25-ampere circuit breaker placarded HF PWR and a 5-ampere circuit breaker placarded HF RCV, located on the overhead circuit breaker panel (fig. 2-7).

b. HF Transceiver Control-Display Unit Controls and Functions.

(1) Digital display. The digital display provides frequency, mode, and operational status information. The upper area of the display shows a two digit channel number when in the program mode, followed by a dash and the first one or two digits of the operating frequency (with the emission mode selector switch set to the USB or AM position). Transmitter operation (X) is shown at the right end of this display. The lower line of the display shows the last four digits of the operating frequency (with the emission mode selector switch set to the USB or AM position).

(2) Light sensor. A light sensor located to the right of the display senses ambient light conditions and adjusts display brightness accordingly.

(3) Store switch. A momentary push button switch placarded STO, is used to store in memory the displayed data when programming preset channels. When the

Table 3-1. VHF Communications Transceiver Fault Codes

CODE	INTERPRETATION
00	No fault found
01	5 V dc below limit
02	5 V dc above limit
03	12 V dc below limit
04	12 V dc above limit
05	Synthesizer not locked
07	Noise squelch open without signal
08	Noise squelch not open with signal
12	BCD frequency code invalid
13	2-out-of-5 frequency code invalid
14	Serial message invalid
15	Frequency out of range
16	Forward power below limit
17	Transmitter temperature excessive
21	Tuning voltage out of limit at highest receive frequency
22	Tuning voltage out of limit at 118 MHz
23	Local oscillator output below limit
24	No-signal AGC voltage too high
25	Inadequate AGC voltage increase with RF signal
26	Reflected RF power above limit
27	Transmitter timed out

BT03838

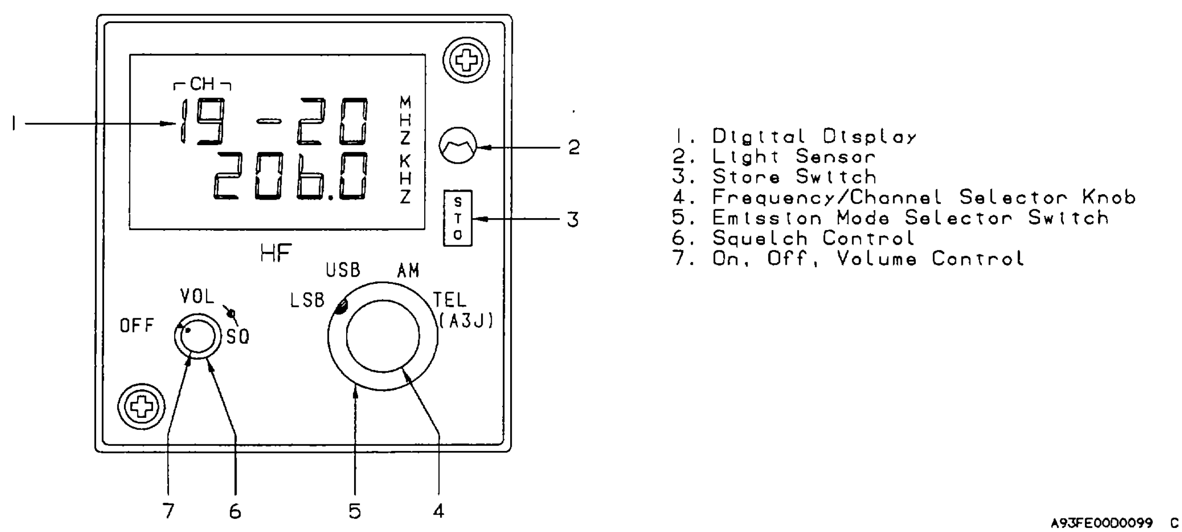


Figure 3-5. HF Communications Transceiver Control Unit

STO switch is pressed simultaneously with a microphone transmit switch, a 1000 Hz operator attention tone will be transmitted (required by some Canadian radiotelephone stations).

(4) *Frequency/channel selector knob.* The frequency/channel selector knob (inner concentric with the

emission mode selector switch) allows the pilot to set channels and frequencies, and serves as a clarifier control in sideband mode. Depressing the control knob causes the flashing cursor on the display to move to the digit that the pilot desires to change. Each time the control is depressed, the cursor moves forward to the next digit. The digit at the cursor position is changed by rotating the channel/ frequency selector knob.

(5) Emission mode selector switch. The emission mode switch, placarded LSB, USB, AM, and TEL (A3J) (concentric with the frequency/selector knob) is used to select the operating mode of the HF transceiver.

(6) Squelch control. A knob placarded SQ (outer concentric with the off/volume control knob) provides a variable squelch threshold control. This control is used to help reduce background noise when a signal is not being received

(7) On, off, volume control. A knob placarded OFF, VOL (inner concentric with the squelch knob) is used to turn the transceiver on and off, and adjust volume. Clockwise rotation from the detent applies power to the system. Further clockwise rotation increases audio output level.

c. Frequency Selection. The HF system has two methods of frequency selection: direct tuning mode and channel mode.

(1) Direct tuning mode. In the direct tuning mode the desired frequency is set into the display using the frequency/channel selector knob, and stored in memory. Only simplex operation is allowed while operating in the direct tuning mode.

(2) Channel mode. When the HF control unit is in the channel mode, channels and their respective frequencies are changed using the frequency/channel selector knob. Frequencies in the channel mode are stored with channel number, emission mode (USB or AM), and transmit and receive frequency.

(a) Simplex operation. The operator programs the same frequency for receive and transmit The simplex function is used by air traffic control, ARINC, and others.

(b) Semi-duplex. In semi-duplex operation the operator programs two different frequencies, one for transmit and one for receive. The semi-duplex function is used by maritime radiotelephone network (public correspondence) stations.

d. HF Communications Transceiver Operation.

(1) Direct frequency tuning operation (simplex only).

1. Emission mode selector switch - USB or AM.
2. Frequency/channel selector switch - Turn knob until a flashing 0 appears in the display. HF system is now in direct tuning mode.
3. Frequency/channel selector switch - Depress repeatedly until cursor is at digit to be changed.

NOTE

The first one or two digits (MHz) of the frequency are shown on the upper right portion of the display, while the last four digits l) of the frequency are displayed on the bottom of the display.

4. Frequency/channel selector switch - Turn knob until desired number has been selected The 0 in channel display will become blank
5. Continue moving cursor and changing digits until desired frequency appears in display.
6. Frequency/channel selector switch - Stow cursor by depressing repeatedly until no digit is left flashing.

NOTE

Keying the microphone momentarily will also stow the cursor.

7. Antenna coupler - Tune by keying radio momentarily. During antenna coupler tuning process, IX on display will flash and frequency numbers will be blank
8. When TX annunciator stops flashing and frequency reappears, antenna tuning cycle is complete and radio is ready to transmit on the selected frequency.

NOTE

Always key the radio after selecting a new frequency to initiate antenna tuning. Otherwise poor reception or failure to hear a ground station which is calling you may be experienced.

(2) Programming simplex preset channels.

1. Emission mode selector switch - USB or AM

2. Frequency/channel selector switch - Depress repeatedly until channel number is flashing.

3. Frequency/channel selector switch - Twist to select desired channel number. Previously programmed receive frequency associated with that channel number will appear in display.

4. Frequency/channel selector switch - Depress repeatedly until cursor is at digit to be changed.

NOTE

The first one or two digits (MHz) of the frequency are shown on the upper right portion of the display, while the last four digits (dl) of the frequency are displayed on the bottom of the display.

5. Frequency/channel selector switch - Twist knob until desired number has been selected. A flashing dash will appear to right of channel number to indicate that transceiver is in program mode.

6. Continue moving cursor and changing digits until desired frequency appears in display.

NOTE

The program mode may be exited at any time and the previously stored frequency returned by keying the microphone.

7. Store switch - Depress to store frequency in receive portion of memory. TX annunciator will flash to indicate that memory is ready to receive transmit frequency.

8. Store switch - Depress a second time to store frequency in the transmit portion of the memory if entering a simplex frequency.

9. If entering a semi-duplex frequency, use frequency/channel selector switch to set transmit frequency in display.

10. Store switch - Depress to enter transmit frequency into memory. Cursor will stow and flashing dash will disappear to indicate that HF control-display unit is no longer in program mode.

11. Antenna coupler - Tune by keying radio momentarily. During antenna coupler tuning process, TX on display will flash and frequency numbers will be blank.

12. When TX annunciator stops flashing and frequency reappears, antenna tuning cycle is complete and transceiver is ready to transmit on the selected frequency.

NOTE

Always key radio after selecting a new frequency to initiate antenna tuning. Otherwise poor reception or failure to hear a ground station which is calling you may be experienced.

(3) Programming semi-duplex preset channels.

1. Emission mode selector switch - USB or AM.

2. Frequency/channel selector switch - Depress repeatedly until channel number is flashing.

3. Frequency/channel selector switch - Twist to select desired channel number. Previously programmed receive frequency associated with that channel number will appear in the display.

4. Frequency/channel selector switch - Depress repeatedly until cursor is at the digit to be changed.

NOTE

The first one or two digits (MHz) of the frequency are shown on the upper right portion of the display, while the last four digits (kHz) of the frequency are displayed on the bottom of the display.

5. Frequency/channel selector switch - Twist knob until desired number has been selected A flashing dash will appear to right of channel number to indicate that transceiver is in program mode.

6. Continue moving cursor and changing digits until desired frequency appears in display.

NOTE

The program mode may be exited at any time and the previously stored frequency returned by keying the microphone.

7. Store switch - Depress to store frequency in receive portion of memory. TX annunciator will flash to indicate that memory is ready to receive transmit frequency.

8. Frequency/channel selector switch - Depress repeatedly until cursor is at the digit to be changed.

NOTE

The first one or two digits (MHz) of the frequency are shown on the upper right portion of the display, while the last four digits (kHz) of frequency are displayed on bottom of display.

9. Frequency/channel selector switch - Turn knob until desired number has been selected A flashing dash will appear to right of channel number to indicate that transceiver is in program mode.

10. Continue moving cursor and changing digits until desired transmit frequency appears in display.

NOTE

The program mode may be exited at any time and the previously stored frequency returned by keying the microphone.

11. Store switch - Depress a second time to store frequency in transmit portion of memory. Cursor will stow and flashing dash will disappear to indicate that HF control-display unit is no longer in program mode.

12. Antenna coupler - Tune by keying radio momentarily. During antenna coupler tuning process, TX on display will flash and frequency numbers will be blank.

13. When TX annunciator stops flashing and frequency reappears, antenna tuning cycle is complete and transceiver is ready to transmit on selected frequency.

e. Clarifier Operation. A clarifier function is provided by the control-display unit which allows the operator to make small adjustments to the receive frequency when operating in the channel mode (simplex or semi-duplex) in the USB mode. The clarifier is not normally used in the AM mode and cannot be used with the emission mode selector switch in the A3J position

The clarifier helps eliminate unnatural sounds associated with SSB transmission as a result of off-frequency ground station transmissions. Operate clarifier as follows:

1. Frequency/channel selector switch - Depress repeatedly until last digit of receive frequency is flashing.

2. Frequency/channel selector switch - Rotate to increase or decrease last digit of receive frequency by one increment

3. Received audio quality - Monitor. If reception does not improve sufficiently, try additional changes in last digit.

NOTE

If transmission is made while using clarifier, transmission will be on the originally selected frequency. The dash to the right of the channel number will not flash and the transceiver will not be in the program mode.

4. To exit clarifier mode, depress store switch or return last digit to original frequency selection.

f. Maritime Radiotelephone Network Channel

Operation. The memory of the control-display unit has all 176 ITU (International Telecommunications Union) public correspondence channels programmed permanently into its memory. Operation in this mode is as follows:

1. Emission mode selector switch - A3J.

2. Frequency/channel selector switch - Depress repeatedly until channel number is flashing.

3. Frequency/channel selector switch - Turn to select desired channel number.

4. Frequency/channel selector switch - Depress repeatedly until cursor is at digit to be changed

5. Frequency/channel selector switch - Turn knob until desired number has been selected.

NOTE

There are only two cursor positions for the ITU channel number. The hundreds position also controls the thousands position. For example, if the displayed channel number is 1204, the cursor could be moved to the 12 but not the 1. With the cursor in the 12 position, turning the frequency/channel selector one step counter-clockwise will change the 12 to an 8, while another step in the same direction will change 8 to a 6. This is consistent with the actual channel numbers.

6. Antenna coupler - Tune by keying radio momentarily. During antenna coupler tuning process, TX on display will flash and frequency numbers will be blank

7. When TX annunciator stops flashing and frequency reappears, antenna tuning cycle is complete and transceiver is ready to transmit on selected frequency.

NOTE

Always key the microphone after selecting a new frequency to initiate antenna tuning. Otherwise poor reception or failure to hear a ground station which is calling you may be experienced.

Before keying the microphone to talk, you should depress the store (STO) switch momentarily. This will allow you to listen on the transmit frequency to see if another aircraft is calling the same ground station.

Some Canadian public correspondence stations require the reception of a 1,000 Hz signal from an aircraft calling the station before it will answer. This signal may be sent by keying the radio and then simultaneously depressing the store (STO) switch.

3-12. VHF-FM TRANSCEIVER (AN/ARC-201A(V), SINCGARS.

a. Description. The single channel ground and airborne radio system (SINCGARS, AN/ARC-201(V)) provides VHF-FM radio communications. The frequency range is 30 to 87.975 MHz. The system provides for secure communications through interfacing with a voice security system. The system is protected by a 10-ampere circuit breaker placarded FM, located on the overhead circuit breaker panel (fig. 2-7).

Control of the VHF-FM transceiver is provided by the aircraft survivability equipment/avionics control system (ASE/ACS).

b. Normal Operation.

NOTE

Some operations in the VHF-FM transceiver require several seconds to accomplish. While these operations are active, the TUNING legend (multifunction display, fig. 4-2), will be displayed and some bezel buttons will become inactive until tuning is complete.

(1) Turn-on Procedure.

1. BATTERY switch (overhead control panel, fig. 2-13) - ON.
2. AVIONICS MASTER POWER switch (overhead control panel, fig. 2-13) - ON.
3. Transmitter-intercom selector switch (audio control panel, fig. 3-1) - 2.
4. FM/AM alternate communication selector switch (pedestal extension, fig. 2-12) - As required.
5. D mode selector switch (multifunction display, fig. 4-2) - Depress to select COMM control page.

NOTE

On power-up, the transceiver is put into the self-test mode for approximately 30 seconds. During this period, the legend TUNING is displayed adjacent to L1 on the COMM control page and at the top center of this page and the transceiver will not respond to operator inputs.

(2) COMM control page. The COMM control page shows the status of the VHF-FM and has a frequency list. Radio name, mode of operation, selected channel and frequency (or hopset number/AJ NET number), and plain/cipher indications are presented. Two arrows indicate which transceiver each pilot has selected with the transmitter-intercom selector switch (audio control panel, fig. 3-1).

NOT INST - The aircraft is configured for the equipment but it is not installed.

FAIL - The equipment has failed.

Blank - No legend at the bezel switch indicates that the aircraft is not configured for the equipment.

NOTE

The following definitions apply to the legend adjacent to the bezel switches:

If L1 line selection switch is depressed with the scratchpad empty:

The FM frequency list will be displayed in the box in the center of the multifunction display (MFD).

The HOPSET/LOCKSET list will be displayed in the box in the center of the MFD if the frequency hopping mode is active.

The legend at R4 will change to FM FREQ.

The legend at R5 will change to 2-FM SETUP.

If the VHF-FM transceiver is in the single channel mode and valid data is scratchpadded, depressing L1 will cause the transceiver to be returned and the display at L1 to be updated to reflect the scratchpadded data. Valid data is:

A channel (1 through 20, or C or E).

A frequency (30,000 to 87.975 with leading and trailing zeroes and decimal points optional).

An identifier (1 through 6 alphanumeric characters, beginning with an alpha but excluding E, C, C plus 1 through 6, and P).

Identifiers are valid only if they exist in the frequency list.

If the VHF-FM is in the frequency hopping mode and valid data is scratchpadded, depressing L1 will cause the transceiver to be returned and the display at L1 to be updated to reflect the scratchpadded data. Valid data is:

A HOPSET channel (0 through 6 or an M).

A HOPSET number (3 digit number).

An identifier (1 through 6 alphanumeric characters, beginning with an alpha but excluding E, C, C plus 1 through 6).

HOPSET and identifier entries are valid only if they exist in the hopset list.

NOTE

Hopset channel 0 is processed and displayed as an M channel.

1 *Displayed data at L1.* The first line of text at L1 is 2-FM followed by an ICS select arrow if the radio has been selected by the transmitter-intercom selector switch (audio control panel, fig. 3-1). The text CIPH and a fill number is displayed to the right of the ICS select arrow if the cipher mode has been selected.

The second line of text at L1 can read:

Channel number/frequency followed by an optional identifier.

E (for emergency)/1 followed by 40.5, followed by an optional identifier.

Net channel number/followed by a FH followed by the net number in the frequency hopping mode.

M/ followed by a frequency if the radio is tuned to a frequency list or if the cipher fill number/status is changed after the radio is tuned.

The third line of text (L1) may contain one of the following messages in the following priority:

FAIL - The radio has failed one of several test.

EMER - The emergency tune function has been selected using the KU EMER switch.

TUNING - The ARC-201 is tuning and L1 is inoperative.

NO TSEC - The FH or FH/M mode is selected and a TSEC variable has not been stored into permanent memory.

(3) 2-FM SETUP page. The 2-FM SETUP page allows the operator to set up the VHF-FM transceiver. On power-up, the transceiver is put into the self-test mode for approximately 30 seconds. During this period, the legend TUNING is displayed adjacent to L1 on the COMM control page and at the top center of this page and the transceiver will not respond to operator inputs.

(a) SC (single channel) mode. The data at the top center of the page is:

Top line - 2-FM SETUP

Second line - Currently tuned preset channel, frequency, and plain/cipher indication plus identifier

Third line - FAIL, EMER, or TUNING if appropriate

1 *L1.* Successive depressions of L1 will cause the mode to change from SC to FH to FH/M, with the active mode boxed.

2 *L5.* In SC mode, this function is a normal clock function.

If the scratchpad is blank, depressing R5 will change the display of time stored in the transceiver. If time is not available from the transceiver, the display remains blank. If valid data is scratchpadded, the data will be displayed adjacent to L5 and sent to the transceiver.

Valid time data is day (0 through 99), hours (0 through 23), and minutes (0 through 59). Data fields not entered are considered zero.

3 *R1.* Successive depressions of R1 will change the squelch from OFF to ON, with the active mode boxed.

4 *R2.* Successive depressions of R2 will cause the frequency offset for the selected preset channel to change from 0 to +5 to +10 to -10 to -5, with the active offset boxed. The offset selected for a preset channel is stored with that preset channel.

NOTE

When the EMER switch on the keyboard unit (KU) is activated, 40.5 MHz is tuned, squelch is set to ON, and the function keys on the 2-FM AM/FM page are disabled.

(b) FH (frequency hopping mode). This mode is the member versus master/controller mode of the frequency hopping mode of the VHF-FM transceiver. The data at the top center of the page is:

Top line - 2-FM SETUP.

Second line - The currently selected FH channel, the text NET, and the NET number.

Third line - Displays FAIL, EMER, TUNING, or NO TSEC if appropriate.

The display formats vary somewhat depending upon whether the aircraft is on the ground or in the air.

1 On the ground.

a L1. Second depressions of L1 will cause the mode to change from SC to FH to FH/M, with the active mode boxed.

NOTE

If a TRANSEC variable has not been loaded, the text NO TSEC appears on the third line of text at the top center of the display.

b L2. The ERF RCV key is used to initiate reception of frequency hopping data from the NET controller's radio. The received data is then stored in the member radio. Depressing L2 causes the legend to be boxed. If an ERF is received while the ERF RCV mode is active, the text at L2 will STORE HSET or STORE LSET, followed by the HSET or LSET data that was received. Depressing L2 will store the LSET in its channel or the HSET data in the channel entered in the scratchpad (valid entry is 1 through 6) and added to the HSET/ LSET list. If the received data is bad, the text BAD is displayed next to L2. If the retrieval/storage of data is unsuccessful for some other reason, the text ERROR is displayed.

c L3. Function key L3 of the 2-FM SETUP page (FH format) is the HSET TUNE function key. This function key allows tuning of a hopset while on the 2-FM SETUP page. Pressing L3 to be tuned to the entered channel. If a channel number is entered which entered which does not contain a valid hopset and L3 is pressed, a scratchpad error will occur.

NOTE

The displayed HSET channel is the one that is used for LATE ENTRY.

d L4. The LSET CH key is used to display lockset data associated with a particular LSET channel. If the scratchpad is empty, depressing L4 will cause the current displayed LSET channel and code to be blanked from the display. If a valid LSET channel is scratchpadded, depressing L4 will cause the scratchpadded channel and its LSET code to be displayed. Valid LSET channels are 1 through 6. Other possible messages are ERROR and NO LSET (no LSET loaded for that channel).

e L5. In FH mode, this function is used to time FH operations. If the scratchpad is blank, depressing R5 will change the display of time stored in the transceiver. If time is not available from the transceiver, the display remains blank. If valid data is scratchpadded, the data will be displayed adjacent to L5 and sent to the transceiver. Valid time data is day (0 through 99), hours (0 through 23), and minutes (0 through 59). Data fields not entered are considered zero.

f R1. Depressing R1 will cause the legend at R1 to be boxed and the transceiver to be put into the LATE NET E (entry) mode. The LATE NET mode can be used to resynchronize the radio to a net if communication has been lost to drifting of the clock.

g R3. The function key R3 of the 2-FM SETUP page (FH format) is the CLEAR function key. Pressing R# with a valid hopset (1-6) or lockset (L1-L8) channel number in the scratchpad will cause the associated hopset or lockset to be cleared from the radio.

h Deleted.

i Deleted.

NOTE

The legend TSEC STORE at R2 is displayed only if the TSEC variable is stored in holding memory.

If a TSEC variable is successfully stored into permanent memory, the text NO TSEC will be removed from the display.

j R5. R5 is used to store hopsets and locksets from a fill device into the transceiver. When depressed, the legend at R5 will be boxed and will load the HSET or LSET channel entered into the scratchpad with the data from the fill device. Valid HSET entries are 1 through 6 or H1 through H6. Valid LSET entries are L1 through L6 or the single character L. ERROR or BAD can be displayed for unsuccessful or bad fill attempts.

2 In the air. The legend at R4 and R5 will be blanked in the air because the TSEC FILL and FILL function is only available when the aircraft is on the ground.

(c) FH/M (frequency hopping - master mode). This mode is the master/controller versus the member mode of the frequency hopping mode of the VHF-FM transceiver. The data at the top center of the page is:

Top line - 2-FM SETUP.

Second line - the currently selected FH channel; and the text NET and the net number.

Third line - CONTROL or CONTROL/NO TSEC, but can read FAIL, EMER, or TUNING if appropriate. The display formats vary somewhat depending upon whether the aircraft is on the ground or in the air.

1 On the ground.

a L1. Successive depressions of L1 will cause the mode to change from SC to FH to FH/M, with the active mode boxed.

The differences between the FH/M and FH mode display formats are:.

FH/M mode - L2 allows the operator to send (versus receive) frequency hopping data.

R1 (LATE NET) - Blanked.

NOTE

If a TRANSEC variable has not been loaded, the text NO TSEC will appear on the third line of text at the top center of the display.

b L2. The ERF SEND key is used to initiate transmission of frequency hopping data from the NET controller's radio. When data is in the scratchpad and L2 is depressed, the text SENDING HSET CH X or SENDING LSET CH X (where X is the HSET or LSET channel in the scratchpad) is displayed. Valid scratchpad data is 1 through 6, H1 through H6, or L1 through L8. The sending legend is displayed for 12 seconds or until the radio has finished sending.

2 In the air. The on-ground and in-air display formats for the FH/M mode are the same except that the legends TSEC FILL (R4) and FILL (R5) keys are blanked (these functions are not available in flight).

c. FM FREQ List Page. The FM frequency list page is accessed by depressing R4 on the COMM control page when FM FREQ is displayed at R4. This page is used to enter/delete preset frequencies and hopsets/locksets for the VHF-FM transceiver. On power-up, all the data displayed in the frequency list box (right side of the display) at shutdown is recalled, and the hopset/lockset information stored in the radio is recalled and displayed in the hopset/lockset box (left side of the display). Leading zeroes and zeroes in the hundredths and thousandths position are not displayed.

(1) EDIT HSET. This key allows the net controller to change/create hopsets. Scratchpadding valid data and depressing L1 will cause the legend at L1 to be boxed. When the scratchpadded data has successfully been entered into the hopset list, the box around the legend at L1 will be removed.

NOTE

If the HSET EDIT is unsuccessful, the text ERROR will temporarily replace the channel identifier until another bezel switch is depressed.

Valid data consists of a valid hopset (HSET) channel (0 through 6 or an M) followed by a valid HSET code (2 digit numbers from 0 through 99 or 3 digit numbers with the first digit being the same as the first digit of the hopset code in the currently selected channel), and/or a valid plain/cipher command (a P or a space or C plus a 1 through 6) and/or a valid identifier (1 through 6 alphanumeric characters, beginning with an alpha but excluding E, C, C plus 1 through 6, and P).

(2) DEL HSET. This key provides a means for deleting hopsets. Scratchpadding valid data and depressing L2 will cause the legend at L2 to be boxed and the hopset,

plain/cipher mode and fill data and identifier to be deleted. When the scratchpadded channel's data has been successfully deleted, the box around the legend at L2 will be removed.

Valid data consists of a valid hopset (HSET) channel (0 through 6 or an M).

NOTE

Several channels can be deleted by scratchpadding several channel numbers with a space between them. Scratchpadding 1 4 and pressing L2 causes data in channels 1 and 4 to be deleted. Scratchpadding 1-4 and pressing L2 causes data in channels 1 thru 4 to be deleted.

(3) DEL LSET. This key provides a means for deleting locksets. Scratchpadding valid data and pressing L3 causes the legend at L3 to be boxed and the hopset, plain/ciph mode and fill data and identifier to be deleted. When the scratchpadded channel's data has successfully been deleted, the box around the legend at L3 is removed. Valid data consists of a valid lockset (LSET) channel (1-8).

NOTE

Several channels can be deleted at once by scratchpadding several channel numbers with a space between them. Scratchpadding 1 4 and depressing L3 will cause data in channels 1 and 4 to be deleted. Scratchpadding 1-4 and depressing L3 will cause data in channels 1 through 4 inclusive to be deleted.

(4) ADD. When the VHF-FM transceiver is in the single channel mode, this key is used to add information to the single channel frequency list. Scratchpadding valid data and depressing R1 will cause the scratchpadded data to be entered into the frequency list.

Valid data consists of a valid channel (1 through 20 or C or E) followed by a valid frequency (30.000 through 87.975 with leading and trailing zeroes and decimal points optional) and/or a valid plain/cipher command (a P or a space or C plus a 1 through 6) and/or a valid identifier (1 through 6 alphanumeric characters, beginning with an alpha but excluding, E, C, C plus 1 through 6, and P).

(5) DEL. This key is used to delete channel (preset) data from the frequency list. Scratchpadding valid data and depressing R2 will cause the frequency, plain/cipher mode and fill data, and identifier for the scratchpadded channels to be deleted.

Valid channels for the VHF-FM transceiver are 1 through 20 or C or E.

NOTE

Several channels can be deleted at once by scratchpadding several channel numbers with a space between them. Scratchpadding 1 4 and depressing R2 will cause data channels 1 and 4 to be deleted. Scratchpadding 1-4 and depressing R2 will cause data in channels 1 through 4 inclusive to be deleted.

3-13. EMERGENCY LOCATOR TRANSMITTER (ELT 110-4).

a. Description. An automatic or manually activated emergency locator transmitter (ELT, fig. 3-6), is located in the left side of the aft fuselage. The associated antenna is mounted on top of the aft fuselage. An access hole with spring-loaded cover is located in the fuselage skin adjacent to the transmitter, enabling a downed pilot to manually initiate or terminate operation, or reset the ELT to an armed mode. The transmitter contains a G switch which automatically activates the transmitter following a velocity change of 3.5 feet per second. When activated, the ELT will radiate omni-directional radio frequency signals on the international distress frequencies of 121.5 and 243.0 MHz. The radiated signal is modulated with an audio swept tone. Internal batteries provide transmitter operation for a minimum of 50 hours at -20˚C.

b. Remote Switch and Functions. The remote switch is accessible through a small (finger-size) spring loaded door, located on the left side of the aft fuselage. The remote switch is placarded ON - ARMED/RESET.

(1) ON. Initiates emergency signal transmissions for test or for emergency purposes.

(2) ARMED/RESET. Used to ARM the ELT or reset it after an accidental activation.

c. Normal Operation. During normal operation the remote switch is in the down (ARMED/RESET) position.

d. Emergency Operation. The ELT may be manually activated by moving the remote switch to the up (ON) position.

e. Resetting the ELT. If the ELT is activated accidently it will need to be reset. Do this by moving the remote switch up to the ON position and holding it there for one second, then immediately rocking it down to the ARMED/RESET position, then releasing the switch.

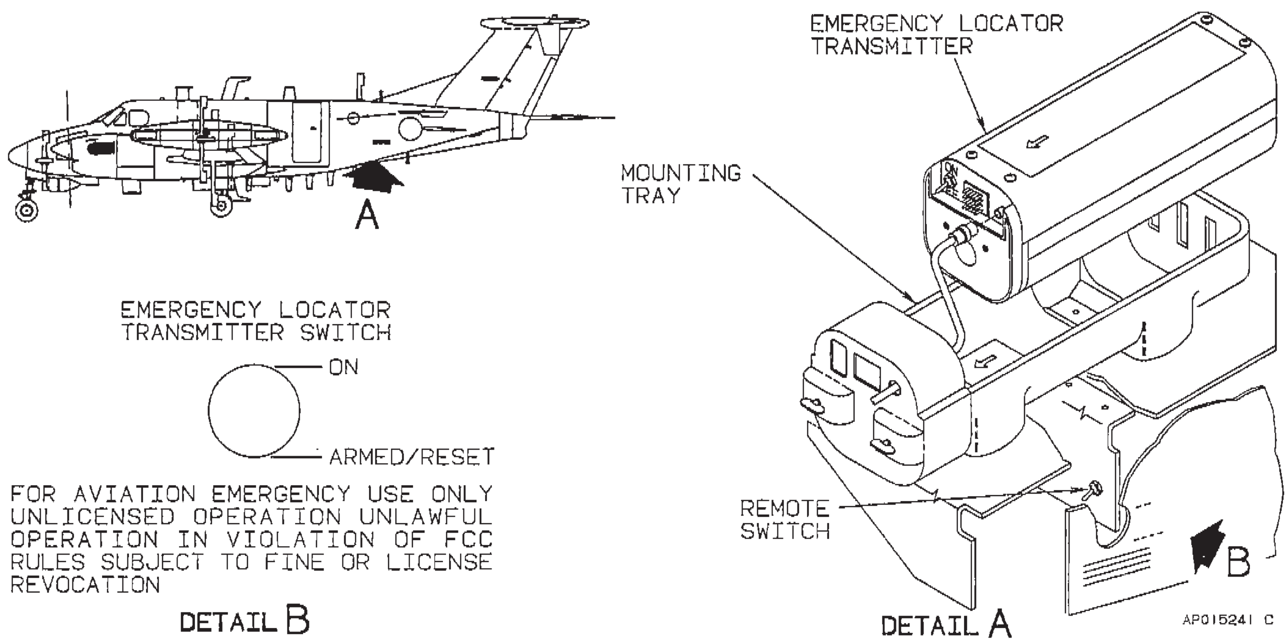


Figure 3-6. Emergency Locator Transmitter

Section III. NAVIGATION

3-14. NAVIGATION EQUIPMENT GROUP DESCRIPTION.

The navigation equipment group provides the pilot and copilot with instrumentation required to establish and maintain an accurate flight course and position, and to make an approach on instruments under Instrument Meteorological Conditions (IMC). The navigation configuration includes equipment for determining attitude, position, destination range and bearing, heading reference, and groundspeed.

3-15. DIGITAL INTEGRATED FLIGHT CONTROL SYSTEM (SPZ-4500).

The digital integrated flight control system (fig. 3-7), provides flight director guidance, autopilot, yaw damper, and trim functions.

The digital integrated flight control system is an integrated fail passive autopilot/flight director/air data system which has a full complement of horizontal and vertical flight guidance modes:

Radio guidance modes

Inertial navigation system tracking

Air data oriented vertical modes

The pilot can couple either the left or right electronic flight instrument system (EFIS) to the single automatic flight control system for control of the aircraft.

The flight control computer provides digital processing of heading, navigation, and air data information to satisfy the pilot's requirements. The data is presented to the pilots on the altitude indicator and the electronic flight instrument systems (EFIS).

The flight control system displays heading, course, radio bearing, pitch and roll attitude, barometric altitude, selected alert altitude, radio altitude, short and long range navigation, course deviation, glideslope deviation, to-from indication, TACAN distance and course indications, and VOR-DME distance information. Display of weather radar and lightning sensor system information on the electronic horizontal situation indicators (EHSI) is also provided.

Lighted annunciators denote selected flight mode, altitude alert, decision height, and go-around mode (on EADI's only) engagement. Pitch and roll steering commands are displayed on the electronic attitude director indicators (EADI).

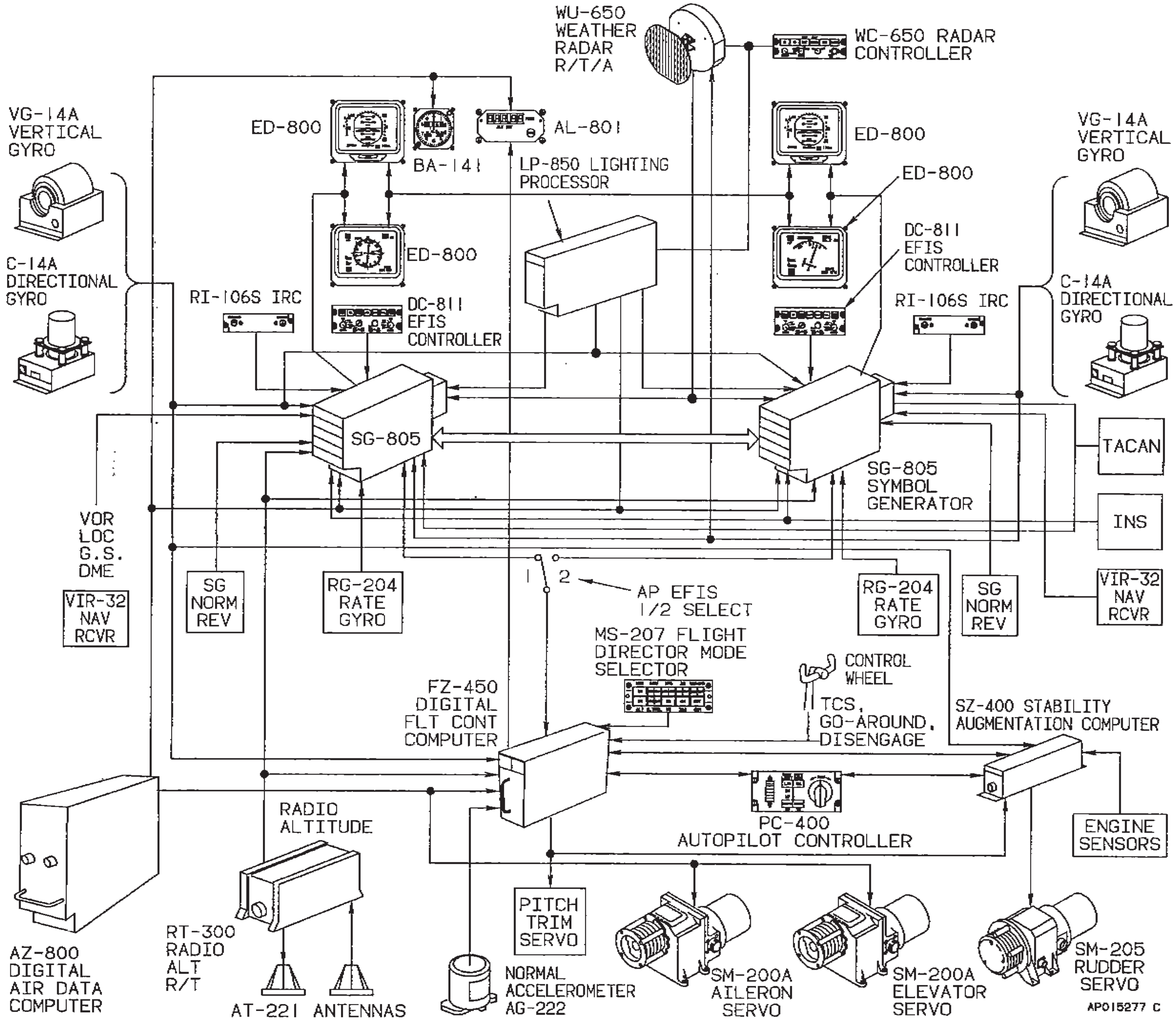


Figure 3-7. Integrated Flight Control System Block Diagram

The pilot's and copilot's symbol generators are the focal point of information flow in the systems. The symbol generator converts information to video and deflection formats required by the EADI and EHSI displays, and provides analog steering information to the flight director/autopilot interfaces.

When engaged and coupled to the flight director commands, the digital integrated flight control system will control the aircraft using the same commands displayed on the EADI. When engaged and not coupled to the flight director commands, manual pitch and roll commands may be inserted using the touch control steering (TCS) switch on the pilot's or copilot's respective control wheel or the autopilot pitch wheel and turn knob located on the pedestal extension.

3-16. ATTITUDE AND HEADING REFERENCE SYSTEM.

The attitude and heading reference system consists of the vertical gyros (VG-14A), directional gyros (C-14A), dual remote compensator (CS-412), flux valves (FX-220), and the inertial navigation system (INS).

The vertical gyros provide the digital flight control system, electronic flight instrument system, and weather radar antenna with pitch and roll information.

The inertial navigation system, when selected for display on the EFIS, also provides inputs to the flight control computer.

The directional gyros, with the flux valve and compensator, provide stabilized magnetic north referenced heading information for use by the digital flight control computer, electronic flight instrument system, INS, and mission equipment.

3-17. AIR DATA SYSTEM (ADZ-800).

The air data system consists of the digital air data computer (AZ-800), pilot's barometric altimeter (BA-141), and the altitude preselector (AL-801).

The digital air data computer is a microprocessor-based digital computer which accepts both analog and digital inputs, performs digital computations, and supplies both digital and analog outputs. It receives both pitot and static pressure for computing standard air data functions. Altitude preselect data is input from the altitude preselector. Information from the digital air data computer is sent to the pilot's barometric altimeter indicator, transponder, flight director/autopilot, INS, and GPS.

3-18. ELECTRONIC FLIGHT INSTRUMENT SYSTEM (EFIS).

a. Description. The electronic flight instrument system consists of the pilot's and copilot's electronic attitude director indicators (EADI) and electronic horizontal situation indicators (EHSI) display units (ED-800), symbol generators (SG-805), display controllers (DC-811), and instrument remote controllers (RI-106S).

The EFIS electronic displays present pitch and roll attitude, heading, course orientation, flight path commands, radio altitude, weather radar and lightning sensor system presentations, and mode and source annunciations.

b. Electronic Flight Instrument System (EFIS) Preflight Test.

NOTE

For this test to be valid, the AUTO PLT POWER switch and the RADIO ALTIMETER switch must be ON.

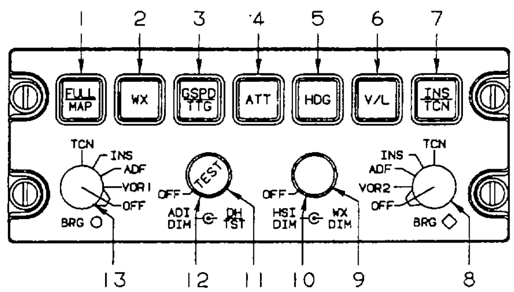
1. TEST switch (display controller, fig. 3-8) - Depress and hold.
2. Verify the following indications on the EADI:
    a. Radio Altimeter - Slews to 100 +/-10 feet.
    b. DH replaced with dashes.
    c. Marker beacon symbology appears.
    d. HDG and ATT annunciators appear.
    e. ATT FAIL annunciator appears in the center.
    f. Pitch and roll command cue (artificial horizon) - out of view.
    g. Runway cue drops from center.
    h. GS and localizer off flags (Red X) appear.
    i. TEST will appear in the upper left corner to indicate that the flight director mode selector lamp is good.
3. Verify the following on the EHSI.
    a. DTRK, NM, GSPD, and HDG replaces with dashes.
    b. HDG FAIL annunciator appears.
    c. Course indicator and glidescope off flags appear.
4. AP disconnect horn sounds after 5-7 seconds.

3-19. DISPLAY CONTROLLER (DC-811).

a. Description. The display controller (fig. 3-8), enables each pilot to control formatting on his respective EHSI and EADI, and to select the source of navigation, attitude, and heading information.

b. Display Controller Controls, Indicators, and Functions:

(1) Full/Map pushbutton selector switch. The FULL/MAP pushbutton selector switch is a multiple function switch that allows selecting the format of the EHSI.



1. Full/Half Arc/Map Pushbutton Selector Switch
2. Weather Pushbutton Selector Switch
3. Groundspeed/Time-to-Go Pushbutton Selector Switch
4. Attitude Source Pushbutton Selector Switch
5. Heading Source Pushbutton Selector Switch
6. VOR/Localizer Pushbutton Selector Switch
7. INS/TACAN Pushbutton Selector Switch
8. Double-Needle Pointer Bearing Source Selector Switch
9. Weather Radar Dim Control
10. EHSI Dim Control
11. Decision Height Setting Control and EFIS Test Switch
12. EADI Dim Control
13. Single-Needle Pointer Bearing Source Selector Switch

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Figure 3-8. Display Controller

When power is first applied to the EFIS, the EHSI will display a full 360 degree compass mode. Depressing the FULL/MAP switch once will change the display to a 90 degree heading arc with a large course pointer. Depressing the switch again selects a 90 degree heading arc display with a navigation map display that is dependant upon the selected navigation source.

(2) Weather pushbutton selector switch. The weather pushbutton selector switch, placarded WX, is used to select weather radar and lightning sensor system data to be displayed on the partial compass heading arc display or the map display on the EHSI. If the EHSI is in the full compass mode, depressing the WX switch will change the display to the partial compass mode and display weather radar returns and lightning sensor system data Depressing the switch again will remove the weather radar returns and lightning sensor system data from the display.

(3) Groundspeed/time-to-go pushbutton selector switch. The groundspeed/time-to-go pushbutton selector switch, placarded GSPD/TrG, is used to select whether groundspeed or time to go will be displayed on the lower right comer of the EHSI. GSPD/TTG data is always INS data if the INS is functioning. The GSPDFITG field will be blank unless INS is the selected navigation source. If the INS is not functioning, the GSPD/TTG field will be dashed

(4) Attitude pushbutton selector switch. The attitude pushbutton selector switch, placarded ATT is used to select whether attitude source # 1 (vertical gyro # 1), attitude source #2 (vertical gyro #2), or attitude source #3 (inertial navigation system) will provide pitch and roll information to the respective EFIS. Each depression of the switch changes the attitude source and the respective EADI.

NOTE

The attitude display on the EADI will power up to the previously selected attitude source.

(5) Heading pushbutton selector switch. The heading pushbutton selector switch, placarded HDG, is used to select whether gyro-magnetic compass system # 1 or # 2 will supply heading information to the respective EHSL Each depression of the switch will cause the display on the EHSI to alternate between MAG1 and MAG2, unless the SLAVE/FREE switch is set to FRE-, then DG1 or DG2 will be displayed.

(6) VOR/localizer pushbutton selector switch. The VOR/localizer pushbutton selector switch, placarded V/L, is used to select which VHF navigation receiver will provide information to the respective EFIS. Each depression of the switch alternates the navigation source display

on the EHSI between VOR1 or VOR2, or ILS1 or ILS2, depending upon whether a VOR or localizer frequency has been selected on the respective VHF navigation receiver control panel.

The VOR/localizer switch may be used to activate the preview mode on the EHSI if:

INS is displayed on the EHSI as the navigation source

LNAV flight director mode annunciator is displayed on the EADI

System is powered-up using the primary on-side VHF navigation receiver.

The preview mode may be cancelled by depressing the V/L switch

(7) INS/TACAN pushbutton selector switch. The inertial navigation system/TACAN pushbutton selector switch, placarded INS/TCN, is used to select whether the INS or TACAN will provide information to the EFIS. Each depression of the switch will alternate the navigation source annunciator on the EHSI between INS and TCN.

(8) Double-needle pointer bearing source selector switch. The double-needle pointer bearing source selector switch, located on the lower right side of the display controller, is used to select which navigation information sources will provide information to the double-needle bearing pointer.

(a) OFF. Removes double-needle pointer from the EHSI.

(b) VOR2. Double-needle pointer receives bearing information from #2 VHF navigation receiver.

(c) ADF. Double-needle pointer receives bearing information from ADF navigation receiver.

(d) INS. Double-needle pointer receives bearing information from the inertial navigation system.

(e) TCN. Double-needle pointer receives bearing information from TACAN navigation receiver.

(9) Weather radar dim control. Control of the intensity of the weather radar display on the EHSI is accomplished by a control knob placarded WX DIM, which is an inner concentric knob with the HSI DIM knob.

The WX DIM control dims only the raster on the EHSI which contains the weather radar information. If the EHSI is in the composite mode with the EADI, the WX DIM control is used to dim the attitude sphere.

(10) EHSI dim control. Control of the intensity of the raster and stroke writing on the EISI is accomplished by a control knob placarded HSI DIM, which is an outer concentric knob with the WX DIM knob. Turning the knob counterclockwise to the OFF position will cause the EHSI to become blank and the composite mode to be displayed on the EADI.

(11) Decision height setting control and EFIS test switch

(a) Decision height setting control. The decision height setting control, placarded DHIRET, is an inner concentric knob with the ADI DIM knob. Rotating the DH knob allows setting the decision height display on the EADI in 10-foot increments from 200 to 990 feet, and in 5 foot increments from 0 to 200 feet By rotating the DH knob completely counterclockwise to the OFF position, the decision height display may be removed from the EADL

(b) EFIS test switch. Depressing the EFIS test switch, placarded TEST, will cause the EFIS displays to enter a test mode. In the test mode, flags and cautions are presented along with a test of the radio altimeter. Observe the following after depressing the TEST switch:

NOTE

A complete test of the EFIS is only functional on the ground. Radio altimeter test is functional at all times except during glideslope CAP/ TRK

Course select, heading select, DH set, DME distance, and GSPD/TTG digital displays are replaced by amber dashes.

ATT and HDG displays are flagged.

All pointers and scales are flagged.

All heading related markers and pointers are removed.

Flight control computer standby mode is activated.

(12) EADI dim control. Control of the intensity of the raster and stroke writing on the EADI is accomplished by a control knob placarded ADI DIM, which is an outer concentric knob with the DH SETREST knob. Turning the knob counterclockwise to the OFF position will cause the EADI to become blank and the composite mode to be displayed on the EHSL

(13) Single-needle pointer bearing source selector switch. The single-needle pointer bearing source selector switch, located on the lower left side of the display controller, is used to select which navigation information

sources will provide information to the single-needle bearing pointer.

(a) TCN. Single-needle pointer receives bearing information from TACAN navigation receiver.

(b) INS. Single-needle pointer receives bearing information from the inertial navigation system.

(c) ADF. Single-needle pointer receives bearing information from ADF navigation receiver.

(d) VOR1. Single-needle pointer receives bearing information from # 1 VHF navigation receiver.

(e) OFF. Removes single-needle pointer from the EHSI.

3-20. ELECTRONIC ATTITUDE DIRECTOR INDICATOR (EADI).

a. Description. The EADI (fig. 3-9), combines a sphere-type attitude display with lateral and vertical computed steering signals to provide commands required to intercept and maintain a desired flightpath The EADI provides the following display information:

Attitude display

Flight director command cue

Flight director mode annunciations

Vertical deviation

Expanded localizer

Radio altitude with rising runway display

Decision height setting and annunciations

Marker beacon annunciations

Air data command

Rate of turn

Reversionary annunciations

Flags

Comparison monitors

b. EADI Controls, Indicators, and Functions (fig. 3-9).

(1) Attitude source annunciator. The selected attitude source will be displayed on the EADI if it is other than the normal source for that instrument Possible annunciations are ATT1 (vertical gyro #1), ATI2 (vertical gyro #2), or AT13 (inertial navigation system). As other attitude sources are selected, they will be annunciated in white. When the pilot's and copilot's attitude sources are the same, the annunciation will be amber.

(2) Lateral mode capture annunciator. Flight director mode capture is annunciated on the EADI in green. Possible annunciations are approach (APR), localizer (LOC), long-range navigation (LNAV), heading (HDG), and navigation (NAV).

(3) Attitude sphere. The attitude sphere moves with respect to the symbolic aircraft reference to display pitch and roll attitude.

(4) Roll attitude pointer. Roll attitude pointer indicates aircraft roll attitude with respect to the roll attitude scale.

(5) Roll attitude scale. The roll attitude scale indicates aircraft bank angle in degrees with respect to a moving pointer.

(6) Vertical mode arm annunciator. Flight director vertical mode arming is annunciated on the EADI in white. Possible annunciations are altitude select (ASEL) and glideslope (GS).

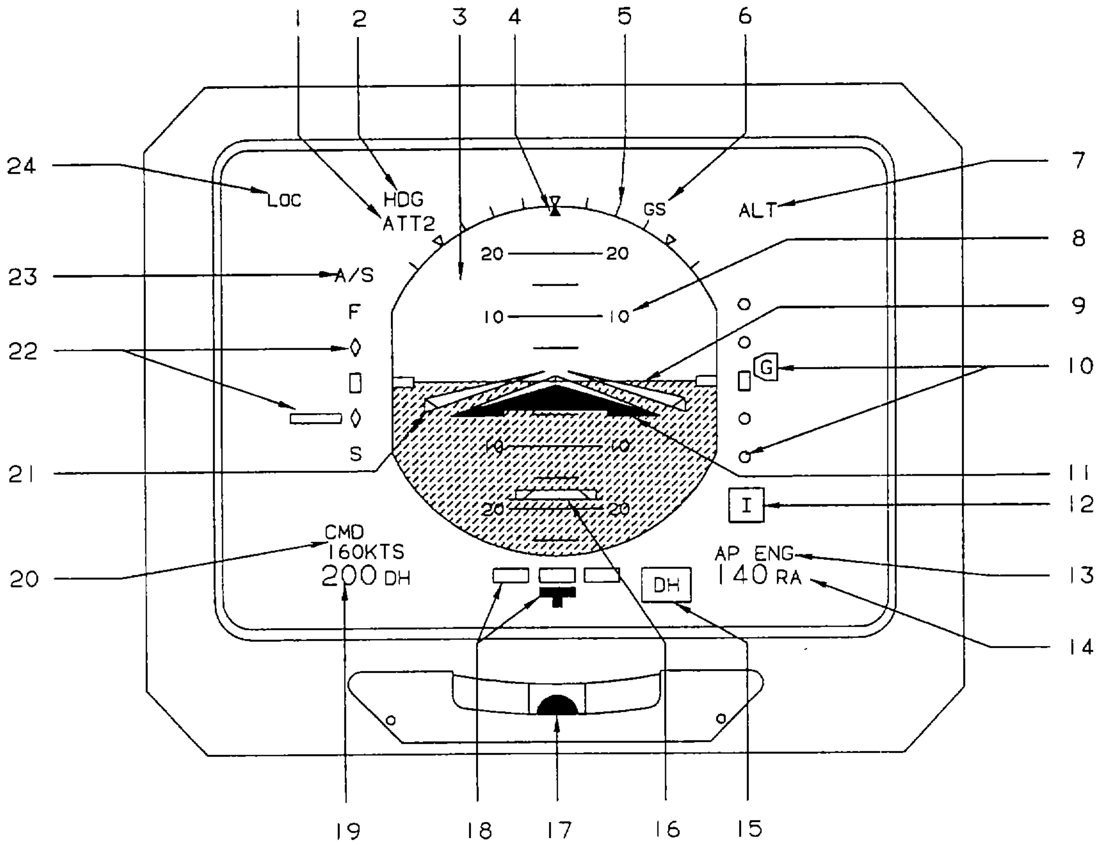
(7) Vertical mode capture annunciator. Flight director vertical mode capture is annunciated on the EADI in green. Possible annunciations are glideslope (GS), vertical speed (VS), indicated airspeed (IAS), altitude (ALT), and go-around (GA).

(8) Pitch attitude scale. The pitch attitude scale has white reference marks in 5 degree increments.

(9) Horizon line. The horizon line is affixed to the sphere and remains parallel to the earth's surface.

(10) Glideslope deviation pointer, annunciator, and scale. The glideslope deviation pointer shows aircraft deviation from the center of the glideslope beam. The G annunciator on the glideslope deviation pointer indicates that the information being presented is glideslope deviation. Deviation from the center of the glideslope beam is measured by the glideslope scale. The distance between two dots is equal to a 0.35 degree deviation. The glideslope display will not be present on the EADI unless a valid ILS frequency has been tuned.

(11) Aircraft symbol. The aircraft symbol serves as a stationary representation of the aircraft. Aircraft pitch and roll attitudes are displayed by the relationship between



1. Attitude Source Annunciator
2. Lateral Mode Capture Annunciator
3. Attitude Sphere
4. Roll Attitude Pointer
5. Roll Attitude Scale
6. Vertical Mode Annunciator
7. Vertical Mode Capture Annunciator
8. Pitch Attitude Scale
9. Horizon Line
10. Glideslope Pointer, Annunciator, and Scale
11. Aircraft Symbol
12. Marker Beacon Annunciator
13. Autopilot Engagement Annunciator
14. Radio Altitude Display
15. Decision Height Annunciator
16. Rising Runway Radio Altitude Display
17. Inclinometer
18. Expanded Localizer or Rate-of-Turn Pointer and Scale
19. Decision Height Display
20. Air Data Command Display
21. Pitch and Roll Command Cue
22. Fast/Slow Deviation Pointer and Scale
23. Fast/Slow Source Annunciator
24. Lateral Mode Arm Annunciator

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Figure 3-9. Electronic Attitude Director Indicator (EADI) the fixed miniature aircraft and the movable attitude sphere. The inverted V shaped miniature aircraft symbol is flown to align with the flight director command cue in order to satisfy the commands of the selected flight director mode.

(12) Marker beacon annunciator. Reception of a marker beacon signal is indicated on the EADI by the illumination of the appropriate marker beacon annunciator. Possible annunciations are outer marker (0, blue), middle marker (M, amber), and inner marker (I, white).

(13) Autopilot engagement annunciator. Autopilot engagement is indicated on the EADI by an annunciator placarded AP ENG (green).

(14) Radio altitude display. Radio altitude is presented by a four-digit display from -20 feet to 2500 feet above ground level (AGL). Radio altitude is displayed in blue numbers followed by RA in white letters. Display resolution between 200 and 2500 feet AGL is in 10-foot increments. Display resolution below 200 feet AGL is in 5-foot increments. The radio altitude display will disappear from the EADI when radio altitude is above 2500 feet AGL

(15) Decision height annunciator. When radio altitude is less than 100 feet above the selected decision height, a white box will appear adjacent to the radio altitude display. When the aircraft is at or below decision height an amber DH annunciator will be illuminated inside the white decision height display box on the EADL

(16) Rising runway radio altitude display. A miniature rising runway symbol displays absolute altitude reference above the terrain. The rising runway appears at 200 AGL and contacts the aircraft symbol at touchdown.

(17) Inclinometer. The inclinometer provides the pilot with a display of aircraft slip or skid for coordinating turns.

(18) Expanded localizer or rate-of-turn pointer and scale. When the flight director navigation source is other than a localizer frequency, rate-of-turn is displayed by a pointer and scale on the EADL A standard-rate turn (3 degrees per second) is indicated when the turn needle is deflected until the needle covers the left or right rate-of- turn scale mark. When the flight director navigation source is a localizer frequency, the rate-of-turn pointer an scale display will become an expanded localizer pointer and scale display. The expanded localizer pointer receives raw localizer data from the navigation receiver. The expanded localizer pointer becomes an extremely sensitive reference indicator of aircraft position with respect to the center of the localizer course. From the center of the expanded localizer scale to the left or right scale index mark equals 33 feet deviation from the center of the localizer course.

NOTE

> When back course (B3C) has been selected on the flight director, or when the selected course is more than 90 degrees from aircraft heading, expanded localizer deviation will automatically be reversed to provide proper sensing with respect to the localizer centerline, and amplification will be reduced by one half.

(19) Decision height display. Decision height is displayed on the EADI by a three-digit display in blue numbers followed by DH in white letters. Decision heights may be set into the display by the decision height setting control on the respective display controller. Decision heights in the 0 to 200 foot range are set into the display in 5-foot increments. Decision heights in the 200 to 990 foot range are set into the display in 10-foot increments.

(20) Air data command display. Flight director air data command modes are vertical speed (VS) or indicated air speed (IAS). When an air data command mode has been selected on the flight director mode selector panel, the command reference will appear on the EADI in blue numbers below CMD in white letters. The autopilot pitch wheel on the autopilot control panel is used to change the air data command reference number when operating in the VS or IAS mode. When a vertical mode other than VS or IAS is selected, the air data command display will disappear from the EADI.

(21) Pitch and roll command cue. The flight director pitch and roll command cue displays the computed commands required to capture and maintain a desired flight path. The inverted V shaped miniature aircraft symbol is flown to align with the flight director command cue in order to satisfy the commands of the selected flight director mode. The cue will be removed from view if an invalid condition occurs in either flight director pitch or roll command. The cue is displayed on the side coupled to the flight director only, and reflects the flight director mode selected by the flight director mode selector panel.

(22) Fast/slow pointer and scale. The fast/slow pointer and scale provide a display of deviation from relative approach speed information provided by the lift computer. The information provided to the indicator is for an approach speed of approximately 1.3 times V,o The display is removed from the EADI when flaps are extended to the full down position.

(23) Fast/slow source annunciator. The fast/ slow source annunciator (white) displays A/S.

(24) Lateral mode arm annunciators. Lateral mode arm function is annunciated on the EADI in white. Possible annunciations are NAV, APR, LOC, and BC.

c. EADI Amber Caution and Failure annunciators (fig. 3-10).

(1) Same attitude source. There is no attitude source annunciated if the pilot and copilot are using their normal attitude sources. Selecting other attitude sources causes the new source to be annunciated in white. If the pilot and copilot have selected the same attitude source, that attitude source will be annunciated in amber on both EADI's.

(2) Comparison monitor. The comparison monitor compares selected pilot and copilot input data in the symbol generator. If the difference between the data exceeds predetermined levels, the out-of-tolerance symbol will be displayed. Table 3-2 shows comparison monitor symbols and miscompare levels.

NOTE

When the compared pitch and roll attitude or glideslope and localizer signals are out of tolerance, a combined symbol (ATT or ILS) is displayed.

(3) Radio altitude failure. Radio altitude failure is indicated by amber dashes replacing the numerical altitude value, and the removal of the rising runway radio altitude display from the EADI, if present

(4) Decision height warning. If a DH potentiometer is open, or during self test, amber dashes will replace numerical values of decision height display.

(5) Autopilot status messages. The following messages may appear for autopilot status. They will replace the autopilot engage (AP ENG) annunciator:

(a) AP ENG. Autopilot engaged.

(b) AFCS? Autopilot wraparound signal failure.

(c) TCS ENG. Touch control steering is engaged.

(6) Flightdirector failure. In the event of a flight director failure, an amber FD FAIL warning will be displayed on the EADI.

(7) Air data command failure. If an air data flight director mode has been selected, and the air data computer fails, amber dashes will replace the numerical values in the air data command display.

(8) Common symbol generator. When in the reversionary mode and one symbol generator is driving both the pilot's and copilot' s display tubes, an amber reversionary warning is given to indicate the information source.

d. EADI Red Failure Annunciations (fig 3-11).

(1) Attitude failure. If the attitude display, pitch scale, or roll pointer fail, they will be removed from the display, the attitude sphere will become blue, and a red ATT FAIL will be displayed on the EADI.

(2) Glideslope, expanded Iocalizer, and rate- of-turn failures. If the glideslope, expanded localizer, or rate-of-turn system fails, the pointer will be removed and a red X will be drawn through the scale. The letter G will remain at the zero deviation position to identify invalid glideslope information.

(3) Internal failure. If an internal failure occurs within the display system itself, the display will be blank A failure of the input/output processor will be indicated by a red X centered on the display with a SG FAIL annunciated (fig. 3-12).

3-21. ELECTRONIC HORIZONTAL SITUATION INDICATOR (EHSI).

a. Description. The electronic horizontal situation indicator (fig. 3-13), combines several displays to provide a maplike display of aircraft position. The indicator displays aircraft displacement relative to a VOR or TACAN radial, inertial navigation system guidance, and localizer and glideslope beam. The EHSI provides the following full and partial compass display information:

(1) Full compass displays Heading

Course selection

Course or azimuth deviation

Distance

Groundspeed

To/from

Desired track

Bearing

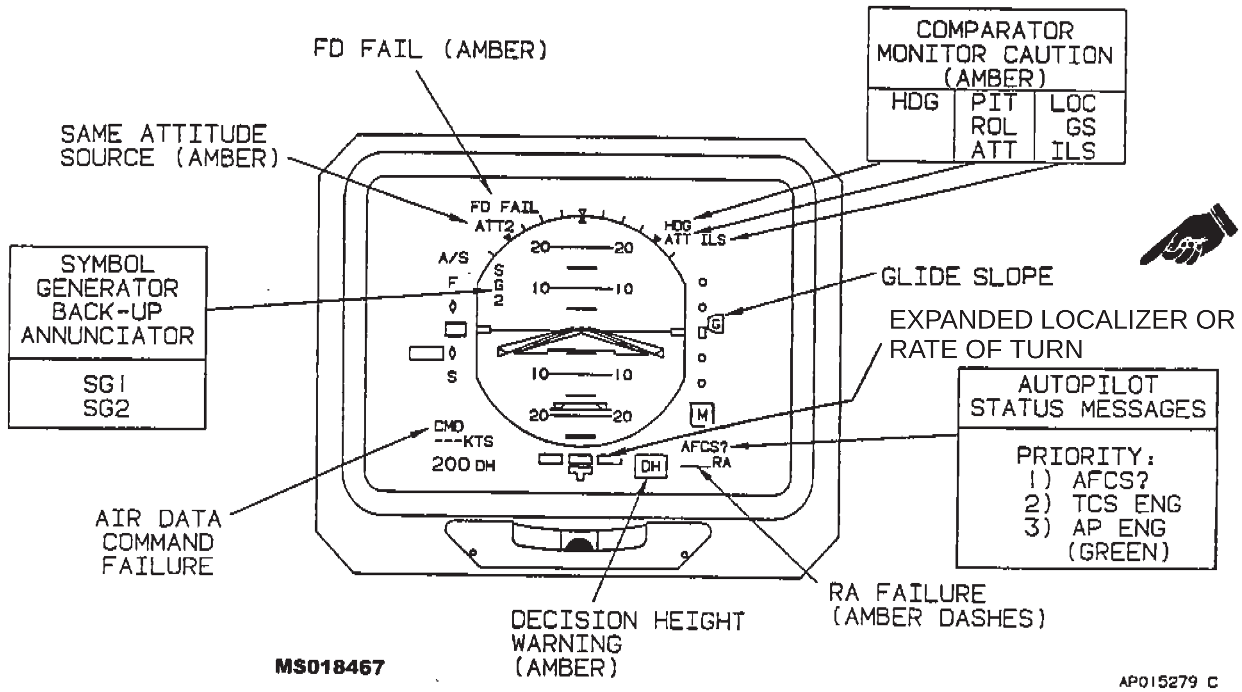


Figure 3-10. EADI Caution Annunciators (Amber)

Heading selection

Glideslope deviation

Time-to-go

Heading and navigation source annunciators

Heading synchronization

(2) Partial compass display Weather radar

Lightning sensor system data

Navigation map

b. EHSI Controls, Indicators, and Functions (fig. 3-13).

(1) Course/desired track display. The course (CRS)/desired track (DTRK) display provides a digital readout of the course selected by the course pointer (yellow) or the desired track when navigation with information supplied by the INS. Course (CRS) or desired track (DTRK) are displayed in white letters with the numerical course displayed in yellow.

(2) Single-needle bearing pointer. The single-needle bearing pointer (blue circle) indicates the relative bearing to the selected navaid. The navigation source is indicated by the single-needle pointer source annunciator. When the bearing pointer navigation source is invalid or a localizer frequency has been chosen, the bearing pointer will be removed from the display.

(3) Heading source annunciator. The heading source annunciator will display MAG1 or MAG2 when slaved or DG1 or DG2 when free, to show which gyrocompass system is providing heading information to the EHSI.

(4) Heading marker. The notched blue heading marker is positioned on the heading dial by the respective heading selection knob on the remote instrument controller panel, which is located on the pedestal extension (fig. 2-12). Once set to the desired heading, the heading marker will maintain its position on the heading dial. The difference between the heading marker and the lubber line index is the amount of heading select error applied to the flight director computer. In heading mode, the EADI pitch and roll command cue will display the proper bank commands to turn to and maintain this selected heading. Pulling on the heading select knob (pedestal extension, fig. 2-12) will set the heading marker to aircraft heading.

(5) Lubber line. Aircraft heading is read from the heading dial under the lubber line.

Table 3-2. Comparison Monitor Symbols and Miscompare Levels

Compared Signals	Displayed Symbol	Miscompare Level
1. Pitch Attitude	PIT	6°
2. Roll Attitude	ROL	6°
** 3. Heading	HDG	6°
* 4. Localizer	LOC	40 mV (1/2 dot)
* 5. Glideslope	GS	50 mV (1 dot)
6. Pitch & Roll Attitude	ATT	50 mV
* 7. Localizer & Glideslope	ILS	50 mV (1 dot)

* These comparisons are only active during flight director localizer and glideslope capture with both NAV receivers tuned to LOC frequency.
** If the compared heading sources are not the same (both MAG or TRU), the comparison monitor is disable.

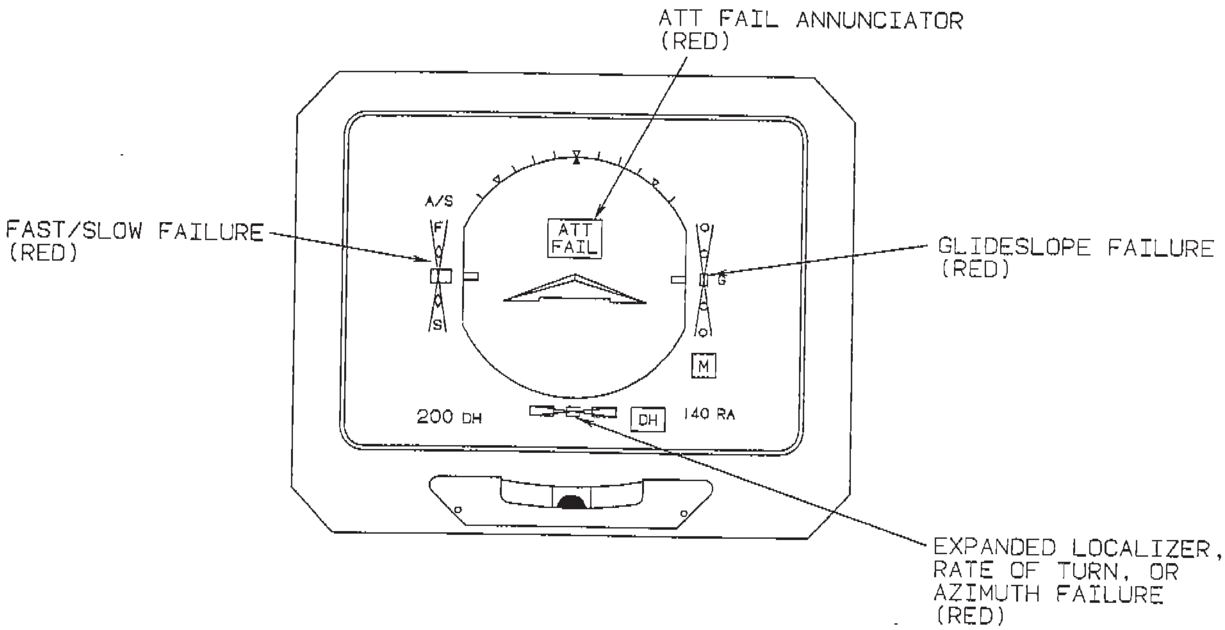


Figure 3-11. EADI Failure Annunciations (Red)

(6) *Double-needle bearing pointer.* The double-needle bearing pointer (green diamond) indicates the relative bearing to the selected navaid. The navigation source is indicated by the double-needle pointer source annunciator. When the bearing pointer navigation source is invalid or a localizer frequency has been chosen, the bearing pointer will be removed from the display.

(7) *DME hold annunciator.* Illumination of the amber DME hold (H) annunciator indicates that hold has been selected on the VOR navigation receiver control panel that is supplying navigation information to the respective EHSI.

(8) *Navigation source annunciator.* The navigation source that is being used by the EHSI is indicated by the illumination of a navigation source annunciator. Possible annunciations are VOR1, VOR2, ILS1, ILS2, TCN, and INS. All the annunciations are white, except INS which is annunciated in blue to show that it is a long range navigation system. The navigation source will annunciate amber if the pilot and copilot select the same navigation source. The navigation source will annunciate amber if the pilot has selected VOR2 or if the copilot has selected VOR1.

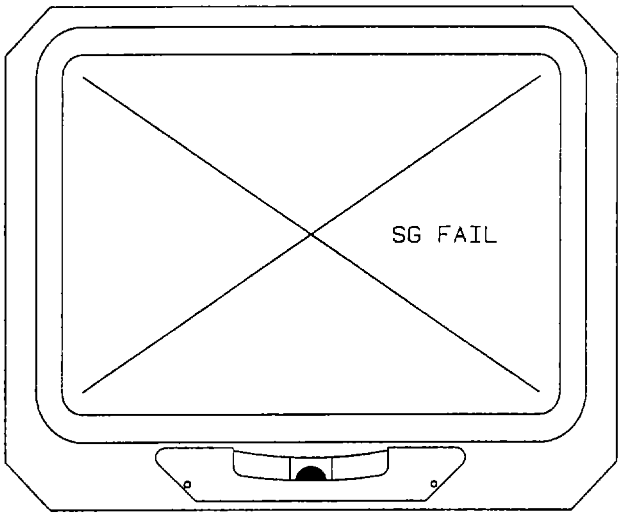


Figure 3-12. EADI Input/Output Processer Failure Indications

(9) Distance display. The distance display indicates the distance in nautical miles to the selected DME station or INS waypoint When short range navigation information is being used the distance will be displayed in a 0 to 399.9 nautical mile format When long range navigation (INS) information is being used the distance will be displayed in a 0 to 3999 nautical mile format

DME distance is supplied to the EFIS by channels # 1 and #2 of the three channel TACAN/DME unit Channel # 1 provides the TACAN distance data when TACAN is the selected navigation source or DME distance data when NAV1 is the selected navigation source. Channel #2 provides distance data when NAV2 is the selected navigation source.

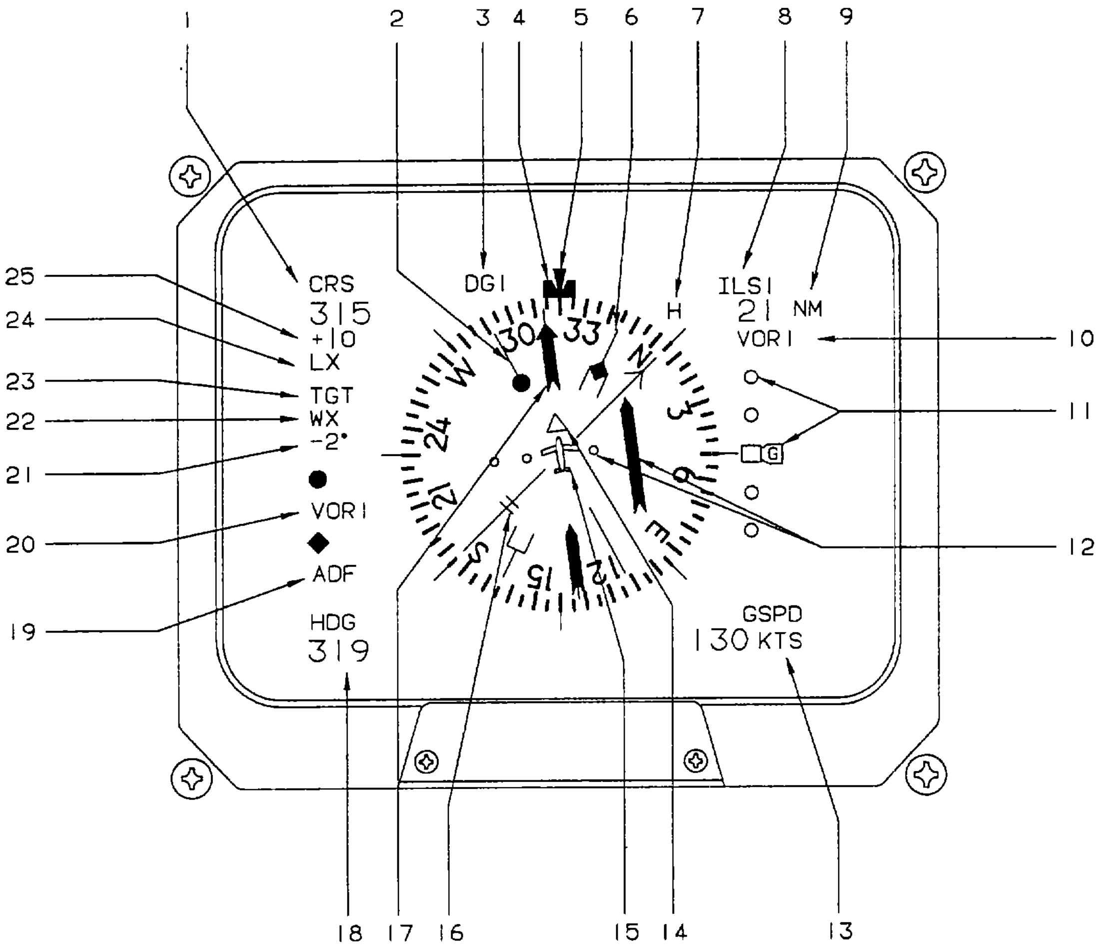
(10) Preview course pointer navigation source annunciator. The preview course pointer navigation source annunciator displays which navigation source is being used by the preview course pointer.

(11) Glideslope deviation pointer, annunciator, and scale. The glideslope deviation pointer shows aircraft deviation from the center of the glideslope beam. The G annunciator on the glideslope deviation pointer indicates that the information being presented is glideslope deviation. Deviation from the center of the glideslope beam is measured by the glideslope scale. The distance between two dots is equal to a 0.35 degree deviation. The glideslope display will not be present on the EHSI unless a valid ILS frequency has been tuned.

(12) Course deviation bar. The course deviation bar represents the centerline of the selected VOR, localizer, or TACAN course, or inertial navigation system (INS) track. The aircraft symbol pictorially shows the aircraft's position in relation to the selected course or track.

(a) VOR/TACAN. When the selected navigation source is a VOR or TACAN station each dot on either side of the aircraft symbol represents a 5 degree deviation from the centerline of the course. When the selected navigation source is a localizer, each dot represents a 1 degree deviation from the centerline of the course. When the selected navigation source is the INS, each dot represents 3.75 nautical miles of cross track deviation

(b) Back course (BC). When back course (BC) mode has been selected, or when a localizer frequency has been tuned and the selected course is more than 90 degrees from aircraft heading, course deviation will automatically reverse to provide proper deviation sensing with respect to the course centerline. The course deviation bar always indicates the location of the course centerline relative to the nose of the aircraft



1. Course/Desired Track Dislay
2. Single-Needle Bearing Pointer
3. Heading Source Annunciator
4. Heading Marker
5. Lubber Line
6. Double-Needle Bearing Pointer
7. DME Hold Annunciator
8. Navigation Source Annunciator
9. Distance Display
10. Preview Course Pointer Navigation Source Annunciator
11. Glideslope Deviation Pointer, Annunciator, and Scale
12. Course Deviation Bar and Scale
13. Groundspeed or Time-to-Go Display
14. To-From Indicator
15. Aircraft Symbol
16. Preview Course Pointer
17. Course Pointer
18. Heading Display
19. Double-Needle Bearing Pointer Source Annunciator
20. Single-Needle Bearing Pointer Source Annunciator
21. Weather Radar Tilt Angle
22. Weather Radar Mode Annunciator
23. Weather Radar Target Alert/Variable Gain/React Annunciator
24. Lightning Sensor System Mode Annunciator
25. Compass System Synchronization Annunciator

A93FE00D0102 C

Figure 3-13. Electronic Horizontal Situation Indicator (EHSI)

(13) Groundspeed or time-to-go display. Depressing the GSPD/TTG button on the display control panel will cause groundspeed or time to go to alternately be displayed. GSPD/TTG information is always referenced to the active INS waypoint

(14) To-from indicator. An arrowhead (white triangular box) in the center of the EHSI indicates whether the selected course is to or from the station or waypoint. The to-from annunciator will be removed from view during localizer operation.

(15) Aircraft symbol. The aircraft symbol provides a quick visual cue as to the aircraft's position with respect to the selected course and aircraft heading.

(16) Preview course pointer. A preview course pointer (magenta) is provided to enable the pilot to preview data prior to its use.

The preview course pointer will be displayed if:

INS is displayed as the navigation source on the EHSI.

LNAV is the lateral capture mode (green) displayed on the EADI.

Selection of V/L or TCN on the display controller after the above two conditions have been met

The preview course pointer may be rotated around the heading dial using the remote course knob on the remote instrument control panel, located on the pedestal extension (fig. 3-14). Each time the preview course pointer position is changed on the heading dial with the remote course knob, the EHSI digital course display will show the preview course in magenta for 5 seconds, or until the course is changed again.

The preview course deviation bar will respond to VOR, localizer, and TACAN signals as appropriate.

Once the previewed navigation source is valid, if the approach mode (for localizer or ILS) or VOR approach mode (for VOR or TACAN) has been selected on the flight director mode selector, the appropriate LOC, ILS, or NAV annunciator will be illuminated on the EADI.

When the flight director determines that the capture point for the previewed mode has been reached, it will transition the flight director from LNAV mode to the capture mode of the previewed navigation source. The preview course pointer will then be removed and the standard course pointer will be slewed to the previewed selected course.

(17) *Course pointer.* The course pointer (yellow) is positioned on the rotating heading dial by a remote course knob on the remote heading/course control panel, located on the pedestal extension (fig. 2-12). The course pointer is set to a magnetic bearing that coincides with the desired VOR or TACAN radial, or localizer course. Once set, the course pointer maintains its position on the rotating heading dial to provide a continuous readout of course error to the flight director computer. Pulling out on the remote course knob (pedestal extension, fig. 2-12), will rotate the course pointer to center the course deviation bar.

When long range navigation (INS) is selected, the course pointer becomes a desired track pointer. The desired track pointer will be positioned on the rotating heading dial by the INS.

(18 Heading display. The heading display is a digital readout of of the heading selected by the blue heading marker. The display is placarded HDG (white) with blue numerals.

(19) Double-needle bearing pointer source annunciator. This annunciator displays the navigation source supplying information to the double-needle bearing pointer (green). This display is marked by a green diamond with the navigation source displayed in white letters. Possible annunciations are ADF, VOR2, INS, and TCN.

(20) Single-needle bearing pointer source annunciator. This annunciator displays the navigation source supplying information to the single-needle bearing pointer (blue). This display is marked by a blue circle with the navigation source displayed in white letters. Possible annunciations are ADF, VOR1, INS, and TCN.

(21) Weather radar tilt angle display. The weather radar tilt angle display (green) shows the angle that the weather radar antenna is tilted upward or downward from level in degrees plus or minus.

(22) Weather radar mode annunciator. The weather radar mode annunciator indicates the operating mode of the radar system Possible annunciations in the full compass format of the EISI are TX (magenta) and WX (amber). TX indicates that the radar is transmitting but not being displayed. WX indicates a weather radar system failure. Possible annunciations in the partial compass format are standby (STBY), test EST), weather detection (WX), rain echo attenuation compensation technique (RCT), ground mapping (GMAP), and fail (FAIL). All partial compass annunciations are green except FAIL, which is amber.

(23) Weather radar target alert and variable gain annunciator. The green TGT annunciator indicates that the target alert function of the weather radar has been

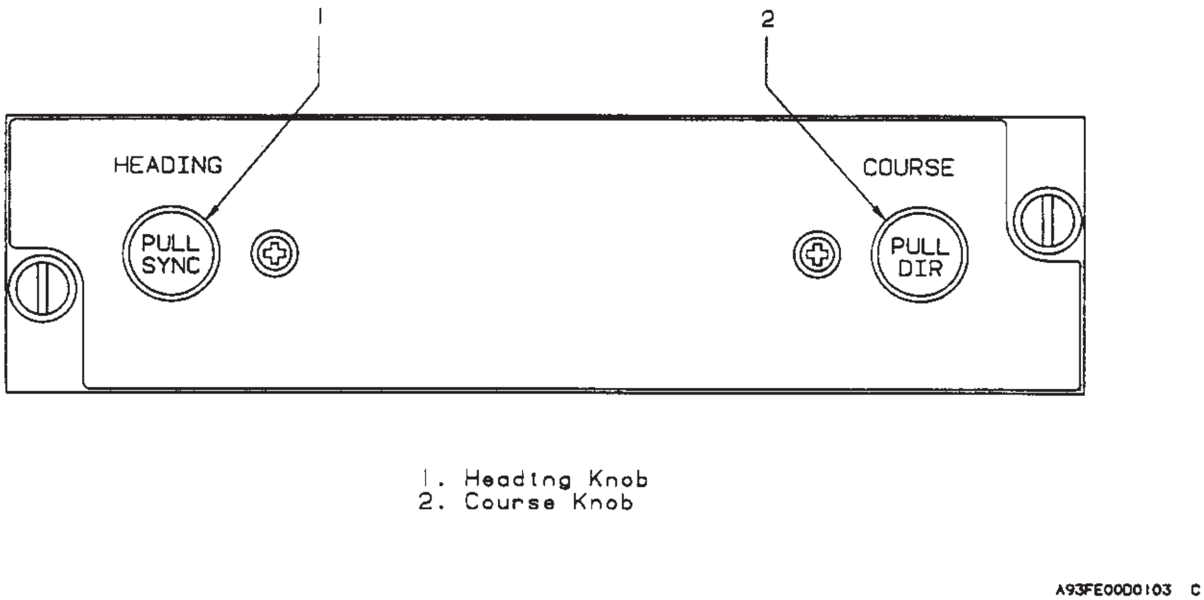


Figure 3-14. Flight Director Remote Heading/Course Control Panel

selected. The amber VAR annunciator indicates that variable gain has been selected.

(24) Lightning sensor system mode annunciator. The lightning strike sensor system mode annunciator indicates the operating mode of the lightning sensor system. Possible annunciations are LX, LX/F, LX/S, LX/T, LX/H, LX/I, LX/C, LX/L, and LXMN. All annunciations are green except LX/F and LXMN which are amber. These mode annunciators are described in the lightning sensor system paragraph in this chapter.

(25) Compass system synchronization annunciator. The compass synchronization system annunciator indicates the state of the compass system in the slaved mode. The bar represents commands to the compass gyro to slew to the indicated direction (+ for increased heading and 0 for decreased heading.) Compass synchronization annunciation will be removed during the compass free gyro mode. If the cross-side compass display has been selected, the synchronization annunciator will be removed.

c. EHSI Partial Compass Format (fig. 3-15). The partial compass mode displays a 90-degree ardc of the compass card. The following additional features are available during partial compass operation:

(1) Range rings. Range rings are displayed to aid in the use of radar returns and position of navaids. The outer range ring is the compass card boundary and represents the selected range on the radar. Range annunciation on the inner ring represents one-half the range setting of the weather radar.

(2) Navaid position. Navaid position may be selected for display during map mode. Source of navaid position markers is selected and annunciated in conjunction with the associated bearing source and is color coded.

(3) Weather. Weather radar information may be displayed in the partial compass mode.

(4) Off scale arrow. When the heading marker is rotated out of view (off scale) an arrow on the compass arc is provided to indicate the shortest direction of the heading marker.

d. EHSI Short Range Navigation (SRN) Map Mode (fig. 3-16). Map mode is selected by depressing the FULL/MAP pushbutton selector switch on the display controller until the EHSI is in the MAP mode.

When the map mode has been selected, the following will occur:

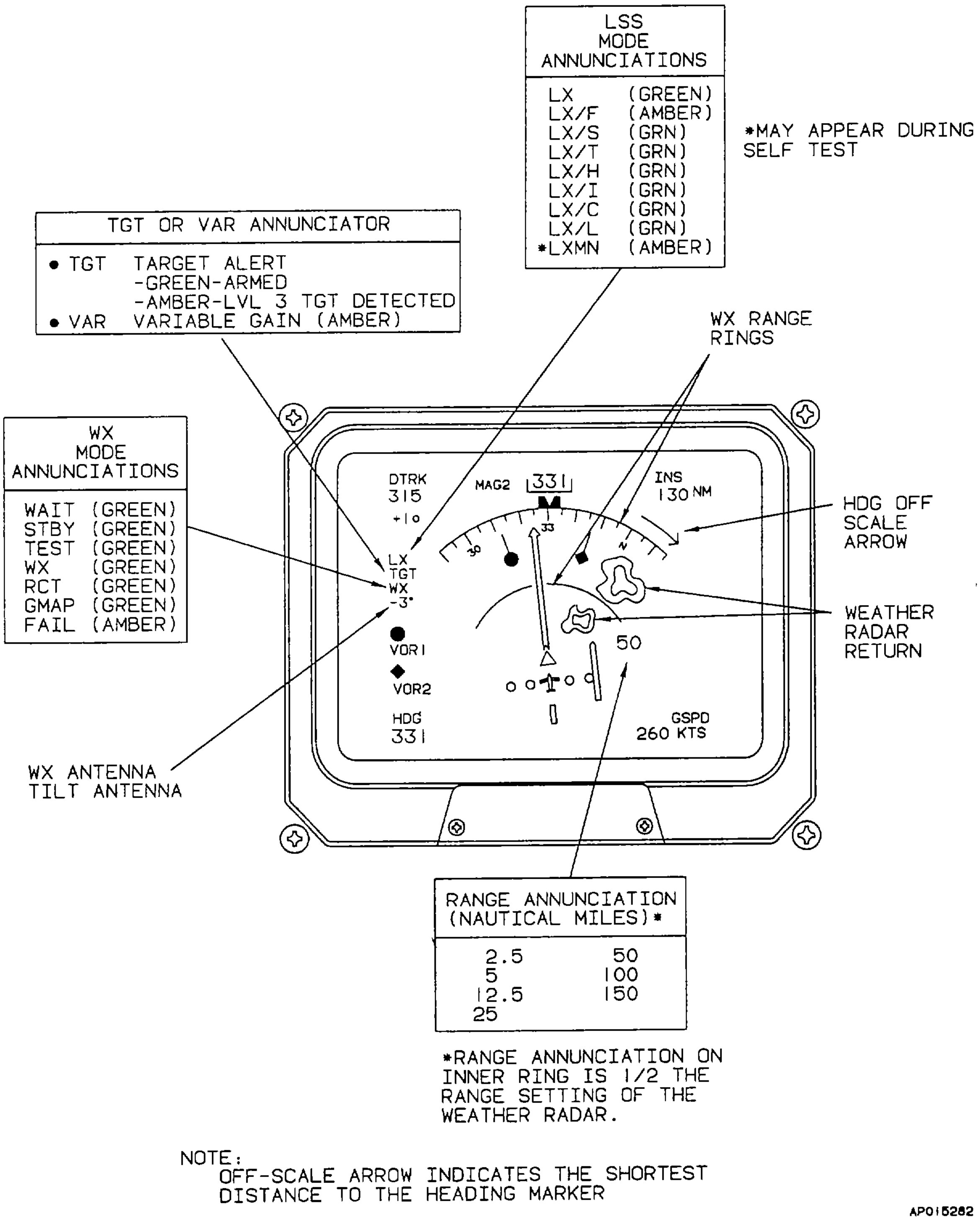


Figure 3-15. EHSI Partial Compass Format Unique Indications

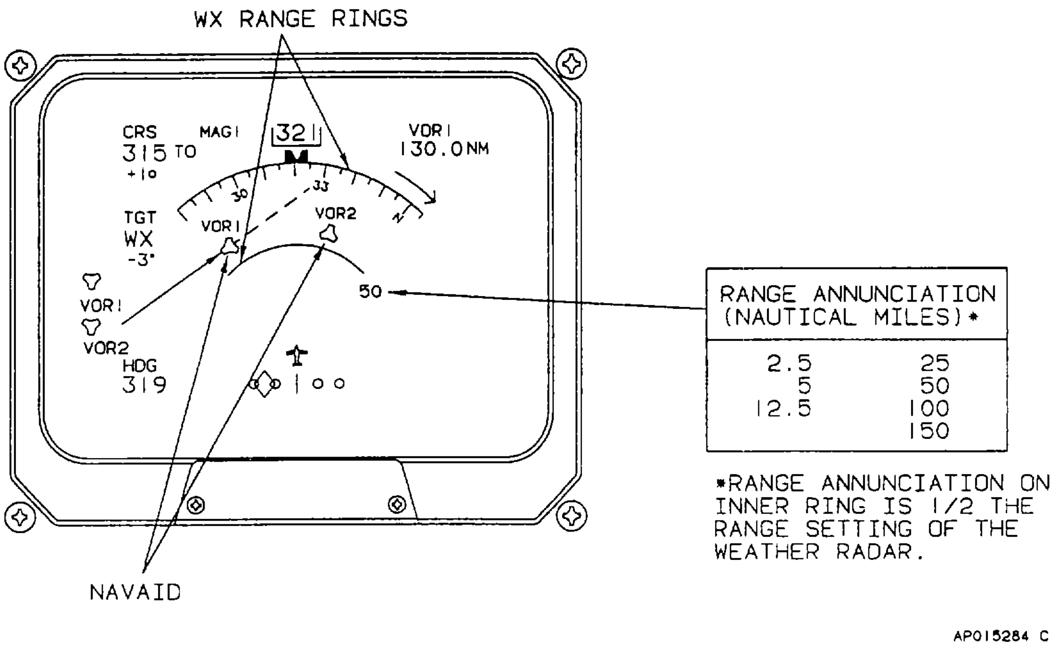


Figure 3-16. EISI Partial Compass VOR Map Mode

The course pointer and course deviation bar displays will be removed.

Both bearing pointers will be removed.

A full-scale navigation deviation display and deviation bar will be present on the bottom of the EHSI display. This will show the position of the aircraft with respect to the selected course.

The map mode deviation display functions as a simple, fixed-card course deviation indicator for VOR or TACAN data. As long as the aircraft is headed within 90 degrees of the selected course or selected radial, and as long as the to-from annunciation is correct, the course deviation indicator (CDI) will be directional; otherwise, it will display reverse sensing and the techniques required for reverse sensing will apply.

When the navigation source is a localizer, and the aircraft has a heading greater than 90 degrees to the selected inbound localizer course, the CDI will reverse polarity, but will remain directional.

When VOR or TACAN stations are shown on the EFIS map, a solid or dashed course line is drawn through the selected navigation source. The solid line represents the selected inbound course to the station. The dashed line represents the selected outbound radial from the station. If TACAN has been selected as the NAV source, the identifier will be displayed adjacent to the navaid symbol. Crossside navaid identifiers are not available.

If the VOR or TACAN stations are out of range of the EFIS map, either a solid magenta or dashed magenta line will appear if within the 90 degree arc. A solid magenta line with an arrow indicates the inbound course to the station. A dashed magenta lines indicates the outbound radial.

e. EHSI Long Range Navigation (LRN) Multiple Waypoint Map Mode. The EFIS can display multiple waypoints from a long range navigation (INS) system (fig. 3-17).

With the INS programmed for multiple waypoints, and the weather radar range set to a range allowing display of multiple waypoints, selecting the MAP mode will permit up to six (6) to be displayed on the EHSI.

When the map mode has been selected, the following will occur:

The course pointer and course deviation bar displays will be removed.

Both bearing pointers will be removed.

The multiple waypoints will appear on the EHSI.

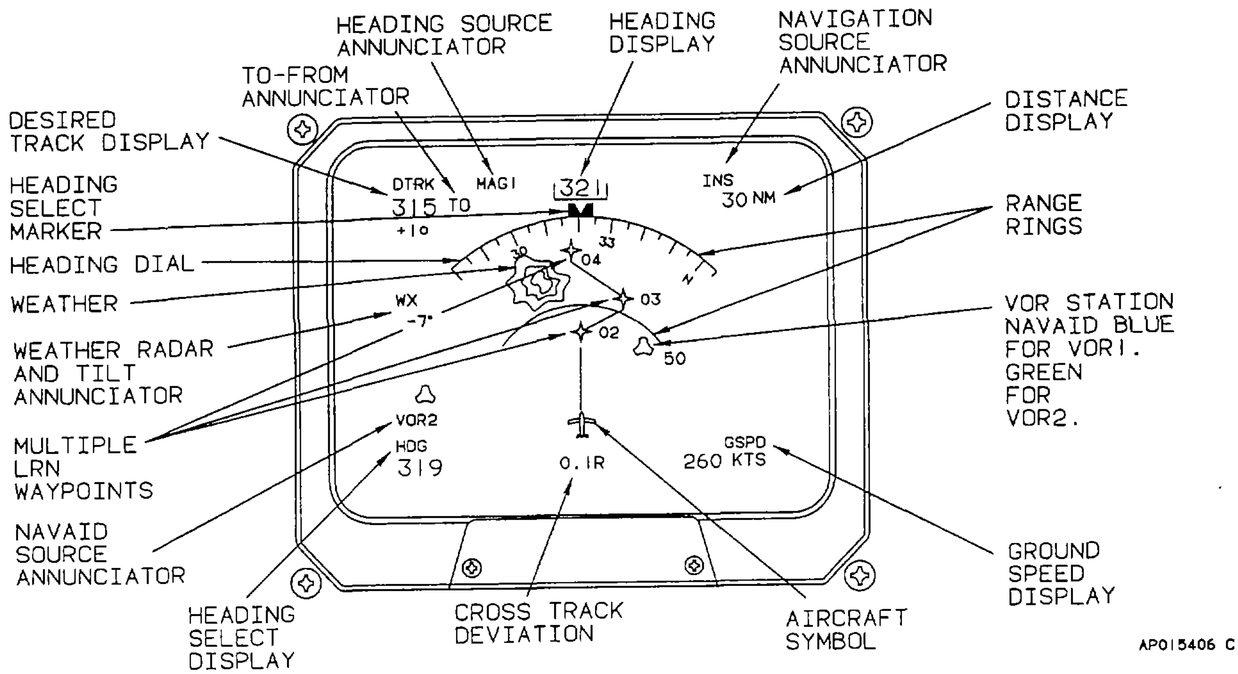


Figure 3-17. EHSI Multiple Waypoint Map Mode (LRN)

Each waypoint will be identified by a number between 00 and 09.

The waypoint to which the aircraft is flying will be magenta, with all other waypoints in white.

If the EFIS is receiving valid TACAN, VOR information, and DME distance, the navaids for the two VOR or TACAN stations will be available for display on the EFIS. The blue navaid will be VORI (NAV1) and the green navaid will be VOR2 (NAV2).

The EHSI can display up to six LRN waypoints and two VOR station navaid symbols at the same time. This assumes that all waypoints are within the selected weather radar range, and all are within the limits of the heading display of the EHSI in the map mode.

The specific functions of the multiple-waypoint map mode are as follows:

(1) Desired track. The desired track annunciator and a digital readout of the desired track from past waypoint to the next waypoint are shown in the upper left corner of the EHSL

(2) To from annunciator. The to-from display is located to the right of the desired track digital readout It shows TO when the aircraft is flying to the waypoint

f. EHSI Weather Radar Displays.

(1) Target alert annunciator (all formats). When target alert is selected on the weather radar controller, TGT in green is displayed on the EHSI. If a level 3 weather radar return is detected within 7.5 degrees of aircraft heading, but beyond the selected radar range, the annunciator will change TGT to amber.

(2) Range ring and annunciator. The range ring and annunciator is displayed only when WX, NAV, and NAV/WX format is selected. The range is selected on the weather radar controller. One-half the selected range is annunciated in white beside the half range ring. If weather radar range control is not available, the range default value will be 50 nautical miles.

(3) Weather radar modes. Weather radar mode is annunciated on the EHSI.

(4) Weather radar return display. Weather radar (WX) mode, weather radar information is displayed (table 3-3).

(5) Lightning sensor system display. Three levels of lightning activity are displayed using a white lightning symbol. A magenta lightning symbol is used to annunciate activity at an unknown range.

Table 3-3. Weather Radar Return Levels

Return	WX	GMAP
Level 1	Green	Cyan
Level 2	Yellow	Yellow
Level 3	Red	Magenta
Level 4	Magenta	--
RCT	Blue	--

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g. EHSI Amber Caution or Failure Annunciations (fig. 3-18).

(1) Same compass source or navigation source. When both the pilot and copilot select the same compass or navigation source, the source annunciators will be amber.

(2) Cross-switched navigation sources. If the pilot selects the copilot's navigation source (VOR2) or if the copilot selects the pilot's navigation source (VOR1), the annunciator will be amber to indicate cross-switched navigation sources. If both the pilot and copilot select TACAN as the navigation source, TCN will be annunciated in amber.

(3) DME hold. When DME is set in the hold position, an amber H is displayed to the left of the numerical DME readout

(4) Waypoint annunciations. An amber WPT annunciation from the long range navigation system (INS) is displayed to indicate waypoint passage.

(5) Cautions due to failures of DME, GSPD, or TTG. When distance measuring equipment (DME), groundspeed (GSPD), or time-to-go (TG) systems fail, the digital displays will be replaced by amber dashes. If NAV1 distance information is not available due to TACAN selection, an amber N/A will appear in the distance position.

NOTE

If one pilot selects TCN but the other pilot selects NAV1 navigation source, the pilot with the NAV1 data will have an N/A in the distance display. If TCN is deselected, distance data will return to the NAV1 distance display.

(6) Target alerts. Weather radar target alerts are annunciated on the EHSI. A green TGT annunciation indicates an armed condition, while an amber TGT indicates an alert condition.

(7) Course select and heading select. Failure of course or heading select signals will cause these displays to be replaced by amber dashes. They are also dashed when the heading display is invalid.

(8) Weather radar failure. Failure of the weather radar system is indicated on the EHSI by WX FAILURE (amber).

h. EHSI Red failure annunciations (fig. 3-19).

(1) Heading failure. A. failure of the heading system results in the removal of bearing annunciators, bearing pointers, course deviation pointer, and course scale. The digital course readout and digital heading readout will be dashed, and a red HDG FAIL will be displayed.

(2) Course deviation or glideslope deviation failure. Failure of course or glideslope deviation systems will result in the removal of course and glideslope pointers and a red X will be drawn through the scale. The letter G will appear at the zero deviation position of the glideslope scale to identify the invalid information

3-22. EADI AND EHSI COMPOSITE DISPLAY.

If an EADI or EHSI display unit fails, a composite attitude and navigation format (fig. 3-20), may be displayed on the remaining display. Selection of the composite mode is made by turning the applicable DIM control to OFF. As in normal EADI and EHSI presentations, all elements are not displayed at the same time. The presence or absence of each display element is determined by flight phase, navigation radio tuning, selected flight director mode, absolute altitude, etc. The failure, caution, and warning annunciations function is much the same as for the normal display mode.

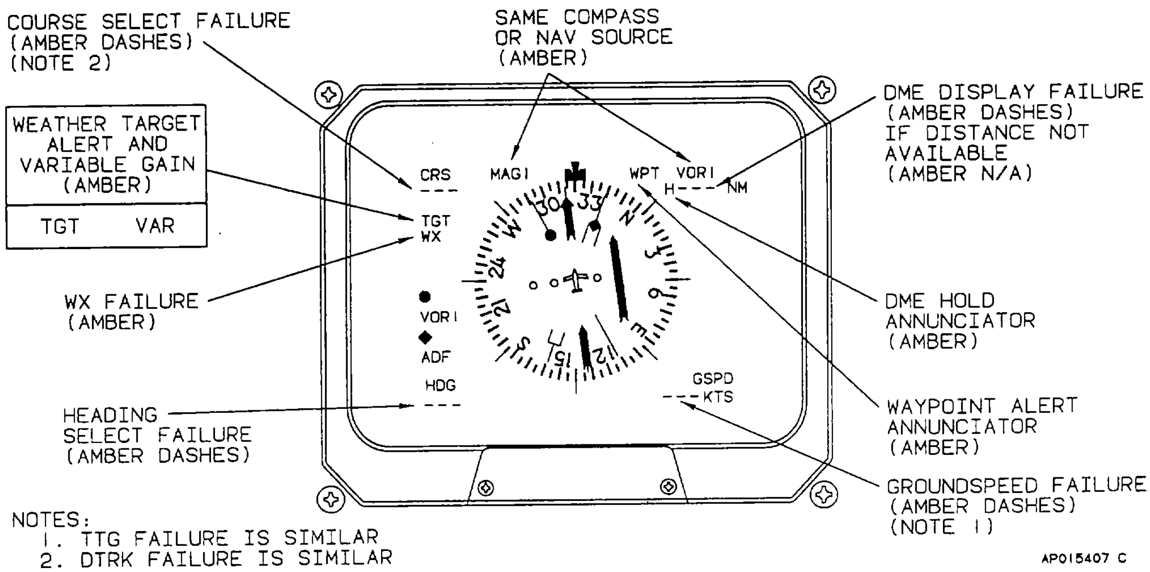


Figure 3-18. EHEI Caution Annunciators (Amber)

NOTE

The composite mode deviation display functions as a simple fixed-card course deviation indicator (CDI) for VORITACAN data. As long as the aircraft is headed within 90 degrees of the selected course or selected radial, and as long as the to-from annunciation is correct, the course deviation pointer is directional; otherwise, it will display reverse sensing and the techniques required for reverse sensing will apply.

When a localizer has been tuned, and the aircraft has a heading greater than 90 degrees to the selected inbound localizer course, the course deviation indicator (CDI) will reverse sensing so that normal front course corrections will apply.

3-23. DIGITAL FLIGHT CONTROL SYSTEM (DFZ450).

The digital flight control system consists of the following components:

Flight Control Computer (FZ450).

Stability Augmentation Computer (SZ-400).

Autopilot Controller (PC-400).

Flight Director Mode Selector (MS-207).

Rudder Servo (SM-205).

Elevator and Aileron Servos (SM-200).

Elevator Trim Tab Servo

a. Flight Control Computer (FZ-450). The flight control computer provides fail-passive operation of flight director, autopilot, and pitch trim. Fail-passive operation is achieved through the use of comparator monitor circuits on vertical gyros, and servo command outputs. Servo command outputs from a computed servo model in all three axes are compared to actual commands. If the difference between commands exceeds a certain threshold value, the flight control computer is disconnected from the servos. Normal flight control computer functions are computed based on the vertical and directional gyros selected with the respective EFIS display controllers.

b. Flight Control Computer/Autopilot Mode Annunciation. Flight control computer/autopilot operating modes are annunciated on the flight director mode selector and on each electronic attitude director indicator (EADI). The flight director command bars, on the coupled side's EADI, reflect the selected mode. The navigation sensor used for the selected modes is chosen with the display controller (DC-811) and annunciated on the EHSI.

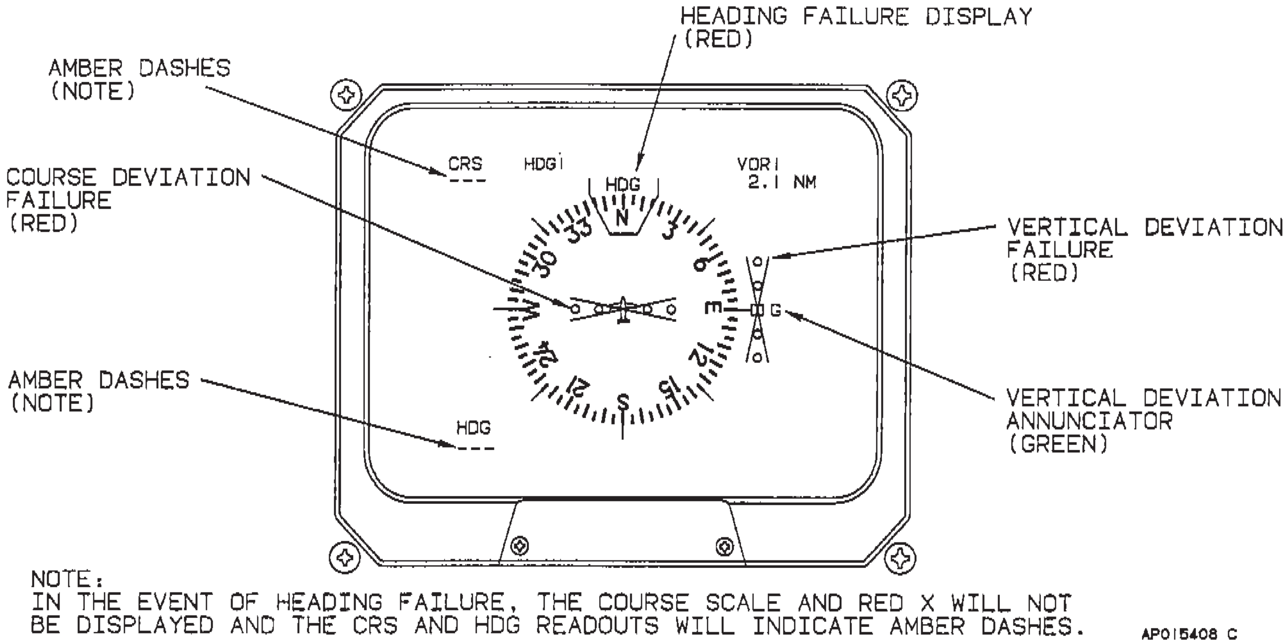


Figure 3-19. EHSI Failure Annunciators (Red)

c. Autopilot Self-Disconnection Fault Messages.

The pilot can investigate the cause of an inflight autopilot disconnection by depressing the SBY button on the flight director mode selector for more than 5 seconds. The altitude preselector display will be disconnected from the digital air data computer and connected to the autopilot. A numerical fault code will appear on the altitude preselector display. Table 3-4 provides an explanation of fault codes. Subsequent pushes on the SBY switch on the flight director mode selector will yield additional fault codes or dashes, which indicate the end of the error code log. When the dashes appear in the display, the altitude preselector display will again be reconnected to the digital air data computer. Fault messages are displayed as a letter code followed by a three digit number. Ignore the last digit of the number, which will be a zero. Table 3-4 describes fault codes.

If the autopilot was disconnected as a result of the fault, depressing the AP DISC button on the control wheel will allow the autopilot to be re-engaged, provided the failure no longer exists.

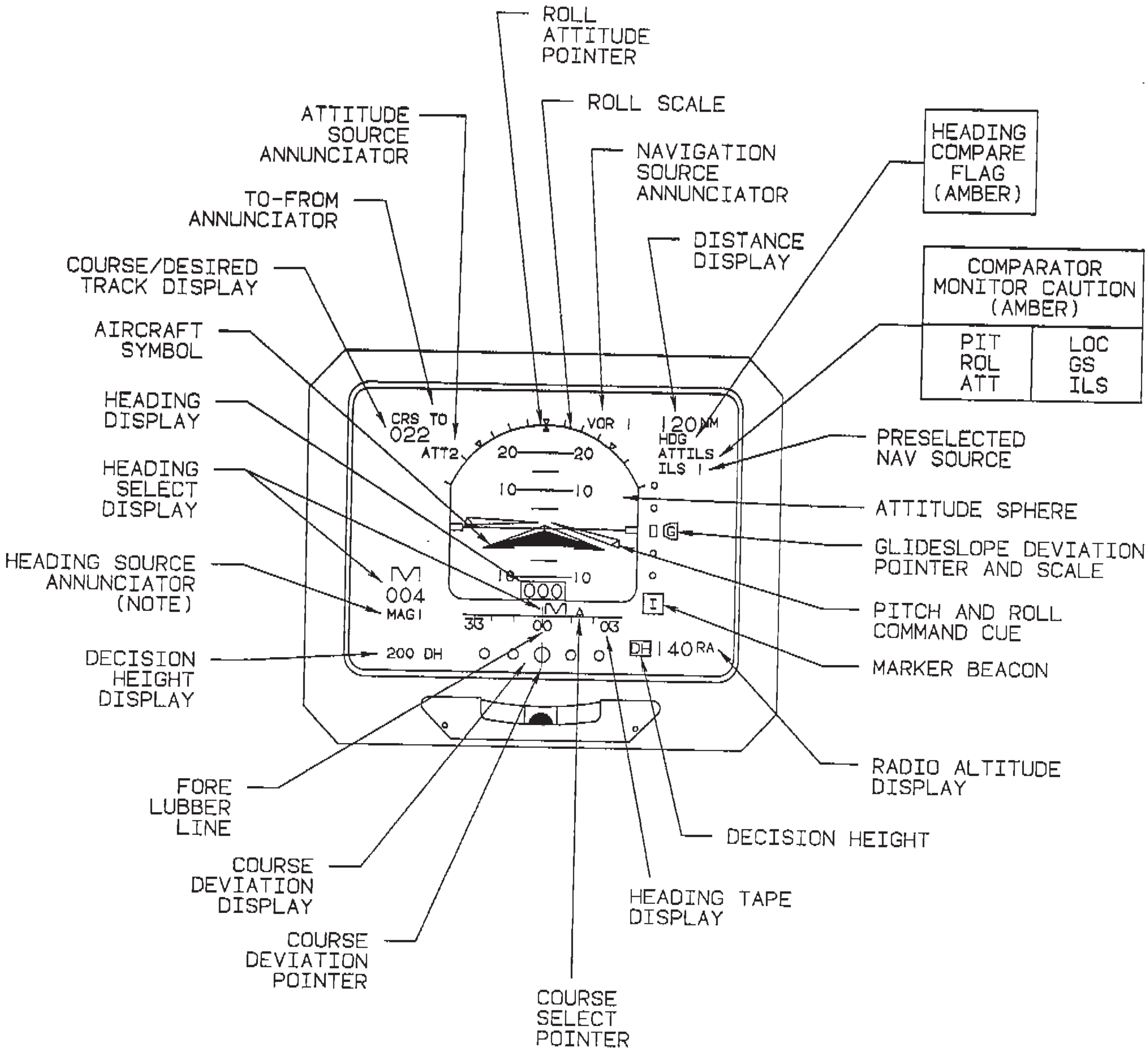
d. Digital Flight Control System Performance/Operating Limits. Table 3-5 contains the digital flight control system performance and operating limits.

e. Yaw Damper. The yaw damper computer provides basic yaw damper functions with or without the autopilot. When the autopilot is engaged turn coordination is active. Yaw damper mode is active when either the YD or AP ENGAGE button on the autopilot controller is selected.

f. Rudder Boost. The yaw damper computer also provides rudder assist (boost) in the event of an engine failure. The amount of assist provided is dependent upon airspeed and engine power differential. The boost function is armed when the rudder boost switch located on the pedestal extension is set to the RUDDER BOOST position.

g. Autopilot Controller (PC-400). The autopilot controller (fig. 3-21), provides a means of engaging/disengaging the autopilot and yaw damper as well as manually controlling the autopilot through the turn knob and pitch wheel. Whenever the autopilot is engaged, it will fly basic roll and pitch hold or the selected lateral or vertical flight director modes.

(1) Pitch Wheel. Rotating the pitch wheel with the autopilot engaged will result in a change in pitch attitude proportional to the amount of rotation and in the direction of wheel movement. Movement of the pitch wheel cancels only altitude hold (ALT HOLD) or altitude select capture (ALT SEL CAP). With the vertical modes of vertical speed



NOTE:
WHEN AIR DATA COMMAND MODES ARE SELECTED THE HEADING SOURCE ANNUNCIATOR IS REMOVED. CANCELING THE AIR DATA COMMAND CAUSES THE HEADING SOURCE ANNUNCIATOR TO REAPPEAR.

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Figure 3-20. EADI/EHSI Composite Display

Table 3-4. Digital Flight Control System Error Codes

FZ-450 Error Codes	
Err 00 Processor Reset/Lost Processor	Err 35 Trim Test Fail
01 +15 Volt DC Fail	36 Lateral Accelerometer Fail
02 -15 Volt DC Fail	50 Aircraft ID Fail
03 -5 Volt DC Fail	51 Abbreviated Trim Test Fail
04 +10 Volt DC Fail	52 DG Fail
05 LVC Monitor Fail	53 Hardware Fail
06 Sawtooth Monitor Fail	54 VG No. 1 Fail
07 26 VAC Reference Fail	55 VG No. 2 Fail
08 Watchdog Monitor Fail	56 Pitch Current Monitor Fail
09 Interrupt Register Fail	57 Roll Current Monitor Fail
10 A/D End-Around Fail	59 Vertical Gyro Comparison Fail
11 EEPROM Fail	60 Pitch Servo Loop Fail
12 PROM Checksum Fail	61 Roll Servo Loop Fail
13 RAM Read/Write Fail	63 Servo Fail
14 CPU Register Fail	64 Excessive Lateral Acceleration
15 CPU Instruction Set Fail	65 Pitch Trim Fail
16 RAM Continuous Fail	66 Excessive Vertical Acceleration
17 Essential RAM Checksum Fail	67 Excessive Roll Rate
18 Continuous A/D and D/A Test Fail	68 Wrong Trim Polarity
19 Continuous PROM Test Fail	69 RG Valid Fail
20 Ticket Fail	70 26 VAC Crosside Reference Fail
21 CPU Fail	71 AP Disconnect PB Fail
30 Pitch Magnitude Rate Limiter Fail	72 Turn Knob Detent Fail
31 Roll Magnitude Rate Limiter Fail	73 Manual Trim Input Fail
33 Roll Torque Fail	
34 Pitch Torque Fail	

(VS) or indicated air speed (IAS) selected on the mode selector, rotation of the pitch wheel will change the respective air data command vertical mode reference (with autopilot engaged or disengaged) which is displayed on the EADI. VS or IAS modes may be cancelled by pressing the mode button on the mode selector panel. Movement of the pitch wheel has no effect with the autopilot coupled to the glideslope.

(2) Bank limit switch-indicator. The BANK LIMIT switch provides a lower maximum bank angle while in the heading select mode. Depressing the bank limit switch-indicator will illuminate the LOW indicator on the switch face. Depressing the switch again will cause the LOW indicator to be extinguished and the autopilot to return to normal bank limits. The lower bank limit is inhibited and the LOW indicator will be extinguished during NAV mode captures. If heading select is again engaged, LOW will again be illuminated on the bank limit switch-indicator.

(3) Soft ride switch-indicator. The SOFT RIDE mode provides reduced pitch and roll autopilot gains while still maintaining stability in rough air. This mode may be used with any flight director mode, but should only be selected ON in turbulence. Depressing the SOFT RIDE switch-indicator will cause the ON indicator to illuminate on the switch face.

(4) Turn knob. Rotation of the turn knob out of the detent results in a roll command. The roll angle is proportional and in the direction of turn knob rotation. The turn knob must be in the detent (center position) before the autopilot can be engaged. Rotation of the turn knob cancels any other previously selected lateral mode.

(5) Yaw damper switch-indicator. Depressing the yaw damper (YD) switch will engage the yaw damper and illuminate the ENGAGE indicator on the switch face. With the autopilot (AP) and yaw damper (YD) engaged, depressing the yaw damper switch-indicator will engage or disengage the yaw damper only (autopilot will remain engaged).

Table 3-5. Digital Flight Control System Limits (Sheet 1 of 3)

Mode	Control or Sensor	Parameter	Value
Yaw Damper	Yaw Engage	Engage Limit	Up to 45° left or right bank
Autopilot Engage	A/P Engage	Engage Limit	Roll: Up to ±15° Pitch: Up to ± 20°
Basic Autopilot	Touch Control Steering (TCS)	Roll Control Limit Pitch Control Limit	Roll: Up to ± 32° Pitch: Up to ± 20°
	Turn Knob	Roll Angle Limit Roll Rate Limit	± 30° ± 5.5° /sec
	Pitch Wheel	Pitch Angle Limit	± 20° pitch
	Heading Hold	Roll Angle Limit	Less than 6° and no roll mode selected
Heading Select	Heading SEL knob on HSI or remote slew knob on console	Roll Angle Limit Roll Rate Limit	± 25° ± 3.0° /sec
VOR or VORAPR	Course Knob, NAV receiver and DME Receiver	Capture Beam Angle Intercept (HDG SEL) Roll Angle Limit Roll Rate Limit Course Cut Limit at Capture Capture Point On Course Roll Angle Limit Crosswind Correction Over Station Course Change Roll Angle Limit Roll Rate Limit	 Up to ± 90° ± 25° ± 5° /sec VORAPR ± 3° /sec VOR ± 30° course Function of beam, beam rate, course error, and DME distance. Maximum trip point is 175 mV. Minimum trip point is 30 mV. ± 13° Up to ± 45° course error in VOR ± 30° in VORAPR Up to ± 30° ± 17° ± 3° /sec
LOC or APR or BC	Course Knob and NAV Receiver and	LOC Capture Beam Intercept Roll Angle Limit Roll Rate Limit	 Up to ± 90° ± 25° ± 5.5° /sec

Table 3-5. Digital Flight Control System Limits (Sheet 2 of 3)

Mode	Control or Sensor	Parameter	Value
LOC or APR or BC (cont)	Radio Altimeter	Capture Point	Function of beam rate and course error. Maximum trip point is 200 mV. Minimum trip point is 60 mV.
		NAV On Course	
		Roll Angle Limit	± 13° of roll
		Crosswind Correction Limit	± 30° of course error
		Gain Programming	Starts at 1200 ft radio altitude, gain reduction = 1 to 0.4
	GS Receiver, Air Data Computer and Radio Altimeter	Glideslope Capture	
		Beam Capture	Function of beam and beam rate.
		Pitch Command Limit	± 10°
		Glideslope Damping	Vertical Acceleration
		Pitch Rate Limit	f (TAS)
		Gain Programming	Starts at 1200 ft radio altitude, gain reduction = 1 to 0.08.
GA	Control Switch on Wheel	Fixed Pitch-Up Command, Wings Level	7° pitch up
Pitch Sync	TCS Switch on Wheel	Pitch Altitude Command	± 20° maximum
ALT Hold	AIR Data Computer	ALT Hold Engage Range	0 to 41,000 ft
		ALT Hold Engage Error	± 30 ft
		Pitch Limit	± 20°
		Pitch Rate Limit	f (TAS)
VS Hold	AIR Data Computer	VERT Speed Engage Range	0 to ± 6,000 ft/min
		VERT Speed Hold Engage Error	± 100 ft/min
		Pitch Limit	± 20°
		Pitch Rate Limit	f (TAS)
IAS Hold	AIR Data Computer	IAS Engage Range	80 to 400 knots
		IAS Hold Engage Error	± 5 knots
		Pitch Limit	± 20°
		Pitch Rate Limit	f (TAS)

Table 3-5. Digital Flight Control System Limits (Sheet 3 of 3)

Mode	Control or Sensor	Parameter	Value
ALT Preselect	Air Data Encoding	Preselect Capture Range	0 to 41,000 ft
	Altimeter and Altitude Pre-select Controller	Maximum Gravitation Force During Capture Maneuver	± 0.20 g
		Pitch Limit	± 20°
		Pitch Rate Limit	f (TAS)
Rudder Boost	Engine Sensors, Air Data	Rudder Force	f(Engine torque differential) f(IAS)

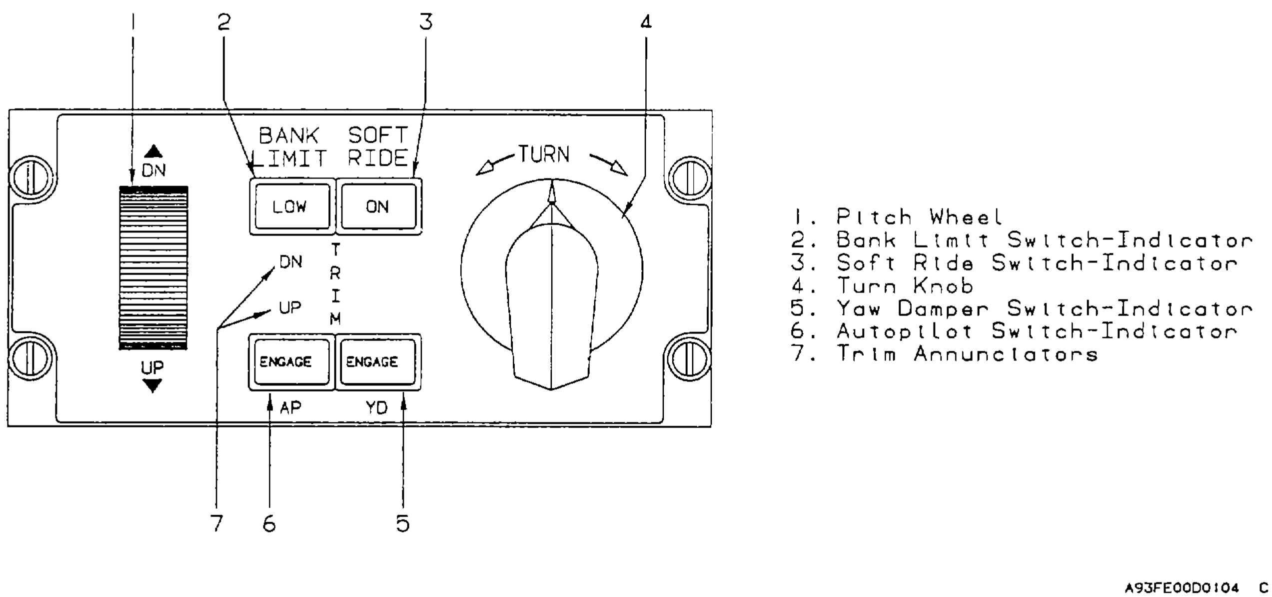

Figure 3-21. Autopilot Controller

(6) *Autopilot switch-indicator.* Depressing the autopilot (AP) switch-indicator will engage the autopilot and yaw damper simultaneously, and will illuminate the AP and YD ENGAGE indicators on the switch face. The autopilot may be engaged with the aircraft in any reasonable attitude. With no flight director modes selected, the autopilot will roll the aircraft to a wings level attitude upon engagement.

h. Flight Director Mode Selector (MS-207). The flight director mode selector (fig. 3-22), provides all mode selection except go-around, which is initiated by the go-around switch located on the left power lever (fig. 2-12). The flight director command bars on the EADI provide integrated pitch and roll guidance to satisfy the selected mode. The top row of illuminated switch-indicators contains the lateral modes, and the bottom row contains the vertical modes. The split light switch-indicators illuminate amber for armed conditions and green for captured conditions. Mode status is annunciated on both EADI's. If more than one lateral or vertical mode is selected, the flight director system automatically arms and captures the submode.

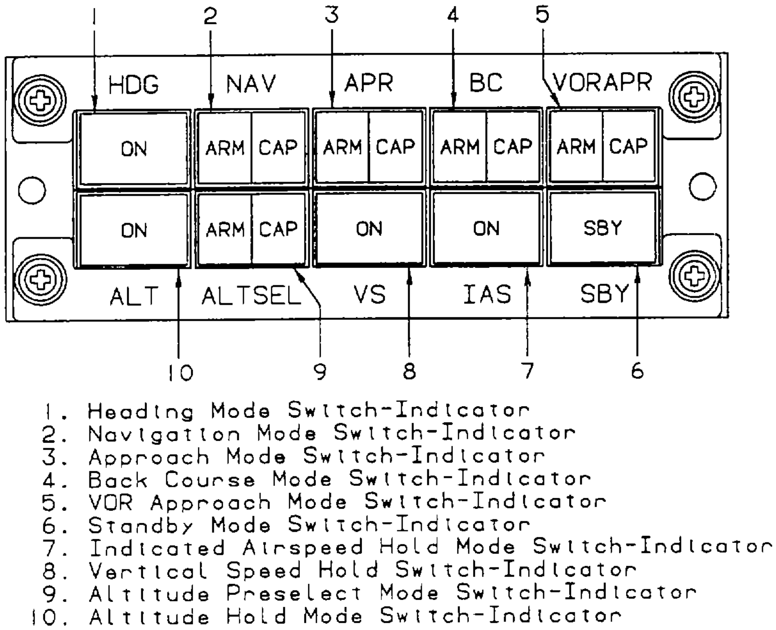

Figure 3-22. Flight Director Mode Selector

(1) Heading mode switch-indicator. Depressing the heading mode switch-indicator, placarded HDG, will illuminate the ON indicator on the face of the switch and will command the flight control computer to follow the inputs of the heading marker located on the heading dial of the coupled EHSL

(2) Navigation mode switch-indicator. Depressing the navigation mode switch-indicator, placarded NAV, will cause the flight control computer to arm, capture, and track the navigation signal (VOR, LOC, TACAN, or LNAV) which has been selected as the navigation source for the EFIS. When approach (APR) has been selected, the navigation (NAV) select switch-indicator will annunciate lateral tracking status.

(3) Approach mode switch-indicator. Depressing the approach mode switch-indicator, placarded APR, will select the appropriate gains to arm and capture the lateral navigation signal for localizer (LOC) and vertical navigation signals for the glideslope. Except for an ILS, when approach is selected, the NAV switch will annunciate the appropriate arm or capture condition

(4) Back course mode switch-indicator. Depressing the back course mode switch-indicator, placarded BC, will command the flight control computer to track the localizer back course, and will illuminate the ARM or CAP indicators on the switch face as appropriate.

(5) VOR approach mode switch-indicator. Depressing the VOR approach switch-indicator, placarded VOR APR, will select the appropriate gains for capturing and tracking a VOR during the approach phase of flight, and will illuminate the ARM and CAPture indicators on the switch face when appropriate.

(6) Standby mode switch-indicator. Depressing the standby mode switch-indicator, placarded SBY, will remove all the selected flight director modes, forcing the command bars to be removed from the EADI, and will illuminate the SBY indicator located on the switch face.

(7) Indicated airspeed hold mode switch indicator. Depressing the indicated airspeed hold mode switch-indicator, placarded IAS, will command the system to maintain the current indicated airspeed or to allow a new indicated airspeed to be selected with either the autopilot pitch wheel or by using the touch control steering switch on the control wheel. When operating in the IAS mode the ON indicator located on the face of the switch will be illuminated and the target airspeed will be displayed on the EADI.

(8) Vertical speed hold mode switch-indicator. Depressing the vertical speed hold mode switch-indicator, placarded VS, will command the system to maintain the

current vertical speed or to allow a new vertical speed to be selected with either the autopilot pitch wheel or by using the touch control steering switch on the control wheel. When operating in the VS mode the ON placard located on the face of the switch will be illuminated and the target vertical speed will be displayed on the EADI.

(9) Altitude preselect mode switch-indicator. Depressing the altitude preselect mode switch-indicator, placarded ALT SEL, will command the flight control computer to arm and capture and maintain the altitude displayed on the altitude preselector (fig. 3-23). When operating in the ALT SEL mode the ARM or CAP indicators located on the switch face will be illuminated as appropriate.

(10) Altitude hold mode switch-indicator. Depressing the altitude hold mode switch-indicator, placarded ALT, commands the flight control computer to hold the current altitude, and will illuminate the ON indicator located on the face of the switch. Capturing the altitude displayed on the altitude preselector will also cause the system to maintain that altitude.

i. Control-Wheel Mounted Autopilot Disconnection Switches. A bi-level autopilot/electric trim/yaw damper disconnect switch, placarded DISC - AP & YD - TRIM, is mounted on each control wheel (fig. 2-22). Depressing the switch to the first level will disconnect the autopilot and the yaw damper. Depressing the switch to the second level will also disconnect the electric elevator trim.

j. Touch Control Steering (TCS). A control-wheel mounted touch control steering switch (fig. 2-22), placarded TCS, allows the pilot to manually change aircraft attitude, altitude, vertical speed, or airspeed without disengaging the autopilot. The TCS switch is held depressed while the aircraft is maneuvered to the new attitude, altitude, vertical speed, or airspeed. When the switch is released, the autopilot will automatically synchronize to the vertical mode. If an air data mode (IAS or VS) was selected, the selected value will be synchronized to the current value when the switch is released.

k. Go-Around Switch. A pushbutton switch located on the left power lever (fig. 2-12), placarded GO AROUND, activates the flight control system go-around mode when depressed. Go-around mode will disengage the autopilot, command a wings-level 7 degree nose-up attitude, and engage the yaw damper.

l. Rudder Boost/Yaw Control Test Switch. A three-position toggle switch located on the pedestal extension (fig. 2-13), placarded RUDDER BOOST - OFF - YAW CONTROL TEST, arms the rudder boost system and is used to test for correct operation of the stability augmentation computer.

m. Autopilot EFIS Select Switch. A pushbutton switch-indicator located above the pilot's EADI, placarded AP EFIS 1 and AP EFIS 2, selects which side's symbol generator will provide inputs to the flight control computer.

n. Symbol Generator Reversionary Switch.

WARNING

Placing the pilot and co-pilot reversionary switches to the REV position on the SYM GEN switch will cause the blanking of all four EFIS display screens.

A symbol generator reversionary toggle switch (fig. 2-16), placarded SYM GEN, REV - NORMAL, is located on the left and right sides of the instrument panel. In the event of a known or suspected symbol generator failure, placing the symbol generator reversionary switch to the REV position connects the corresponding EFIS system to the cross-side symbol generator. In the reversionary position, the opposite side symbol generator provides all the information to both (all four) displays. Additionally, the opposite display controller controls all of the display functions.

NOTE

If the SYM GEN reversionary switch is moved to the REV position with the autopilot/flight director selected to that side, the flight director modes will disengage.

Table 3-6 shows which flight director modes are reset by the EFIS when sources are changed.

Table 3-6. Flight Director Modes Reset when EFIS Sources Change

Selection Action	FD Modes Reset
V/L or INS/TCN	Navigation
HDG	Lateral
ATT	All modes

NOTE: When ATT is selected, the autopilot also disengages.

NOTE

When ATT is selected, the autopilot will disengage.

o. Automatic Flight Control System - Check as follows:

1. MASTER SWITCH (overhead control panel, fig. 2-13) - ON.
2. AVIONICS MASTER POWER switch (overhead control panel, fig. 2-13) - ON or EXT PWR as required.
3. #1 and #2 EFIS POWER switches (overhead control panel, fig. 2-13) - ON.
4. AUTO PLT POWER switch (overhead control panel, fig. 2-13) - ON.
5. RUDDER BOOST/YAW CONTROL TEST switch (pedestal extension, fig. 2-12) - RUDDER BOOST.

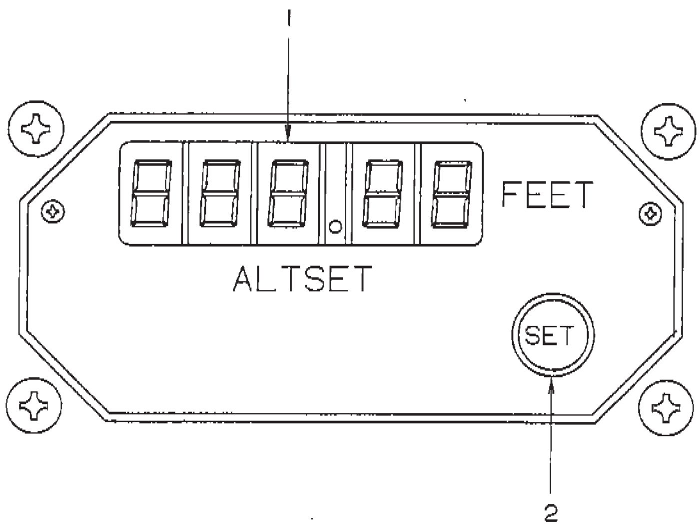

Figure 3-23. Altitude Preselector

6. RADIO ALT switch (mission control panel, fig. 4-1) - ON.
7. Autopilot EFIS selector switch (instrument panel, fig. 2-16) - AP EFIS 1.
8. Attitude alerter - Check as follows:
   a. Pilot's altimeter - Set to field elevation.
   b. Altitude preselector - Set to more than 1000 feet above field elevation.
   c. Pilot's altimeter barometric set knob - Slowly increase pilot's altimeter setting.
   d. Altitude alerter annunciator and horn - Verify that the altitude alert annunciator on the pilot's altimeter illuminates and the altitude alerter horn sounds when the pilot's altimeter reading is approximately 1000 feet from the value set on the altitude select controller.
   e. Pilot's altimeter - Reset to field elevation.
   f. Altitude preselector - Reset to field elevation.
   g. Pilot's altimeter barometric set knob - Slowly increase pilot's altimeter setting.
   h. Altitude alerter annunciator and horn - Verify that the altitude alerter annunciator on the pilot's altimeter illuminates and the altitude alerter horn sounds when the altimeter reading is approximately 250 feet from the value set on the altitude alert controller.
   i. Pilot's altimeter - Reset to current barometric altimeter setting or to field elevation.
9. Flight director - Check as follows:
   a. SBY push-button switch (flight director mode selector) - Depress for at least 5 to 8 seconds and verify the following indications:
      (1) Flight director mode selector - Annunciators illuminated.
      (2) Autopilot controller - Annunciators illuminated.
      (3) Altitude select controller - All 8's illuminated.
      (4) Pilot's altimeter altitude alerter annunciator - Illuminates.
      (5) EADI - FD FAIL (amber) and Glide slope off flag will be annunciated.

b. After SBY push-button switch has been held depressed for 5 to 8 seconds verify that:
   (1) AP TRIM annunciator - illuminates.
   (2) Autopilot disconnect horn - Sounds.
   (3) SBY push-button switch - Release.
   (4) EADI - FD FAIL and glide slope off flag will be extinguished.

10. Autopilot - Check as follows:
   a. Autopilot trim annunciators - Check extinguished.
   b. TURN knob - Center.
   c. ELEV TRIM switch - Check ON.

NOTE

The control wheel must be held at mid-travel due to ballast in the elevator. The autopilot will disconnect during elevator trim follow up check due to the heavy nose down force if the control wheel is not off the forward stop.

   d. Control wheel - Move to mid-travel.
   e. AP ENGAGE switch-indicator (autopilot controller) - Depress to engage autopilot and yaw damper. Check that AP ENGAGE and YD ENGAGE switch indicators on autopilot controller and remote annunciators on instrument panel are illuminated.

11. Autopilot overpower check - Check as follows:
   a. Rudder pedals - Overpower slowly.
   b. Control wheel - Overpower slowly in both directions.

WARNING

If the autopilot or the yaw damper disengages during the overpower test, the system is considered non-operative and should not be used. The elevator trim system must not be forced beyond the limits which are indicated on the elevator trim indicator.

12. Elevator trim follow-up - Check as follows:
   a. Control wheel - Move to mid-travel. Trim wheel should run nose down after approximately 3 seconds. TRIM DN annunciator (autopilot controller) should illuminate after approximately 6 to 8 seconds, and AP TRIM annunciator (instrument panel) should illuminate after approximately 15 seconds.
   b. Control wheel - Move forward of mid-travel. Trim wheel should run nose up after approximately 3 seconds. TRIM UP annunciator (autopilot controller) check illuminated after approximately 6 to 8 seconds. AP TRIM annunciators (instrument panel) check illuminated after approximately 15 seconds.

13. AP & YD/TRIM DISC switch (control wheel) - Depress to first to first level. Check that autopilot and yaw damper disengages. AP ENGAGE and YD ENGAGE switch indicators on the autopilot controller and remote annunciators above the EADI flash 5 times.
14. Control wheel - Hold to mid-travel.
15. AP ENGAGE switch - Re-engage.
16. Turn knob - Check that elevator control trim wheel follows in each applied direction, then center knob.
17. Pitch wheel - Check that trim responds to pitch wheel movements (UP TRIM and DN TRIM annunciators may illuminate).
18. Heading marker - Center and engage HDG. Check that control wheel follows a turn in each direction.
19. GO AROUND button (left power lever) - Depress. Check that AP disengages and FD commands a wings level 7 degrees nose up attitude. Check GA annunciator on EADI illuminates. Yaw damper should automatically engage and YD ENGAGE switch-annunciator should be illuminated on the autopilot controller and the remote annunciators above the EADI should be illuminated.
20. RUDDER BOOST/YAW CONTROL TEST switch (pedestal extension) - TEST. Check the RUDDER BOOST annunciator above the EADI’s illuminates, yaw damper disengages, YD ENGAGE switch-indicator on the autopilot controller extinguishes, and the YD ENGAGE remote annunciators above the EADI flash 5 times.

WARNING

If the SBY annunciator on the flight director mode selector does not illuminate within 10 seconds after the avionics master switch is turned on, the autopilot has failed self-test and is considered inoperative and should not be used.

CAUTION

Do not force the elevator trim system beyond the limits which are indicated on the ELEVATOR trim tab indicator.

21. YD ENGAGE push-button switch-indicator (autopilot controller) - Depress while holding rudder boost/yaw control test switch in TEST. Yaw damper should not engage.
22. RUDDER BOOST/YAW CONTROL TEST switch - RUDDER BOOST. Check RUDDER BOOST annunciator extinguished.
23. Electric elevator trim - Check.
    a. ELEV TRIM switch - ON.
    b. Pilot and copilot trim switches - Check operation.

WARNING

Operation of the electric trim system should occur only by movement of pairs of switches. Any movement of the elevator trim wheel while depressing only one switch element indicates a trim system malfunction. The electric elevator trim control switch must then be turned OFF and flight conducted by operating the elevator trim wheel manually. Do no use autopilot.

   c. Pilot and copilot trim switches - Check individual element for no movement of trim, then check proper operation of both elements.
   d. Pilot trim switches - Check that pilot switches override copilot switches while trimming in opposite directions, and trim moves in the direction commanded by pilot.
   e. Pilot or copilot trim switches - Check trim disconnects while activating pilot or copilot trim disconnect switches.
   f. ELEV TRIM switch - OFF then ON (ELEV TRIM OFF annunciator extinguishes).

p. Digital Flight Control System Modes of Operation.

(1) Heading hold mode (wings level). The basic lateral mode of the autopilot is heading hold. Heading hold mode is defined as:

Autopilot engaged

No lateral flight director mode selected

Bank angle less than 6 degrees

If the above conditions are satisfied, the autopilot will roll the aircraft to a wings level attitude. When the aircraft's bank angle is less than 3 degrees for 10 seconds, the heading hold mode is automatically engaged. The heading hold mode is not annunciated on the EADI as it is the default lateral mode when no other lateral steering mode is selected. Autopilot engagement is annunciated on the EADI.

(2) Roll hold mode. The autopilot will recognize the roll hold mode as being operational when:

No lateral flight director mode has been selected

The aircraft's bank angle is greater than 6 degrees, but less than 35 degrees

The autopilot is engaged

When the above conditions have been satisfied, the autopilot will maintain the desired bank angle. With the autopilot engaged, bank angles up to 35 degrees can be established using the turn knob. If touch control steering (TCS) was used to initiate the roll, bank angles up to 35 degrees can be maintained and TCS ENG will be annunciated on the EADI.

(3) Heading select mode. The heading select mode is used to intercept and maintain a magnetic heading. The mode is selected with the HDG switch-indicator on the flight director mode selector panel (fig. 3-22). Heading mode selection is annunciated by a green HDG annunciator on the EADI. The heading marker is set on the heading dial of the EHSI by means of the instrument remote controller (pedestal extension, fig. 2-12). When operating in the heading mode the flight control computer provides inputs to the pitch and roll command cue on the EADI to command a turn to the heading selected by the heading marker located on the EHSI. Heading mode signal gain is a function of airspeed. Bank angle limit is 25 degrees in the heading select mode.

Heading select mode is cancelled by:

Capture of any other lateral steering mode

Selecting go-around mode

Selecting standby mode

EFIS 1/2 reversionary selection

NAV, ATT, or HDG reversionary selections

(4) VOR (NAV) mode. The VOR mode provides for automatic intercept, capture, and tracking of a selected VOR radial, using the selected navigation source displayed on the EHSI. The navigation source displayed on the EHSI is a function of the VOR/localizer (V/L) pushbutton selector switch located on the display controller (fig. 3-8). Prior to engaging the VOR (NAV) mode, perform the following:

1. VOR navigation receiver control panel - Set desired VOR frequency.
2. V/L pushbutton selector switch (display controller) - Depress to select VOR1 or VOR2.
3. Course pointer (EHSI) - Set desired course on heading dial.
4. Heading marker (EHSI) - Set desired intercept heading for selected course.

With the aircraft outside the normal capture range of the VOR signal (typically, course deviation indicator on EHSI off course by more than 2 dots), engage the NAV switch-indicator on the flight director mode selector. HDG switch-indicator on the flight director mode selector panel will illuminate ON, and the NAV switch-indicator will annunciate ARM. HDG (green) and VOR ARM (white) will also be annunciated on the EADI. The flight control computer is now armed to capture the VOR signal, and is generating a roll command to fly the heading select mode.

When reaching the lateral beam sensor trip point, the system will automatically drop the heading select mode and will switch to the VOR capture phase. The EADI will display the following indications:

VOR annunciator (white) will extinguish

HDG annunciator (green) will extinguish

NAV (green) will be annunciated and will be enclosed in a white box for 5 seconds to indicate the capture phase

The heading pushbutton switch-indicator on the autopilot/flight director mode selector will extinguish and the NAV pushbutton switch-indicator will switch from ARM to CAP

The flight control computer now generates the proper roll command to capture and track the selected VOR radial.

Course select error signal is established by the heading selected by the course pointer on the EHSI. This signal represents the difference between the actual aircraft heading and the desired course. The course error signal is then sent from the symbol generator to the flight control computer.

The radio deviation signal is routed from the navigation receiver to the symbol generator and flight control computer. The signal is lateral gain programmed in the flight control computer.

The lateral gain programming is performed as a function of DME distance to the station (if available), true airspeed, and barometric altitude. This gain programming adjusts for the aircraft going toward or away from the VOR station.

NOTE

If possible, avoid using DME hold or having N/A as a distance display annunciation during VOR capture and tracking. When in this condition the flight control computer cannot use DME distance for gain programming.

When flying a VOR intercept, the optimum intercept angle is less than 45 degrees. When the aircraft satisfies VOR track conditions, the course error signal is removed from the lateral steering command. This leaves radio deviation, roll attitude, and lateral acceleration to track the VOR signal, and to compensate for beam standoff in the presence of a crosswind. The system will automatically compensate for a crosswind of up to 45 degrees course error.

As the aircraft approaches the VOR station, it will enter a zone of unstable radio signals (zone of confusion). This zone radiates upward from the station in the shape of a truncated cone. In this area, the radio signal becomes highly erratic and it is desirable to remove it from the roll command. The overstation sensor monitors entry into the zone of confusion and removes radio deviation from the roll command.

The system also uses the collocated DME signal (if available) to adjust tracking gains.

When over the VOR station, the system will accept and follow a course change of up to 30 degrees.

(5) VOR approach mode. The set-up procedure for the VOR approach mode is the same as for VOR tracking, except the VORAPR pushbutton switch-indicator on the mode selector panel is depressed instead of the NAV switch-indicator. ARM will be annunciated by the VORAPR switch-indicator on the mode selector panel and APR will be displayed in white on the EADI.

The flight control computer will now apply the gains appropriate for a VOR approach. Upon capture of the selected course, the VORAPR mode selector switch will annunciate capture (CAP), and APR will be annunciated on the EADI in green.

(6) TACAN navigation and approach mode. TACAN navigation and approaches is accomplished in a similar manner to VOR navigation and approaches. Prior to engaging the mode, perform the following:

1. TACAN navigation receiver control panel Set desired channel.
2. INS/TCN pushbutton selector switch (display controller) - Depress to select TCN.
3. Course pointer (EHSI) - Set desired course on heading dial.
4. Heading marker (EHSI) - Set desired intercept heading for selected course.
5. Flight director mode selector panel - Select NAV for TACAN navigation or APR for a TACAN approach. The EADI will annunciate NAV arm and capture when appropriate.

The flight control system will perform the capture and tracking as described for VOR navigation and approaches.

(7) Inertial navigation system (INS) steering mode. Operation in the INS steering mode is similar to operation in the NAV mode, with the following differences:

Instead of using course error and radio deviation from the symbol generator, a composite lateral steering command from the INS through the symbol generator is used.

Lateral steering command gain is programmed in the INS.

LNAV is annunciated on the EADI.

Desired track is selected by the INS

When the NAV pushbutton switch-indicator on the flight director mode selector panel is depressed, LNAV will annunciate in green on the EADI. The flight command computer will use the INS-supplied steering commands to track the desired course. Bank angle limit is 22 degrees.

LNAV mode is cancelled by:

Depressing the NAV pushbutton indicator-selector switch on the flight director mode selector panel.

Selecting go-around mode

Selecting standby mode

Selecting an alternate ATT, HDG, or NAV source on the display controller.

(8) Preview and transition mode. A preview course pointer (magenta) is provided to enable the pilot to preview data prior to its use. The flight control computer can be commanded to automatically transition from tracking the INS to tracking one of the short range navigation (SRN) sources (VOR, localizer, or TACAN). One use for this feature is to transition from tracking the INS to an approach using VOR, localizer, or TACAN.

Set-up for preview course pointer mode is as follows:

1. INS/TACAN pushbutton selector switch (display controller) - INS.
2. NAV pushbutton selector switch (flight director mode selector panel) - Depress NAV to capture and track INS track.
3. EADI - Observe that LNAV (green) is displayed.
4. Selection of VIL or TCN on the display controller after the above three conditions have been met.

The preview course deviation bar will respond to VOR, localizer, and TACAN signals as appropriate.

Once the previewed navigation source is valid, if the approach mode (for localizer, ILS, or TACAN) or VOR approach mode (for VOR) has been selected on the flight director mode selector, the appropriate LOC, ILS, or NAV annunciator will be illuminated on the EADI.

When the flight director determines that the capture point for the previewed mode has been reached, it will transition the flight director from LNAV mode to the capture mode of the previewed navigation source. The preview course pointer will then be removed and the standard course pointer will be slewed to the previewed selected course.

NOTE

Since INS and TACAN are selected with the same display controller pushbutton switch, it is possible to inadvertently reselect the INS as the navigation source rather than preview the TACAN navigation source.

(9) Localizer (NAV) mode. The localizer mode provides for automatic intercept, capture, and tracking of a front course localizer beam. Prior to mode engagement, perform the following:

1. VHF navigation receiver control panel - Set desired localizer frequency.
2. V/L pushbutton selector switch (display controller) - Depress to select LOC1 or LOCZ
3. Course pointer (EHSI) - Set inbound course on heading dial.
4. Heading marker (EHSI) - Set desired intercept heading for course interception.

The EHSI will now display the relative position of the aircraft to the center of the localizer beam and the desired inbound course. With the heading marker set, the heading select mode can be used to perform the intercept Outside the normal capture range of the localizer signal (between one and two dots on the EHSI), depressing the NAV or APR pushbutton switch on the flight director mode selector will cause the EADI to annunciate LOC and GS in white and HDG in green. The aircraft will now be flying the desired heading intercept and the system will be armed for automatic localizer and glideslope beam capture.

With the aircraft approaching the selected course interception, the lateral beam sensor (LBS) is monitoring localizer beam deviation, beam rate, and true airspeed. At the computed time, the LBS will trip and capture the localizer signal The flight control computer will drop the heading select mode and generate the proper roll command to bank the aircraft toward the localizer beam center. When the LBS trips, the EADI will display LOC in green. LOC will be enclosed in a white box for 5 seconds.

If both radio altitude and glideslope deviation are valid, distance is calculated using radio altitude and glideslope deviation data If only radio altitude is valid, distance is first estimated for capture. It is assumed that an approach to the runway is being made without glideslope, and distance is calculated based on radio altitude only. If radio altitude information is not valid, distance is estimated as a function of glideslope deviation and true airspeed. If neither radio altitude nor glideslope data is valid, distance is estimated as a function of true airspeed and time,

The glideslope mode is cancelled by:

Depressing NAV or APR pushbutton switch-indicator on the flight director mode selector

Selecting a VOR frequency on the selected VHF navigation receiver control panel

Selecting go-around mode

Selecting standby mode

Selecting back course mode

Coupling flight control computer to the cross-side EFIS

Selecting an alternate ATT, HDG, or NAV source on the display controller.

When the aircraft satisfies the localizer track conditions, the course error signal is removed from the lateral steering command. This leaves radio deviation, roll attitude, and lateral acceleration to track the localizer signal, and to compensate for localizer beam standoff in the presence of a crosswind The system will automatically compensate for a crosswind of up to 45 degrees course error.

(10) Back course mode. The back course mode (BC) provides for automatic intercept, capture and tracking of the back course localizer signal. When flying a back course localizer approach, glideslope capture is automatically inhibited. The back course mode is set up and flown exactly like a front course localizer approach, with the following differences:

Back course (BC) is selected on the flight director mode selector.

With the aircraft outside the normal back course localizer capture limits, the EADI will annunciate BC in white and HDG in green.

At back course capture, the EADI will annunciate BC in green (BC will be enclosed in a white box for 5 seconds).

When the back course mode has been selected on the flight director mode selector, logic in the flight control computer was established to internally reverse the polarity of the course error and localizer signals, and provide expanded localizer display on the EADI. Also a gain change takes place in the computer when BC has been selected, since the aircraft will now be closer to the localizer transmitter by the length of the runway plus 1000 feet. At back course capture, the flight control computer will generate a roll command to capture and track the back course localizer signal.

The back course mode is cancelled by:

Depressing the BC pushbutton switch-indicator on the flight director mode selector

Selecting a VOR frequency on the selected VHF navigation receiver control panel

Selecting go-around mode

Selecting standby mode

Selecting heading mode

Coupling flight control computer to the cross-side EFIS

Selecting an alternate ATT, HDG, or NAV source on the display controller.

(11) ILS approach mode. The ILS approach mode provides for automatic intercept, capture, and tracking of the front course localizer and glideslope signals.

This allows flying a fully coupled ILS approach Set-up for the ILS approach mode is as follows:

1. VHF navigation receiver control panel - Set desired localizer frequency.
2. V/L pushbutton selector switch (display controller) - Depress to select LOC1 or LOC2
3. Course pointer (EHSI) - Set inbound course on heading dial.
4. Heading marker (ESI) - Set desired intercept heading for course interception.

The ESI will now display the relative position of the aircraft to the center of the localizer beam and the desired inbound course. With the heading marker set for intercept, the heading select mode can be used to perform the intercept Outside the normal capture range of the localizer signal (between one and two dots on the EHSI), depressing the APR pushbutton switch on the flight director mode selector will cause the EADI to annunciate LOC in white and HDG in green. The aircraft will now be flying the desired heading intercept and the system will be armed for automatic localizer beam capture.

With the aircraft approaching the selected course interception, the lateral beam sensor (LBS) is monitoring localizer beam deviation, beam rate, and true airspeed. At the computed time, the LBS will trip and capture the localizer signal The flight control computer will drop the heading select mode and generate the proper roll command to bank the aircraft toward the localizer beam center. When the LBS trips, the EADI will display LOC in green. LOC will be enclosed in a white box for 5 seconds.

The glideslope portion of the approach mode is used for the automatic intercept, capture, and tracking of the glideslope beam. The beam is used to guide the aircraft down to the runway in a linear descent Typical glideslope beam angles vary between 2 and 3 degrees, depending on terrain. When the glideslope mode is used as the vertical portion of the approach, it allows the pilot to fly a fully coupled ILS approach The mode is interlocked, so that glideslope capture is inhibited until localizer capture has occurred.

As the aircraft approaches the glideslope beam, the vertical beam sensor monitors true airspeed, vertical speed, and glideslope deviation to determine the correct capture point At glideslope capture, the computer drops any other vertical mode that was in use, and automatically generates a pitch command to smoothly track the glideslope beam Gain programming is performed on the glideslope signal to compensate for the aircraft closing on the glideslope transmitter and beam convergence caused by the directional properties of the glideslope antenna Glideslope programming is normally accomplished as a function of radio altitude and vertical speed. If the radio altimeter is riot valid, glideslope gain programming is accomplished as a function of preset height- above-the-runway estimates and run-down as a function of true airspeed.

The ILS approach mode is cancelled by:

Depressing NAV or APR pushbutton switch-indicator on the flight director mode selector

Selecting a VOR frequency on the selected VHF navigation receiver control panel

Selecting go-around mode.

Selecting standby mode

Selecting back course mode

Coupling flight control computer to the cross-side EFIS

Selecting an alternate ATT, HDG, or NAV source on the display controller

When the aircraft satisfies the localizer track conditions, the course error signal is removed from the lateral steering command. This leaves radio deviation, roll attitude, and lateral acceleration to track the localizer signal, and to compensate for localizer beam standoff in the presence of a crosswind The system will automatically compensate for a crosswind of up to 45 degrees course error.

(12) Pitch attitude hold mode. The pitch attitude hold mode is the basic vertical flight director mode. It is activated when a flight director lateral (roll) mode is selected without an accompanying vertical (pitch) mode. There is no annunciation for pitch hold mode although the basic AP ENG annunciation is available. The pitch command on the EADI provides the pilot with a pitch reference corresponding to the pitch attitude existing at the moment the lateral mode was selected. This pitch reference can be changed with the touch control steering (TCS) switch located on the control wheels. The reference pitch attitude can also be changed as a function of the pitch wheel on the autopilot controller when the autopilot is engaged. Pitch attitude hold mode may be cancelled by selecting any vertical mode or the automatic capture of a vertical mode.

(13) Vertical speed hold mode. The vertical speed hold mode is used to automatically maintain the aircraft at a selected vertical speed reference. To initiate the mode, the aircraft is maneuvered to the desired climb or descent attitude to establish the vertical speed reference, then the mode is engaged by depressing the VS pushbutton switch-indicator on the flight director mode selector. The reference vertical speed can be changed by pushing the

touch control steering (TCS) switch on the control wheel and maneuvering the aircraft to a new vertical speed reference and then releasing the switch. The vertical speed reference can also be changed by the use of the pitch wheel on the autopilot controller.

When the vertical speed mode is engaged, VS (green) will be annunciated on the EADI, and the vertical speed target will be displayed in the lower left comer of the EADI. When the vertical speed reference is changed by using the pitch wheel on the autopilot controller, the EADI's will indicate the commanded vertical speed reference. Actual aircraft vertical speed will be displayed on the vertical speed indicator. Selecting vertical speed (VS) will reset all previously selected vertical modes.

Vertical speed mode may be cancelled by:

Depressing the VS pushbutton switch-indicator on the flight director mode selector

Selecting another vertical mode

Selecting the go-around mode

Selecting the standby mode

Coupling to the cross-side EFIS

Selecting an alternate ATT source on the display controller

(14) Indicated airspeed hold mode. Activation of the IAS pushbutton indicator-selector switch on the flight director mode selector automatically commands the flight director to maintain the present indicated airspeed. The referenced airspeed can be changed by depressing the touch control steering (TCS) switch on the control wheel, maneuvering the aircraft to a new indicated airspeed, then releasing the TCS switch. The airspeed reference can also be changed by using the pitch wheel on the autopilot controller. When the airspeed mode is engaged, IAS (green) will be annunciated on the EADI, and the indicated airspeed target will be displayed in the lower left comer of the EADI. Actual aircraft indicated airspeed will be displayed on the airspeed indicator. When the indicated airspeed hold mode is selected, all previously selected vertical modes will be reset

The indicated airspeed mode may be cancelled by:

Depressing the IAS pushbutton switch-indicator on the flight director mode selector

Selecting another vertical mode

Selecting go-around

Coupling to the cross-side EFIS

(15) Altitude hold mode. The altitude hold mode is a vertical flight director mode which is used to maintain a barometric altitude reference. The vertical command for altitude hold is displayed on the flight director pitch command cue on the EADI. To select altitude hold, depress the ALT pushbutton switch-indicator located on the flight director mode selector, while operating in any lateral mode. The ALT (green) annunciator will be illuminated on the EADI while altitude hold mode is active. The vertical axis of the flight director will maintain the barometric altitude at the time of mode engagement The reference altitude may be change by depressing the touch control steering (TCS) switch on the control wheel, maneuvering the aircraft to the desired altitude, then releasing the TCS switch.

The altitude hold mode may be can be cancelled by:

Moving the pitch wheel on the autopilot controller

Depressing the ALT pushbutton switch-indicator on the flight director mode selector

Selecting any other vertical mode

Coupling to the cross-side EFIS

Selecting an alternate ATT source on the display controller.

(16) Altitude preselect mode. The altitude preselect (ALT SEL) mode is used in conjunction with another vertical mode to achieve automatic capture, flare, and level-off onto a preselected altitude. The ALT SEL mode is armed by depressing the ALT SEL pushbutton switch-indicator on the flight director mode selector. The desired altitude is entered into the altitude preselector display window using the SET knob.

When armed, the ALT SEL mode is annunciated on the EADI. Vertical speed hold mode (VS HOLD), indicated airspeed hold (IAS), or pitch hold can be used to fly to the selected altitude. When reaching the bracket altitude, the system automatically switches to the ALT SEL CAP mode and the previous pitch mode is cancelled. A command is then generated to asymptotically capture the selected altitude. The ALT SEL mode is cancelled in altitude hold (ALT) or after glideslope capture. ALT SEL capture is annunciated on the EADI by a green ASEL at the vertical capture annunciation location. To indicate the transition to capture, ASEL will be enclosed in a white box for 5 seconds.

The aircraft will remain in the ALT SEL capture mode until the following conditions exist simultaneously:

ALT error is less than 25 feet

ALT rate is less than 5 feet per second

At this time, the altitude select (ALT SEL) mode will be dropped and the system will be placed in the altitude hold (ALT) mode.

The ALT SEL CAP mode will be dropped and the ALT SEL ARM mode will be automatically reselected following an ALT SEL knob motion or a pitch wheel actuation Perform the following steps to fly to a preselected altitude using the altitude select mode (ALT SEL):

1. Set selected altitude on altitude preselector.
2. Select pitch hold, VS, or IAS mode descend or ascend toward selected altitude.
3. Depress ALT SEL pushbutton switch-indicator on flight director mode selector panel. ALT SEL mode is now armed.

The altitude flare point (ALT SEL CAP) is a nonlinear function, dependent upon vertical speed and distance to the selected altitude.

4. ALT SEL capture is dropped and ALT HOLD is automatically engaged.

The ALT SEL capture submode is cancelled by:
Moving the ALT SET knob on the altitude preselector
Moving the pitch wheel on the autopilot controller
Selecting on or captured any other vertical mode
Coupling to the cross-side EFIS
Selecting an alternate ATT source on the display controller

(17) Go-around mode (wings level). The go-around mode is normally used to transition from an approach to a climb when a missed approach has occurred. Go-around mode is selected by depressing the go-around switch located on the left power lever. With go-around selected, all flight director modes are cancelled, and the autopilot is disengaged The pilot will see a wings level command and a 7-degree climb angle will be presented on the EADI. When go-around is selected, the autopilot will automatically disengage, and the yaw damper will automatically engage.

3-24. VHF NAVIGATION RECEIVERS (VIR-32).

a. Introduction. The VHF navigation receivers (fig. 3-24), provide 200 50-kHz spaced VOR/localizer channels from 108.00 through 117.95 MHz, 40 glide slope channels automatically paired with localizer channels, and a marker beacon receiver. The digital navigation receiver provides VOR, LOC, and GS deviation outputs, high and low level flag signals, magnetic bearing to the station, to/from information, marker beacon lamp signals, and VOR and marker beacon audio outputs. The navigation receivers are powered through the 2-ampere VOR # 1 and VOR #2 circuit breakers, located on the overhead circuit breaker panel (fig. 2-7).

b. VHF Navigation Receiver Control Unit Controls and Functions. All operating controls for the navigation receiver are located on the CTL-32 navigation receiver control unit (fig. 3-24). The VHF navigation receiver control unit also controls the DME function of the TACAN when it is operated in DME mode.

(1) Active frequency display. The active frequency (frequency to which the receiver is tuned) and diagnostic messages are displayed in the upper window.

(2) Transfer/memory switch. This switch is a 3-position spring-loaded toggle switch placarded XFR/MEM, which, when held to the XFR position, causes the preset frequency to be transferred up to the active display and the receiver to be retuned. The previously active frequency will become the new preset frequency and will be displayed in the lower window. When this switch is held to the MEM position, one of the four stacked memory frequencies will be loaded into the preset display. Successive pushes will cycle the four memory frequencies through the display.

(3) Store switch. This switch, placarded STO, allows up to four preset frequencies to be selected and entered into the control unit's memory. After presetting the frequency to be stored, the STO switch should be pushed. The upper window displays the channel number of available memory channel (CH 1 though CH 4) while the lower window continues to display the frequency to be stored For approximately 5 seconds, the MEM switch may be used to advance through the channel numbers without changing the preset display. The STO switch is pushed a second time to commit the preset frequency to memory in the selected location After approximately 5 seconds, the control will return to normal operation.

(4) Tuning knobs. Two concentric tuning knobs control the preset or active frequency displays. The larger knob changes the three digits to the left of the decimal point in 1-MHz steps. The smaller knob changes the two digits to the right of the decimal point in 0.05 MHz steps. The two frequency select switches are independent of each other so that the upper and lower rollover of the 0.1 MHz digit will not cause the 1.0 MHz digit to change.

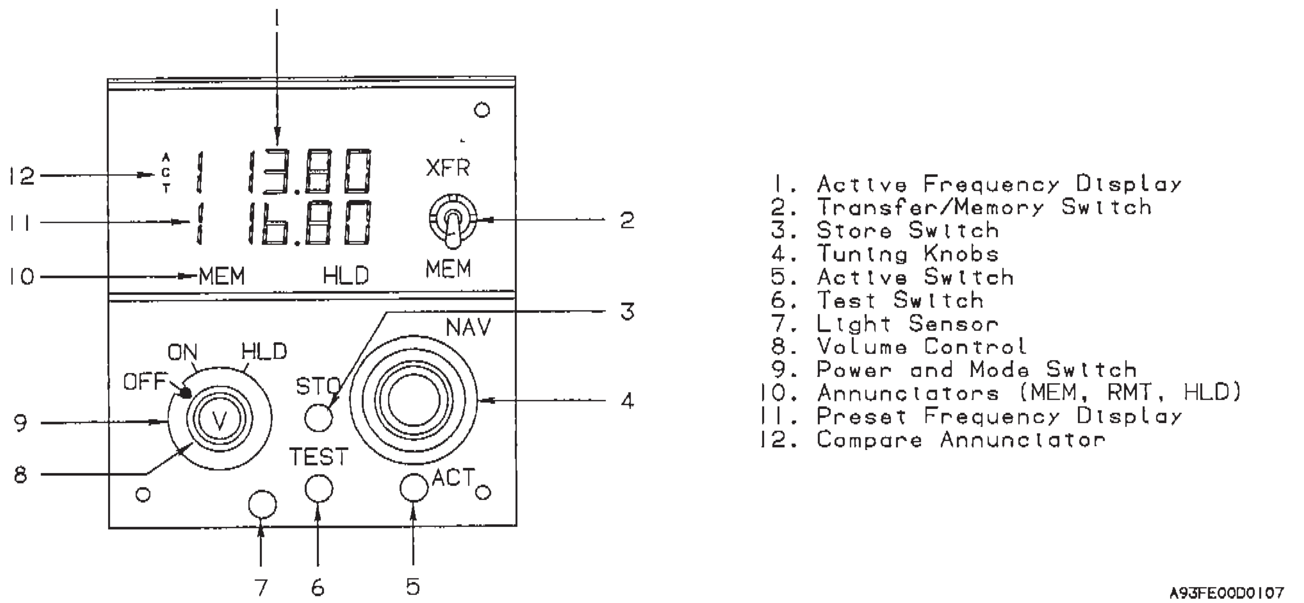

Figure 3-24. VHF Navigation Receiver Control Unit

(5) Active switch. The active switch, placarded ACT, enables the tuning knobs to directly tune the receiver when depressed and held for two seconds. The bottom window will display dashes and the upper window will continue to display the active frequency. Pushing the ACT switch a second time will return the control unit to the normal 2-display mode.

(6) Test switch. This switch, placarded TEST, initiates the receiver self-test diagnostic routine. (Self-test is active only when the TEST switch is pressed.)

(7) Light sensor. This built-in light sensor automatically controls display brightness.

(8) Volume control. The volume control is concentric with the power and mode switch.

(9) Power and mode switch. The power and mode switch contains three detented positions placarded OFF, ON, and HLD. The ON and OFF position switches system power. The hold (HLD) position allows the navigation receiver frequency to be changed while holding the DME in its present frequency.

(10) Annunciators. The receiver control unit contains MEM (memory) and RMT (remote) annunciators. The MEM annunciator illuminates whenever a preset frequency is being displayed in the lower window. The RMT annunciator is not used in this installation.

(11) Preset frequency display. The preset (inactive) frequency and diagnostic messages are displayed in the lower window.

(12) Compare annunciator. An annunciator placarded ACT normally illuminates when frequencies are being changed. The ACT annunciator flashes if the actual radio frequency which the receiver is tuned to is not identical to the frequency shown in the active frequency display.

c. Operating Procedures.

WARNING

It is not practical to provide monitoring for all conceivable system failures and, it is possible that erroneous operation could occur without a fault indication. It is the responsibility of the pilot to detect such an occurrence by means of cross-checks with redundant or correlated information available in the cockpit.

(1) Equipment turn-on. The VIR-32 receiver and the CTL-32 NAV control are turned on as follows:

1. BATTERY switch (overhead control panel, fig. 2-7) - ON.
2. AVIONICS MASTER POWER switch (overhead control panel, fig. 2-7) - ON or EXT PWR as required.
3. EFIS power switches (2, overhead control panel, fig. 2-7) - ON.
4. Power and mode switch (fig. 3-25) - ON.

After power is applied, the control unit displays the same active and preset frequencies that were present when the equipment was last turned off.

(2) Frequency selection. Frequency selection is made using either the frequency select knobs, or the XFR/MEM (transfer/memory recall switch). Rotation of either frequency select knob increases or decreases the frequency in the preset frequency display. The larger, outer knob changes the frequency in 1-MHz increments (number to the left of decimal point). The smaller, inner knob changes the frequency in 0.05 MHz increments. After the desired frequency is set in the preset frequency display, it can be transferred to the active frequency display by momentarily setting the XFR/MEM switch to XFR. At the same time that the preset frequency is transferred to the active display, the previously active frequency is transferred to the preset display. The ACT annunciator on the control unit flashes while the receiver is tuning to the new frequency.

NOTE

The ACT annunciator continuing flashing indicates that the receiver is not turned to the frequency displayed in the active display.

The control unit has memory that permits storing up to four preset frequencies. Once stored, these frequencies can be recalled to the preset display by positioning the XFR/MEM switch to the MEM position. The storage location (CH 1 through CH 4) for the recalled frequency is displayed in the active frequency display while the XFR/MEM switch is held in the MEM position. All four stored frequencies can be displayed one at a time in the preset display by repeatedly positioning the XFR/MEM switch to the MEM position. After the desired stored frequency has been recalled to the preset display, it can be transferred to the active display by momentarily positioning the XFR/MEM switch to the XFR position.

During normal operation, all frequency selections and revisions are accomplished in the preset frequency display. However, the active frequency can be selected directly as described in the direct active frequency selection paragraph.

(3) Direct active frequency selection. The active frequency can be selected directly with the frequency select knobs by pushing the ACT switch for about 2 seconds. The active frequency selection mode is indicated by dashes appearing in the preset display. Also, the ACT annunciator will flash as the frequency select knobs are turned to indicate that the receiver is being retuned.

NOTE

The ACT annunciator continuing flashing indicates that the receiver is not tuned to the frequency displayed in the active display.

To return to the preset frequency selection mode, push the ACT switch again for about 2 seconds. As a safety feature, the control unit automatically switches to the active frequency selection mode when a frequency select knob is operated while the STO, TEST, or XFR/MEM switches are actuated.

(4) Frequency storage. Up to four preset frequencies can be stored in memory in the control unit for future recall. To program the memory, select the frequency in the preset frequency display using the frequency select knobs and push the STO switch once. One of the channel numbers (CH 1 through CH 4) will appear in the active display for approximately 5 seconds. During this time, the channel number can be changed, without changing the preset frequency, by momentarily positioning the XFR/MEM switch to the MEM position. After the desired channel number has been selected, push the STO switch again to store the frequency.

NOTE

When storing a frequency the second actuation of the STO switch must be done within 5 seconds after selecting the channel number or the first actuation of the STO switch. If more than 5 seconds elapse, the control will revert to the normal modes of operation and the second store command will be interpreted as the first store command.

After a frequency has been stored in memory, it will remain there until changed by using the STO switch. Memory is retained even when the unit is turned off for an extended period of time.

d. Self-Test. During self-test, the VIR-32 provides VOR, ILS, and marker beacon test outputs. The following paragraphs provide the procedures required and the results to be expected when performing the self-test.

(a) VOR Self-Test

1. Tuning knobs (NAV control unit) - Select a VOR frequency.

NOTE

A specific frequency is not required for the test. Also, a signal on the frequency will not interfere with the self-test.

2. VOR/localizer pushbutton selector switch (display controller, fig. 3-8) - Select VOR1 or VOR2, as required.
3. Single-needle bearing pointer source selector switch (display controller, fig. 3-8) - Select VOR1.
4. Double-needle bearing pointer source selector switch (display controller, 3-8) - VOR2.
5. Course knob (HSI) - Rotate until course pointer indicates approximately 0 degrees.
6. TEST switch (NAV control unit) - Depress and hold.
7. NAV flag on the HSI will come into view. After approximately 2 seconds the flag will go out of view, the HSI course deviation bar will approximately center, and a TO indication will appear. The bearing pointers will indicate approximately a 0-degree magnetic bearing. The VIR-32 will return to normal operation after approximately 15 seconds, even if the TEST switch is held.

(b) ILS (Localizer and Glide Slope) Self-Test.

1. Tuning knobs (NAV control unit) - Select a localizer frequency.

NOTE

A specific frequency is not required for the test. Also, a signal on the frequency will not interfere with the self-test.

2. TEST switch (NAV control unit) - Depress and hold.
3. HSI - NAV and GS (glide slope) flags will come into view. After approximately 3 seconds, the flags will go out of view, the HSI course deviation bar will deflect right approximately 2/3 of full scale and the glide slope pointer will deflect down approximately 2/3 of full scale.
4. The VIR-32 will return to normal operation after approximately 15 seconds, even if the TEST switch is held.

(c) Marker beacon self-test. The marker beacon assembly is tested automatically when the self-test is actuated and either a VOR or localizer frequency is selected. Proper operation of the marker beacon assembly is indicated when all three marker indicators are displayed on the EADI. A 30 Hz tone will also be present in the marker beacon audio output.

(d) Marker beacon audio. Marker beacon audio generally associated with an ILS, must be source selected by the NAV A or B audio selector switches located on the audio control panel. Sensitivity selection for marker beacon audio is accomplished by a toggle switch placarded MKR BCN HI-LO, and audio volume is controlled by a knob placarded VOL (both are located on the pedestal extension, fig. 2-12).

(e) Diagnostic display.

NOTE

The diagnostic routines are intended as an extension of the self-test capability. The pilot should first observe the deviation indicators and associated flags for the proper self-test responses. If a fault condition exists, the problem may be verified in more detail by the diagnostics.

An extensive self-test diagnostic routine is also initiated in the VIR-32 NAV receiver by pushing the TEST switch on the NAV control unit. The NAV control unit will modulate the active and preset display intensity from minimum to maximum to annunciate the self-test is in progress. If a fault condition existed prior to actuating self-test, the NAV control unit will display the diagnostic code associated with the fault for approximately 2 seconds immediately after the TEST switch is pressed (the code will appear in the preset display). If a fault is detected during self-test, that fault code will also be displayed on the NAV control unit along with the word ’DIAG’, ’FLAG’, or four dashes (’----’) in the active display. The four dashes will be displayed along with the code ’00’ indicating that no faults have been found. ’FLAG’ will be displayed along with a 2-digit code when something is abnormal but a failure has not occurred (i.e. low signal, etc.). ’DIAG’ is displayed along with a code to indicate a failure has been detected in the VIR-32. Completion of self-test is indicated when either the normal frequency displays or a fault code is displayed on the NAV control. A partial list of diagnostic and fault codes is provided below. The codes are listed in table 7 (The TEST switch must be pushed before any fault code can be displayed).

3-25. ADF RECEIVER (ADF-60).

a. Introduction. The ADF receiver (fig. 3-25), provides aural reception of signals from a selected ground station and indicates relative bearing to that station. The ground station must be within the frequency range of 190 to 1749.5 kHz. The ADF receiver has three functional modes of operation. In the antenna (ANT) mode the ADF receiver functions as an aural receiver, providing only an aural output of the received signal. In automatic direction finder (ADF) mode it functions as an automatic direction finder receiver in which relative bearing to the station is presented on an associated bearing indicator, and an aural output of the received signal is provided. The tone (TONE) mode provides a 1000-Hz aural output tone when a signal is being received to identify keyed continuous wave (CW) signals. The ADF receiver is powered through a 2-ampere circuit breaker placarded ADF, located on the overhead circuit breaker panel (fig. 2-7).

b. ADF Control Unit Operating Controls, Indicators, and Functions. All operating controls for the ADF receiver are located on the ADF control unit (fig. 3-25).

(1) Active frequency display. The active frequency (frequency to which the ADF receiver is tuned) and diagnostic messages are displayed in the upper window.

(2) Transfer/memory switch. This switch is a 3-position spring-loaded toggle switch placarded XFR/MEM, which, when held to the XFR position, causes the preset frequency to be transferred up to the active display and the ADF receiver to be returned. The previously active frequency will become the new preset frequency and will be displayed in the lower window. When this switch is held to the MEM position, one of the four stacked memory frequencies will be loaded into the preset display. Successive pushes will cycle the four memory frequencies through the display.

(3) Store switch. This switch, placarded STO, allows up to four preset frequencies to be selected and entered into the control unit’s memory. After presetting the frequency to be stored, push the STO switch. The upper window displays the channel number of available memory (CH 1 through CH 4); the lower window continues to display the frequency to be stored. For approximately 5 seconds, the MEM switch may be used to advance through the channel numbers without changing the preset display. Push the STO switch a second time to commit the preset frequency to memory in the selected location. After approximately 5 seconds, the control will return to normal operation.

(4) Tuning knobs. Two concentric tuning knobs control the preset or active frequency displays. The larger knob changes the 1,000’s and 100’s kHz digit. The smaller knob changes the 10’s, units, and tenths kHz digits. Each detent of the larger knob changes the frequency in the display in 100-kHz steps. Each detent of the smaller knob changes the frequency in the display in 1-kHz steps, with the exception that the first two detent positions following a change in rotational direction of the knob will cause a 0.5 kHz change in frequency. Rapid rotation of the smaller knob will cause frequency changes greater than 1-kHz as a function of rate of rotation. Frequencies roll over at the upper and lower limits. The two tuning knobs are independent of each other in that the upper and lower limit rollover of the 10-kHz digit will not cause the 100-kHz digit to change.

(5) Active switch. The active switch, placarded ACT, enables the tuning knobs to directly tune the ADF receiver when depressed and held for two seconds. The bottom window will display dashes and the upper window will continue to display the active frequency. Pushing the ACT switch a second time will return the control unit to the normal two-display mode.

(6) Test switch. This switch, placarded TEST, initiates the receiver self-test diagnostic routine (Self-test is active only when the TEST switch is pressed).

(7) Light sensor. This built-in light sensor automatically controls display brightness.

(8) Volume control. The volume control is concentric with the power and mode switch.

Table 3-7. VHF Navigation Receiver Fault Codes

CODE	INCORPORATION	COMMENT
00	No fault found	
02	RAM test failed	Unit unusable (µP problem)
03	No serial data to unit	Unit unusable (CTL problem)
04	No serial freq word	Unit unusable (CTL problem)
05	Invalid NAV freq	CTL may be tuned to DME channel
06	Microprocessor fault	Unit unusable
09	Microprocessor fault	Unit unusable
10	Microprocessor fault	Unit unusable
11	AID fault	Unit unusable
12	A/D failed accuracy test	Unit unusable
13	+13 V dc power supply fault	Unit unusable
14	-13 V dc power supply fault	Unit unusable
15	VOR sin e / GS D/A fault	VOR/LOC unusable
16	VOR cos 6 /GS D/A fault	VOR/GS unusable
17	VOR smo unlocked	VOR receiver imperative
18	VOR AFC not locked	VOR unusable (no rf signal)
19	Low 30 Hz reference signal	VOR unusable
20	Low 30 Hz variable signal	VOR unusable
21	400 Hz pwr supply unusable	VOR OBI and OBS unusable
22	OBI sin out of tolerance	VOR OBI and OBS unusable
23	OBI cos out of tolerance	VOR OBI and OBS unusable
24	OBS return out of tolerance	VOR OBS unusable
25	LOC smo unlocked	LOC receiver inoperative
26	LOC signal level low	LOC unusable
27	LOC dev out of tolerance	LOC dev unreliable
28	GS smo unlocked	GS receiver inoperative
29	GS signal too low	GS unusable
30	GS dev out of tolerance	GS dev unreliable
32	Marker beacon fault	Observe marker lamps for fault

BTO3844

(9) Power and mode switch. The power and mode switch contains four detented positions placarded OFF, ANT, ADF, and TONE The OFF position removes system power. Selecting ANT, ADF, or TONE position applies power to the ADF system and establishes the system mode of operation.

(10) Annunciators. The receiver control unit contains a MEM (memory) and a RMT (remove) annunciator. The MEM annunciator illuminates whenever a preset frequency is being displayed in the lower window. The RMT annunciator is not used in this installation.

(11) Preset frequency display. The preset (inactive) frequency and diagnostic messages are displayed in the lower window.

(12) Compare annunciator. An annunciator placarded ACT momentarily illuminates when frequencies are being changed. The ACT annunciator flashes if the actual radio frequency which the receiver is tuned to is not identical to the frequency shown in the active frequency display.

c. Operating Procedures.

WARNING

It is not practical to provide monitoring for all conceivable system failures and, it is possible that erroneous operation could occur without a fault indication. It is the responsibility of the pilot to detect such an occurrence by means of cross-checks with redundant or correlated information available in the cockpit

(1) Equipment turn on. The ADF receiver and the control unit are turned on by rotating the power and mode switch on the ADF control unit to the ANT, ADF, or TONE position After power is applied, the control unit displays the same active and preset frequencies that were present when the equipment was last turned off.

(2) Frequency selection. Frequency selection is made using either the frequency select knobs or the XFR/ MEM (transfer/memory recall switch).

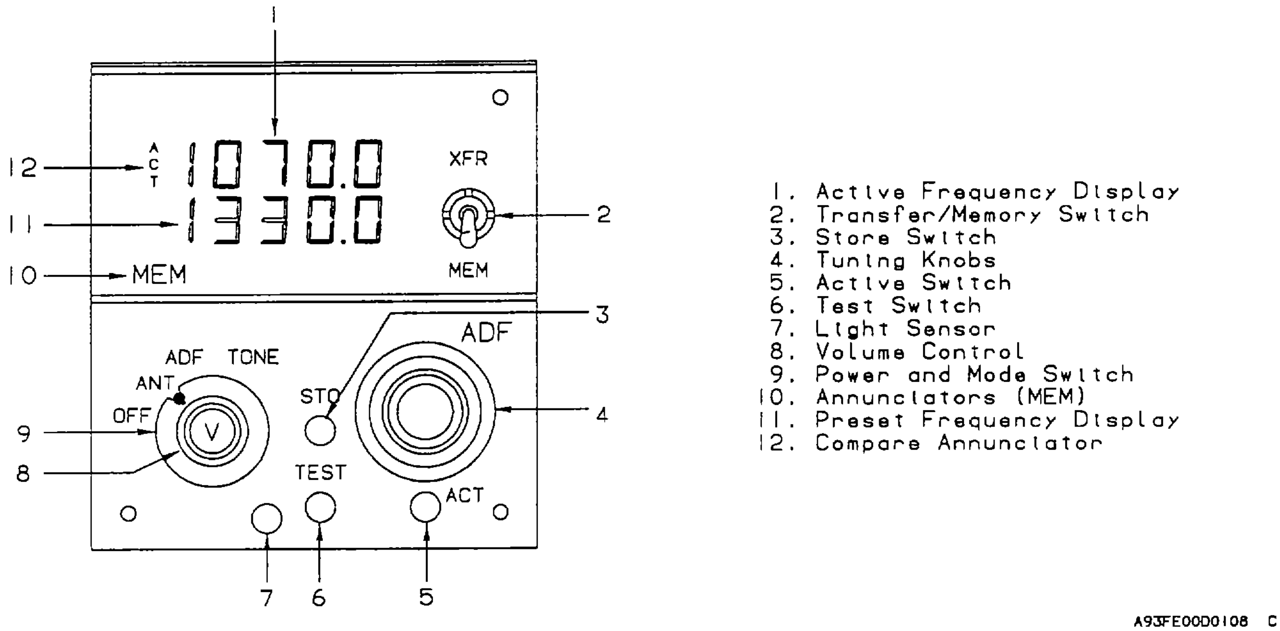

Figure 3-25. ADF Control Unit

For future developments, the control unit has a normal frequency range of 190.00 to 1799.5 kHz. However, when used with the ADF-60, the upper frequency is limited to 1749.5 kHz. Rotation of either frequency select knob increases or decreases the frequency in the preset frequency display. The larger outer knob changes the frequency in 1000-kHz and 100-kHz increments (first and second numbers from the left). The smaller inner knob changes the frequency in 10's, units, and tenths kHz increments (third, fourth, and fifth numbers from the left). After the desired frequency is set in the preset frequency display, it can be transferred to the active frequency display by momentarily setting the XFR/MEM switch to XFR. At the same time that the preset frequency is transferred to the active display, the previously active frequency is transferred to the preset display. The ACT annunciator on the control flashes while the receiver is tuning to the new frequency.

NOTE

If the ACT annunciator continues flashing, it indicates that the receiver is not tuned to the frequency displayed in the active display.

The ADF control unit has a memory that permits storing up to four preset frequencies. Once stored, these frequencies can be recalled to the preset display by positioning the XFR/MEM switch to the MEM position. The storage location (CH 1 through CH 4) for the recalled frequency is displayed in the active frequency display while the XFR/MEM switch is held in the MEM position. All four stored frequencies can be displayed one at a time in the preset display by repeatedly positioning the XFR/MEM switch to the MEM position. After the desired stored frequency has been recalled to the preset display, it can be transferred to the active display by momentarily positioning the XFR/MEM switch to the XFR position. During normal operation, all frequency selections and revisions are done in the preset frequency display. However, the active frequency can be selected directly as described in the following paragraph.

(3) Direct active frequency selection. The active frequency can be selected directly with the frequency select knobs by pushing the ACT switch for 2 seconds. The active frequency selection mode is indicated by dashes appearing in the preset display. The ACT annunciator will flash as the frequency select knobs are turned to indicate that the transceiver is being retuned.

NOTE

If the ACT annunciator continues flashing, it indicates that the receiver is not tuned to the frequency displayed in the active display.

To return to the preset frequency selection mode, push the ACT switch again for 2 seconds. As a safety feature, the ADF receiver control unit automatically switches to the active frequency selection mode when a frequency select knob is operated while the STO, TEST, or XFR/MEM switches are actuated, or the memory recall inputs to the control are grounded.

(4) Frequency storage. Up *to* four preset frequencies can be stored in the memory in the ADF receiver control unit for future recall. To program the memory, select the frequency in the preset frequency display using the frequency select knobs and push the STO switch once. One of the channel numbers (CH 1 through CH 4) will appear in the active display for approximately five seconds. During this time the channel number can be changed without changing the preset frequency by momentarily positioning the XFR/MEM switch to the MEM position. After the desired channel number has been selected, push the STO switch again to store the frequency.

NOTE

When storing a frequency, the second actuation of the STO switch must be done within 5 seconds after selecting the channel number or the first actuation of the STO switch. If more than 5 seconds elapse, the control will revert to the normal modes of operation and the second store command will be interpreted as the first store command.

After a frequency has been stored in memory, it will remain there until changed by using the STO switch Memory is retained even when the unit is turned off for an extended period of time.

d. Normal Operation.

1. Power and mode switch - ANT, ADF, or TONE (BFO).
2. Tuning knobs - Set desired frequency.
3. ANT function - Position power and mode switch to ANT. Select ADF on audio system and adjust volume.
4. ADF function - Position power and mode switch to ADF. Bearing pointer will indicate relative bearing to tuned station.

NOTE

When the ADF system is not receiving a reliable signal, bearing pointer will be removed from view. The ADF bearing pointer may momentarily blank during station crossings because of signal loss.

5. TONE function - Position power and mode switch to TONE (BFO). A 1000-Hz tone will identify keyed CW stations.

(1) Self-test

1. Power and mode switch - ADF.
2. Tuning knobs - Tune a nearby NDB, compass locator, or broadcast station.
3. TEST switch - Depress. Bearing pointer will rotate 90 degrees from the previous valid indication. Release TEST switch and verify that the bearing pointer returns to previous valid indication.

NOTE

If the signal received is weak or of poor quality, bearing pointer rotation will be slow.

ADF receiver fault codes are listed in table 3-8.

3-26. TACAN/DME SYSTEM (AN/ARN-154).

a. Description. The TACAN/DME system (fig. 3-26) operates in conjunction with TACAN and VORTAC ground stations to provide distance, groundspeed, time to station, and bearing to station. The TACAN/DME system electronically converts elapsed time to distance by measuring the length of time between the transmission of a radio signal to a selected DME/TACAN station and the reception of the reply signal. The distance is measured on a slant from the aircraft to the ground station and is commonly referred to as slant-range distance. Slant range approximates actual ground distance. The difference between slant-range distance and ground distance is smallest at low altitude and long range, and greatest when in close proximity to the selected ground station. The system is capable of tracking the range of up to four stations and the bearing of two stations simultaneously. The system will operate on any one of 252 preselected frequencies (126 X mode and 126 Y mode channels). Course deviation, bearing to station, and distance to TACAN or VORTAC stations are displayed on the EHSI. Distance, time to station, bearing, station identifier, and groundspeed may be displayed on the TACAN digital display. The TACAN/DME also provides distance information to the inertial navigation system (INS). The system is protected by a 2-ampere circuit breaker placarded TACAN, located on the overhead circuit breaker panel (fig. 2-7).

b. TACAN Control Unit Controls and Functions (fig. 3-26).

(1) TACAN channel display. Indicates selected channel.

Table 3-8. ADF Receiver Fault Codes

CODE	INTERPRETATION
00	No faults
02	RAM test failed (test failed at power-up)
03	No serial sync block received
04	No serial data block received for more than 2 seconds
05	Transponder label received in first block
06	I/O port 1 failure
07	I/O port 2 failure
08	Illegal ADF frequency
09	Serial input failed or stuck low
10	ADF not lock in ADF mode

BT03845

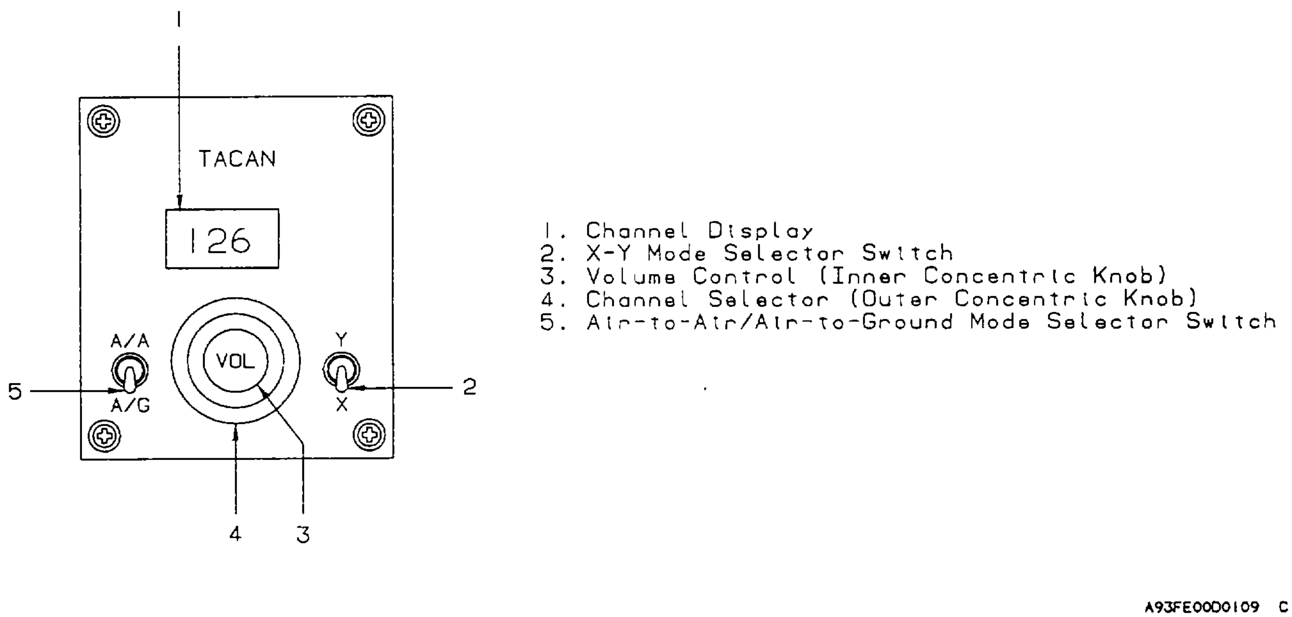

Figure 3-26. TACANIDME Control Unit

(2) X-Y mode selector switch. Selects either X or Y mode.

(3) Volume control (inner concentric knob). Turns system on. Volume control is inoperative in this installation.

(4) Channel selector (outer concentric knob). Rotation allows selection of desired TACAN channel.

(5) Air-to-air/air-to-ground mode selector switch. Allows selection of air-to-air or air-to-ground mode of operation.

c. TACANIDME Display Unit Controls and Functions (fig. 3-27).

(1) Display. Displays distance to station, bearing to station, groundspeed, time to station, and station identifier, depending on the page being viewed.

(2) PAGE pushbutton selector switch. When the mode selector switch is in the NAV 1 or NAV 2 position, depressing the PAGE pushbutton selector switch will alternate the lower right portion of the display between distance to station and groundspeed. When the mode selec-

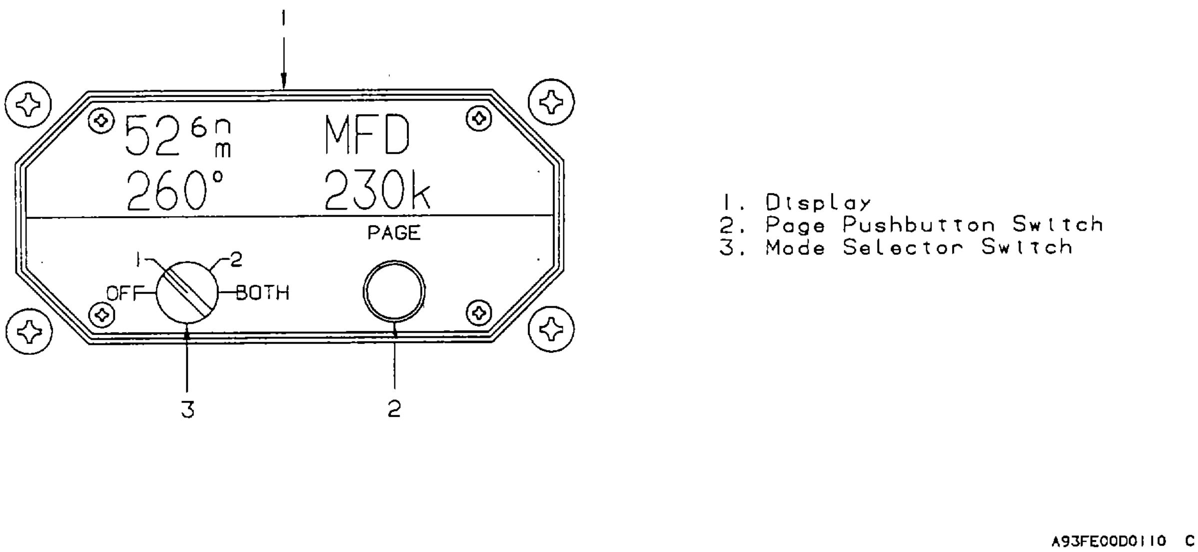

Figure 3-27. TACAN/DME Display Unit

tor switch is set to BOTH the PAGE pushbutton selector switch will alternate the left and right lower displays between bearing to station and station identifier.

(3) Mode selector switch.

(a) OFF. Turns system off/o**n.**

(b) NAV 1. Selects information for display from the TACAN/DME unit as selected by the # 1 VHF navigation receiver or TACAN control unit, depending upon whether either pilot has selected TACAN on EFIS display controller.

(c) NAV 2. Selects information for display from the TACAN/DME unit as selected by the #2 VHF navigation receiver.

(d) BOTH. Selects information for display from the TACAN/DME unit as selected by both the # 1 and #2 VHF navigation receivers.

d. Normal Operation.

(1) Turn-on procedure.

1. BATTERY switch - ON.
2. AVIONICS MASTER POWER switch - ON.
3. INS/TCN pushbutton selector switch (display control panel, fig. 3-8) - Select TCN.
4. Mode selector switch (TACAN indicator, fig. 3-27) - Select operating mode.
5. VOL control (TACAN control unit, fig. 3-26) - Rotate clockwise from detent to adjust volume.

The TACAN/DME indicator will run a display segment text and then scroll from right to left and display IND in the upper left comer of the display and the software version number in the upper right corner of the display for approximately 3 seconds. TCN will be displayed in the lower left corner and the software version will be displayed on the lower right corner of the display for approximately 3 seconds. After the three seconds SELF TEST PASS or SELF TEST FAIL (with a fail message number) will be displayed.

NOTE

The fail message number indicates the circuit which has failed. Always note the fail message number prior to system shutdown

(2) TACAN air-to-ground navigation procedure. After turn-on procedure proceed as follows:

1. X-Y mode selector switch (TACAN control unit, fig. 3-26) - As required.

2. Air-to-air/air-to-ground switch - A/G.
3. Channel selector knob - Select desired channel.

(3) TACAN air-to-air ranging. Air-to-air ranging may be accomplished between two airborne aircraft when each is equipped with an appropriate TACAN system. Air-to-air ranging is activated by placing the two-position mode selector switch on each aircraft's respective TACAN control unit in the A/A position and tuning to channels that are 63 channels apart from each other (such as channel 20 and channel 83). The X/Y mode switches will have to both be in the X or Y mode position.

3-27. INERTIAL NAVIGATION SYSTEM.

a. Description. The inertial navigation system (INS) is a self-contained navigation and attitude reference system. It is aided by (but not dependent upon) data obtained from the global positioning system (GPS), TACAN, encoding altimeter data, and heading information from the gyromagnetic compass system The position and attitude information computed by the INS is supplied to the automatic flight control system, the electronic flight instrument system (EFIS), and to mission equipment The INS provides a visual display of present position data in universal transverse mercator (UTM) coordinates or conventional geographic (latitude-longitude) coordinates during all phases of flight When approaching the point selected for a leg switch, a WPT will be displayed on both EHSI's and "way-point alert" will be displayed on the multifunction display (MFD) informing the pilot of an imminent automatic leg switch or the need to manually insert course change data The INS may be manually updated for precise aircraft present position accuracy by flying over a reference point of known coordinates. The INS may be updated automatically by the TACAN system or the GPS. Altitude information is automatically inserted into the INS computer by an encoding altimeter whenever the INS is operational.

The INS consists of a navigation unit (NU), mode selector unit (MSU), and a battery unit (BU).

The aircraft survivability equipment/avionics control system (ASE/ACS) keyboard (fig. 4-3) provides a means for entering data into the INS and displaying navigation and system status information. Refer to chapter 4 for a complete description and operating instructions for the ASE/ACS.

The INS system receives AC power from a 10-ampere INS PWR, a 5-ampere INS HIR POWER, and a 5-ampere INS FAN PWR circuit breaker, located on the mission power cabinet The INS system receives DC power from a 5-ampere INS CONTROL circuit breaker located on the overhead circuit breaker panel (fig. 2-7).

(1) Navigation unit. The navigation unit (NU) contains an inertial reference unit (IRU), a digital computer unit (DCU), and an inertial reference unit electronics (IRUE). All INS attitude, navigation, and steering information is determined in the NU.

(a) Inertial reference unit. The inertial reference unit (IRU) is a gyro-stabilized platform and gimbal assembly which is electronically controlled to provide a local horizontal azimuth reference regardless of aircraft attitude.

(b) Battery unit. The battery unit (BU) provides auxiliary DC power to initiate INS turn-on and to supply essential power to maintain INS operation should 115 volt primary power be interrupted after INS turn-on. The battery unit will sustain operation of the INS for 15 minutes.

(c) Inertial reference unit electronics. The inertial reference unit electronics (IRUE)-includes power circuits, temperature control circuits, and circuits required for interface between the inertial reference unit (IRU), computer, mode selector unit,(MSU), aircraft survivability equipment/avionics control system (ASE/ACS), battery unit, and for malfunction warning signals.

b. Controls, Indicators, and Functions, INS Mode Selector Unit (fig. 3-28).

(1) READY NAV lamp. The READY NAV (ready to navigate) lamp illuminates when high-accuracy alignment status of the INS has been attained. When alignment has been accomplished with the mode selector set to ALIGN, the ready NAV lamp will remain illuminated until NAV is selected. The READY NAV lamp will illuminate momentarily during transition from state 9 to 8 and when alignment is accomplished with the mode selector at the NAV position.

(2) BAT lamp. The battery (BAT) lamp illuminates only when the INS has automatically shut down due to low battery unit voltage. The INS will automatically shut down before the battery unit is completely discharged. A shutdown due to low battery unit voltage can only occur while the INS is operating on battery unit power. The INS operates on battery power for a short period during coarse leveling (alignment state 8). If the battery unit charge is below the required minimum level during this period, the INS will shut down and the BAT lamp will illuminate to indicate the reason.

(3) Mode selector knob. The mode selector knob controls the operating modes of the INS. The knob must be pulled out for rotation across mechanical stops between STBY and ALIGN and between NAV and ATT.

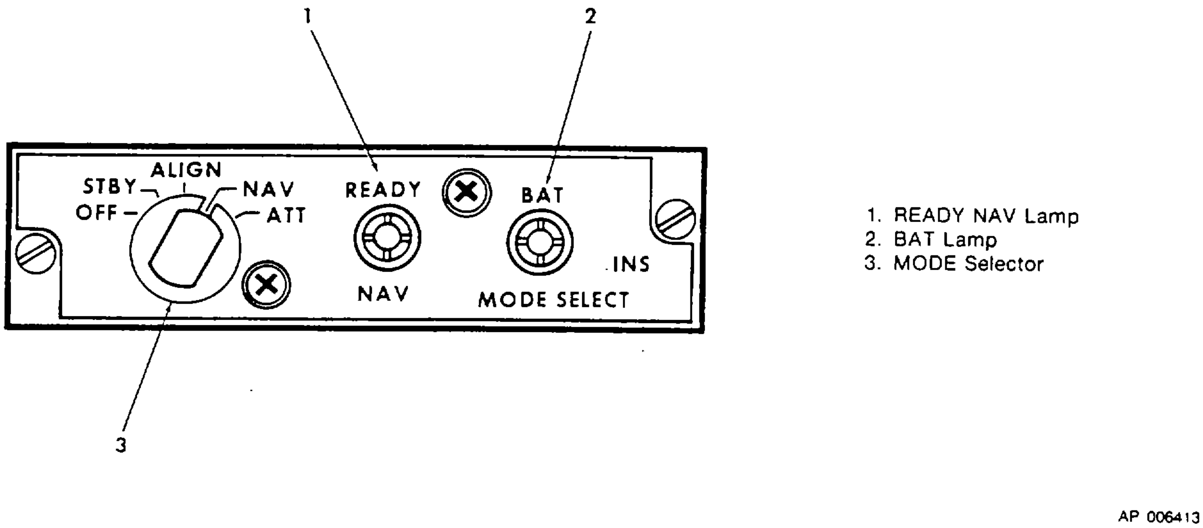

Figure 3-28. INS Mode Selector

(a) OFF. Deactivates INS.

(*b) STBY.* The standby (STBY) position is used only during ground operation. Setting the mode selector to STBY from OFF:

Starts fast warm-up in the navigation unit (NJ).

Cages the inertial reference unit (IRU) to the orientation of the aircraft

Starts the gyro wheels spinning.

Activates the computer so information can be entered.

When STBY is selected from any other position, the IRU is not caged but operates the same as during the attitude mode of operation.

(c) ALIGN. The alignment (ALIGN) position is used only during ground operation while the aircraft is parked Setting the mode selector to ALIGN from STBY will start automatic INS alignment, providing that the fast warm-up heaters have shut off. Fine alignment will not be started until present position has been inserted. The computer automatically cycles through leveling alignment. The ALIGN position can be selected from the OFF position, but leveling will not be started until the fast warm-up heaters have shut off. Moving the mode selector from NAV will not downmode the INS but will allow automatic shutdown if an overtemperature is detected.

(d) NAV. The navigation (NAV) position is used to command entry into the navigation mode after automatic alignment is completed. The NAV position must be selected before moving the aircraft. The INS will automatically sequence through standby and alignment operation to the navigation mode when the NAV position is selected from the STBY position, providing that present position is inserted and the aircraft is parked.

This position is also used to shorten the time in STBY if stored heading is valid and to bypass the battery test in state 8.

*(e) A*TT. The attitude (ATT) position is used to provide only INS attitude signals. This position shuts down the computer so that navigation and steering signals are not provided. The ATT position can be selected from any other position. Once the ATT position is selected, INS alignment is lost and the INS must be realigned before the navigation mode of operation can again be used.

c. INS Modes of Operation. The INS can be operated in four modes: Standby (STBY), Align, navigation (NAV), attitude (ATT). When the INS is turned on it will (under normal conditions) proceed through the STBY and ALIGN modes and enter the NAV mode, where it will remain until it is downmoded at the end of the flight. The only exception will be in the event of a malfunction, in which case the INS will be shut down or placed in the ATT mode. In the ATT mode, the computer is turned off and the INS will only provide attitude signals.

(*1) Standby mode.* The characteristics of the standby mode vary, depending upon whether the INS is being turned on or is being downmoded from NAV, ALIGN, or ATT. During standby mode the alignment state number is 9.

(a) Standby mode (INS being turned on). If the INS is being turned on by setting the mode selector to STBY, the navigation unit is brought up to operating temperature by fast warm-up heaters and the gyro wheels are brought up to speed. The INS platform is caged to the aircraft axes and all instrument warning lamps controlled by the INS indicate warning.

(b) Standby mode (INS being downmoded). If the INS is being downmoded from a higher mode by setting the mode selector switch to STBY, the INS platform retains its alignment with local horizontal, and all instrument flags controlled by the INS except ATTITUDE and PLATFORM HEADING flags, will indicate warning.

NOTE

Present position, waypoint coordinates, and TACAN station data can be inserted into the INS while in the standby mode.

(2) Alignment mode. In the alignment (ALIGN) mode the INS computer progresses through a series of submodes called alignment states.

(a) Alignment state 8. During alignment state 8, the INS platform is aligned to local horizontal and the INS battery is tested. Attitude warnings are removed at the beginning of state 8, but all other instrument flags controlled by the INS continue to indicate warnings. The battery unit is tested during the first 12 seconds of this state. The INS spends a minimum of 51 seconds in state 8.

During the transition of state 8 to state 7, the heading is set to the stored value. If this value compares favorably with magnetic heading plus magnetic variation, the status will remain unchanged. If the comparison is unfavorable,

the status will be set invalid, and the system must be upmoded to NAV before a heading may be stored.

NOTE

Present position must be loaded before the system will progress from state 8 to state 7.

(b) Alignment states 7 and 6. The primary function of states 7 and 6 is to refine the relationship between the INS platform and true north. This function continues unchanged throughout both states 6 and 7. In state 6 the INS compares the latitude of the loaded present position with the latitude it has computed as part of the alignment process, and it uses the results of this comparison (with other information) to update certain self-calibration data. During these states it is possible to enter the navigation mode if the stored heading is valid. Entry to NAV will immediately follow the setting of the mode selector to NAV. The alignment will be entirely dependent upon the stored values regardless of the length of time in states 7 or 6.

(c) Alignment states 5 through 0. Entry into alignment state 5 indicates that normal or standard accuracy alignment is complete. The NAV mode may be selected at any time after entry into this mode, but for precision inertial accuracies, the alignment should be allowed to progress until the READY NAV lamp is illuminated, and preferably to alignment state 2 or 1. A standard accuracy alignment takes about 20 minutes, while a high accuracy alignment requires about 45 minutes.

Alignment states 4 through 0 indicate continuing operating of the self calibration process begun in alignment states 6 and 5. In addition, automatic calibration data for the azimuth gyro is now available. If the INS is left in ALIGN, the self-calibration data will continue to be refined and the alignment state will decrease toward 0.

(3) Navigation mode. In the navigation (NAV) mode, all navigation data is computed and available for display. All warning flags controlled by the INS will disappear from view. The INS depends on its own inertial instruments for all position and velocity data. The present position computed by the INS can be updated by TACAN, GPS, data link, or manually when the aircraft passes over a known position reference.

(4) Attitude mode. In the attitude (ATT) mode, the computer is shut down and no navigation information is available. The ATT mode is entered at the discretion of the pilot if navigation and/or steering data signals become unreliable. Attitude signals and platform heading outputs continue to be available. The NAV mode can only be reentered from the ATT mode after the system has been realigned. Alignment can take place only on the ground.

(5) Pattern steering using INS. Pattern steering provides a box or straight line pattern which may be used to fly the aircraft in a specific pattern. The pattern will originate at the current TO waypoint. The length of the base leg, true bearing of the pattern, offset distance of the return leg, and direction of the turns are loaded into the computer via the ASE/ACS. Should the operator specify a zero offset distance for the return leg, the direction of the turns will alternate at each end of the pattern.

A waypoint change to 00 will cause the computer to enter the pattern steering mode. The coordinates for waypoints 1, 2, 3, and 4 will be saved and replaced with computed waypoints for the pattern. Waypoints 0 and 4 will be the initial point (IP) for the pattern. The differences between the pattern steering mode and the normal steering mode are:

Automatic leg switching will occur when directly over the destination waypoint.

Leg switching can only be accommodated automatically. If MAN leg changing was specified on the INS SETUP page, the aircraft will continue on the same path with a flashing WAYPOINT ALERT lamp until leg changing is changed to AUTO on the MFD.

The approach to the base or return legs will be at 90 degrees versus the normal approach of 45 degrees.

The program is designed to overfly all waypoints with a minimum of overshoot, provided sufficient distance to the return leg has been entered. When coupled to the autopilot, up to three maximum bank turns may be commanded while performing the 180 degree return.

The pattern steering mode is exited when the operator inserts a valid non 00 leg switch command. The original set of four waypoint coordinates will be returned to their former location.

d. Normal Operating Procedures.

(1) Preflight procedure.

(a) GPU - Connected.

(b) Battery Switch - ON.

(c) Overhead and mission panel switches - Set as follows:

1. Aircraft #1 and #2 INVERTER switches - ON.
2. AUTO PLT POWER switch - ON.
3. AVIONICS MASTER POWER switch - EXT PWR.
4. #1 and #2 EFIS POWER switches - ON.
5. #1 and #2 three phase inverter switches - RESET/ON.
6. BUS CROSS TIE SWITCH - AUTO.
7. ATT push-button selector switch (display controller) - Depress as required.
8. Autopilot EFIS 1/2 switch - EFIS 1.

(2) INS Alignment. Align as follows:

(a) Mode switch B (MFD) - Depress to select FPLN page.

(b) NAV SETUP (R5) - Depress.

(c) INS SETUP (R5) - Depress.

(d) INS mode selector - STBY. (Text at L1 will be blank until the INS mode selector is placed in STBY or ALIGN. Then 1. LAST ALIGN and 2. LAST KNOWN text will appear.

(e) Present position - Enter by one of these methods:

1. To accept LAST ALIGN coordinates, SKPD 1, then depress L1.
2. To accept LAST KNOWN coordinates, SKPD 2, then depress L2.
3. SKPD alignment coordinates, then depress L1.
4. If using the Data Transfer System, load the present position by depressing SETUP DATA L5 in the desired data set on DATA TRANSFER page.

NOTE

When L1 is depressed INS LOADING will appear at the top of the MFD and L1 text changes to ALIGN = X.DD.MM.SY.DDD.MM.SS and ALIGN STATE 9. It takes 6 to 8 minutes for the program to load.

Valid alignment data for LAT/LONG is X.DD.MM.SS.T.YY.DDD.MM.SS.T where:

X = Latitude hemisphere (N or S)

DD = Degrees of latitude (0 - 90)

MM = Minutes of latitude

SS = Seconds (0 - 59)

T = Tenths of seconds (0 - 9)

Y = Longitude hemisphere (E or W)

DDD = Degrees of longitude

Table 3-9. INS Malfunction Codes

MALF CODE	FAILED TEST	MODES OF OPERATION	RECOMMENDED ACTION CODE
10	Invalid heading	ALIGN	04
11	GR/CS program pin connected in error	ALIGN	01
12	Canned altitude profile in use (input altitude invalid)	ALIGN, NAV	05
13	Y velocity change	NAV	02
14	X velocity change	NAV	02
15	Torque limited	ALIGN, NAV	02
16	Invalid pitch and roll	ALIGN, NAV	05
17	Invalid magnetic heading	ALIGN, NAV	05
18	Excessive saturation time	ALIGN	04
20	Bearing to waypoint	ALIGN, NAV	03
22	Bearing to waypoint	ALIGN, NAV	03
23	Drift angle	ALIGN, NAV	03
24	Steering converter	ALIGN, NAV	03
25	True heading converter	ALIGN, NAV	03
26	XTK converter	ALIGN, NAV	03
27	Tick mark too fast	STBY	01
31	Ground speed	NAV	02
32	Memory parity	STBY, ALIGN, NAV	02
33	Azimuth stabilization loop	ALIGN, NAV	01
34	Inner roll stabilization loop	ALIGN, NAV	01
35	Pitch stabilization loop	ALIGN, NAV	01
36	Accelerometer loop	ALIGN, NAV	01
37	Z platform overtemperature	NAV	01
38	XY platform overtemperature	NAV	01
40	Heading error	ALIGN	04
42	Drift angle 45°	NAV	02
44	Azimuth gyro drift rate	ALIGN	02
45	Gyro scale factor or loaded altitude	ALIGN	04
47	15-second loop	NAV	02
49	Fix measurement too large	NAV	02
51	Excessive wind	ALIGN, NAV	05
54	Incomplete conversation from UTM to L/L	STBY, ALIGN, NAV	05
57	XY platform rotation rate	ALIGN	02
59	600 Millisecond loop	STBY, ALIGN, NAV	02
60	X or Y sample and hold change	ALIGN	04
62	XY platform rotation rate	NAV	02
63	DCU self-checks	STBY, ALIGN, NAV	02

Table 3-10. INS Action Codes and Recommended Actions

Code	Recommended Action
01	Shut down INS.
02	Watch for degradation (NAV). During ground operation, downmode to STBY and restart alignment.
03	INS may be used for navigation. One or more analog outputs are not functioning properly. Check 26 VAC circuit breakers. HSI and autopilot.
04	Downmode to STBY and restart alignment (ground operation only).
05	Correct problem in interfacing system (could be INS). Will not seriously affect performance.

Valid alignment data for UTM is ZZ.KKK.MMM.KKK.MMM, where:

ZZ = UTM zone

KKK = Easting Kilometers

KKKK = Northing Kilometers

MMM = Northing or easting meters

NOTE

Zero is assumed for meters, minutes, and seconds.

(f) INS mode selector - ALIGN. Place the mode selector ALIGN when the INS LOADING message goes out.

(3) INS BIT check.

(a) UTIL on MFD - Depress.

(b) SYSTEM BIT (R1) - Depress.

(c) BIT check - Conduct on installed equipment as required. Before conducting the INS BIT, check that the INS is in align state 8 or lower. Before INS is placed in the NAV mode of operation, set up the EHSI for an interface check by performing the following:

1. INS on EHSI - Select by depressing INS/TCN on EFIS display controller.
2. INS - Select on single needle bearing source selector switch on EFIS display controller.

(d) INS (R2) - Depress. Check indications as follows:

1. MFD - INS BATT, INS FAIL, and WAYPOINT ALERT CWA lights illuminated.
2. EHSI - INS needle 30 degrees right of lubber line and course deviation bar displaced left. Check WPT ALERT illuminated.
3. Aircraft caution/advisory annunciator panel - Amber INS annunciator light illuminated.
4. INS mode controller - Green READY light and red BATT light illuminated.
5. Mission annunciator panel - Green INS UPDATE and amber NO INS UPDATE annunciator lights illuminated.
6. After 15 seconds the text COMPLETE or any ACTION and MALFUNCTION codes will be displayed. If ACTION and MALFUNCTION codes are displayed they may have been cleared by the BIT test and the display is showing what was previously there. The only way to ensure they are cleared is to conduct another BIT and the text COMPLETE appears.

(4) Navigation setup.

(a) Waypoint list - Build as follows:

1. Mode switch B - Depress to select FPLN page.
2. WPT LIST (R4) - Depress. WPT numbers 10 - 59 are shown. The WPT select window surrounds a WPT line.
3. Waypoint string (line number, WPT ID, and LAT/LONG coordinates) - Enter into scratchpad.
4. ADD/SEL (R1) - Depress to load WPT into system.

or

5. Load waypoint list using the Data Transfer System by pressing NAV DATA (L2) when the desired data set is boxed on the DATA TRANSFER page.

(b) Flight Plan - Build as follows:

1. WPT numbers - Enter into scratchpad in order of desired use (up to nine) or box desired WPTs by pressing PREV (R2) or NEXT (R3) and depress LOAD SCRATCHPAD (L5).
2. ROUTES (R5) - Depress.
3. Route - Select 1st, 2nd, or 3rd to enter WPT numbers by depressing the appropriate line button to store the WPTS as a route.
4. NEW FPLN (L1) - Depress to activate the FPLN.

(c) TACAN list - Build as follows:

1. Mode switch B - Depress to select FPLN.
2. NAV SETUP (R5) - Depress.
3. INS SETUP (R5) - Depress.
4. TACAN LIST (R4) - Depress.
5. TACAN station information (list number, ID, channel number, latitude/longitude, and station elevation) - Enter into scratchpad.
6. R1 line button - Depress to load into system.
7. TACAN stations to be used for updating - Enter into scratchpad.
8. R4 line selection switch - Depress to select TACAN SELECT.

(d) Pattern steering mode - Program as follows:

1. Mode switch B - Depress to select FPLN page.
2. R5 line selector switch - Depress to select NAV SETUP page.
3. True bearing - Enter into scratchpad.
4. L1 line selector switch - Depress to enter BEARING.
5. Leg length in NM - Enter into scratchpad.
6. L2 line selector switch - Depress to enter LEG LENGTH.
7. L3 line switch - Depress to select LEFT or RIGHT.
8. Offset distance in NM - Enter into scratchpad.
9. L4 line selector button - Depress to enter OFFSET.

(e) Waypoint move - Program as follows:

1. Mode switch B - Depress to select FPLN page.
2. R5 line button - Depress to select NAV SETUP page.
3. True bearing - Enter into scratchpad.
4. R1 line button - Depress to enter BEARING.
5. Range in NM - Enter into scratchpad.
6. R2 line button - Depress to enter RANGE.

(5) Navigation Information.

1. B mode selector switch - Depress to select FLIGHT PLAN page.

Table 3-11. Datum Cross Reference

DATUM	LOCAL GEODETIC SYSTEM	SPHEROID	FLATNESS COEFFICIENT	RELATIVE RADIUS
30	ORD SURVEY OF GB 1936	AIRY	29932	7563
3	AUSTER GEODETIC 1966	AUS NATL	29825	8160
4	BUKIT RIMPAH	BESSEL	29915	7397
6	DJAKARTA	BESSEL	29915	7397
11	G. SEGARA	BESSEL	29915	7397
39	TIMBALAI	BESSEL	29915	7397
40	TOKYO	BESSEL	29915	7397
44	SD TOKYO SPECIAL	BESSEL	29915	7397
10	GUAM 1963	CLARKE 1866	29498	8206
21	LUZON	CLARKE 1866	29498	8206
25	N AMER 1927 CONUS	CLARKE 1866	29498	8206
26	N AMER 1927 ALA & CAN	CLARKE 1866	29498	8206
43	SD LUZON SPECIAL	CLARKE 1866	29498	8206
1	ADINDAN	CLARKE 1880	29346	8249
2	ARC 1950	CLARKE 1880	29346	8349
19	LIBERIA 1964	CLARKE 1880	29346	8249
22	MERCHICH	CLARKE 1880	29346	8249
24	NIGERIA-MINNA	CLARKE 1880	29346	8249
16	INDIAN	EVEREST	30080	7276
42	SD-MGRS INDIAN SPEC	EVEREST	30080	7276
5	CAMP AREA ASTRO	INTERNATIONAL	29700	8388
7	EUROPEAN 1950	INTERNATIONAL	29700	8388
8	GEODETIC DATUM 1949	INTERNATIONAL	29700	8388
13	HERAT NORTH	INTERNATIONAL	29700	8388
14	HJORSEY 1955	INTERNATIONAL	29700	8388
15	HU-TSU-SHAN	INTERNATIONAL	29700	8388
27	OLD HAWAIIAN-MAUI	INTERNATIONAL	29700	8388
28	OLD HAWAIIAN-OAHU	INTERNATIONAL	29700	8388
27	OLD HAWAIIAN-KAUAI	INTERNATIONAL	29700	8388
31	QORNOQ	INTERNATIONAL	29700	8388
33	S AMER-PROVIN 1956	INTERNATIONAL	29700	8388
34	S AMER-CORREGO ALEGRE	INTERNATIONAL	29700	8388
35	S AMER-CAMPO INCHAUSPE	INTERNATIONAL	29700	8388
36	S AMER-CHUA ASTRO	INTERNATIONAL	29700	8388
37	S AMER-YACARE	INTERNATIONAL	29700	8388
38	TANANARIVE OBS~RV 192	INTERNATIONAL	29700	8388
17	IRELAND (ERIE) 1965	MODIFIED AIRY	29932	7340
18	KERAU-MALAYAN REV TRI	MODIFIED EVRST	30080	7304
46	WGS 72	WGS 72	29826	8135
9	GHANA	WGS 84	29826	8137
12	G. SERINDUNG	WGS 84	29826	8137
23	MONTJONG LOWE	WGS 84	29826	8137
32	SIERRA LEONE 1960	WGS 84	29826	8137
41	VOIROL	WGS 84	29826	8137
45	SD, WGS 84 SPECIAL	WGS 84	29826	8137
47	WGS (DEFAULT DATUM)	WGS 84	29826	8137

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2. *LA* line selector switch - Depress to select NAV DATA information box. The following information is provided in the NAV DATA box:

(a) Present position. The present position (RESENT POS) display shows the actual latitude and longitude coordinates of the point on the earth's surface directly below the aircraft at any given instant.

(b) Navigation status. The navigation status display (NAV STATUS) shows the alignment status of the INS by a number (1 through 9).

(c) Ground track angle. The ground track angle (TRK) is the clockwise angle from true north to an imaginary line on the earth's surface connecting successive points over which the aircraft has flown (ground track).

(d) Wind direction and wind speed. Wind direction and wind speed are shown in the TRU WIND display. Wind direction is the clockwise angle from true north to the wind velocity vector. Wind speed (knots) is the velocity of the wind with respect to a point on the earth's surface. Zero wind speed and direction will be displayed when there is no true airspeed input.

(e) Desired track. The desired track angle (DES TRK) is the clockwise angle from true north to an imaginary line on the earth's surface connecting successive points over which flight is desired (desired track). The line describes the great circle course between two successive waypoints, and is further defined by the intersection of a plane and the earth's surface when the plane passes through the two successive waypoints and the center of the earth.

(f) True heading. The true heading (TRU HDG) display is the clockwise angle from true north to the aircraft centerline.

(g) Track angle error. The track angle error (TRK ERR) display is the angle between the aircraft's actual ground track and the desired track, or the angular difference between ground track angle and the desired track angle. Track angle error is left when the actual track angle is less than the desired track angle and right when the actual track angle is greater than the desired track angle.

(h) Drift angle. Drift angle (DFr ANG) is the angle between the airplane centerline and ground track or the angular difference between the true heading and ground track angle. Drift angle is right when ground track angle is greater than true heading and left when ground track angle is less than true heading.

(i) Cross track deviation. Cross track deviation (XTRK DEV) is the shortest distance between the aircraft's present position and the desired track. Cross track deviation is left when the present position is left of the desired track and right when present position is right of the desired track.

1. L5 line selection switch - Depress. If the scratchpad is empty, present position and NAV STATUS will be displayed. If a single valid waypoint number is scratchpadded, the time and distance to that waypoint will be continuously displayed. If two valid waypoint numbers between 1 and 9 are scratchpadded, the time and distance between those two waypoints will be continuously displayed.

(7) INS operation.

1. INS mode selector - NAV when desired nav status is achieved.
2. B mode selector switch - Depress to call up FLIGHT PLAN page.
3. R5 line selector switch - Depress to call up NAV SETUP page.
4. R5 line selector switch - Depress to call up INS SETUP page.
5. L3 line selector switch - Depress to select LEG CHANGES to AUTO or MAN.
6. R2 line selector switch - Depress to select Roll limit OFF or ON.
7. R3 line selector switch - Depress to select AUTO MIXING mode: TACAN, DL, GPS, or OFF.

(8) INS update.

1. R5 line selection switch - Depress to select INS UPDATE STATUS page.
2. Valid waypoint number or coordinates - Enter into scratchpad and depress L1. Update box will be displayed for approximately 30 seconds. The data within the box will show:

The scratchpadded coordinates or those associated with the scratchpadded waypoint.

The current NAV status number.

The difference between the scratchpadded waypoint/coordinates and the INS position when the update button was depressed. This difference is displayed in nautical miles and tenths if LAT/LONG is selected, and in kilometers and tenths if UTM is selected.

3. To accept the INS update - Depress L1 (UPDATE ACCEPT).
4. To reject the INS update - Depress L2 (UPDATE REJECT).

(9) INS stored heading procedure. An accurate INS heading and the local magnetic variation will be stored in the computer memory by performing the stored heading shutdown procedure. This will allow the INS to be ready for the next flight in a shorter period of time.

NOTE

Once a stored heading alignment has been performed, the next alignment must be a full alignment.

(a) Stored heading shut down.

1. Come to a complete stop in desired parking position.
2. Wait for STORED HEADING to appear in the advisory box on the MFD. This will take approximately 5 minutes.
3. INS mode selector - OFF.

NOTE

After completion of the stored heading shutdown the aircraft must not be moved until the stored heading alignment is complete.

If more than one week elapses prior to the next alignment, a stored heading alignment should not be attempted.

(b) Stored heading alignment. This procedure may be done before or after starting the engines. If prior to engine start (GPU), the complete procedure must be done before engaging the starter switch to ensure the data is not dropped from the INS due to power drop.

1. INS mode selector - STBY.
2. B mode selector switch - Depress to call up FPLN page.
3. R5 line selector switch - Depress to call up NAV SETUP page.
4. R5 line selector switch - Depress to call up INS SETUP page.
5. Valid alignment data - Enter into scratchpad. “2” for LAST KNOWN as long as this reflects the correct present position coordinates, or scratchpad in correct coordinates.
6. L1 - Depress to enter position.
7. INS mode selector - NAV.
8. Wait for completion of alignment. This will take 7 to 8 minutes. This can be confirmed by noting that the ALIGN STATE legend at L1 of the INS SETUP page has disappeared.

NOTE

Do not move the aircraft until the alignment is complete.

3-28. GLOBAL POSITIONING SYSTEM (AN/ASN-149 ((B)3)).

a. Description. The GPS is used to provide updated position information to the inertial navigation system and to mission equipment. The GPS system consists of a receiver-processor, an antenna electronics unit, and an antenna. The GPS is controlled by the aircraft survivability equipment/avionics control system (ASE/ACS).

b. GPS Normal Operation.

(1) Turn-On Procedure.

1. BATTERY switch (overhead control panel, fig. 2-13) - ON.
2. AVIONICS MASTER POWER SWITCH (overhead control panel, fig. 2-13) - ON.
3. #1 3Ø AC inverter control switch (mission control panel, fig. 4-1) - RESET, then ON.
4. A mode selection switch (multifunction display, fig. 4-2) - Depress to select UTILITY page.
5. B mode selection switch (multifunction display, fig. 4-2) - Depress to select FLIGHT PLAN page.
6. R5 line selection switch - Depress to select NAV SETUP page.
7. R4 line selection switch - Depress to select GPS SETUP page.

NOTE

On the GPS SETUP page, data fields are filled with dashes if data is unavailable from the GPS or if the data is invalid.

(2) GPS Initialization mode. Successive depressions of R1 will cause the GPS mode to toggle from NAV to INIT, with the active mode boxed. Normally, on power-up, a BIT runs for approximately 30 seconds, followed by the nav legend automatically being boxed and the legend QUICK, NORMAL or COLD (indicating start-up mode) being displayed to the right of the text at L5. Valid year data is 1 or two digits in the range 0 through 99. If GPS data displayed is not correct, depress R1 to select INIT and correct data as follows:

(a) GPS position data insertion.

1. If position is not correct, enter position data into the scratchpad.

Valid position data is X.DD.MM.SS.T. Y.DDD.MM.SS.T, where:

X = Latitude Hemisphere.(N or S)

DD = Degrees of Latitude (0 - 90)

MM = Minutes of Latitude or Longitude

SS = Seconds (0 - 59)

T = Tenths of Seconds (0 - 59)

Y = Longitude Hemisphere (E or W)

DDD = Degrees of Longitude

NOTE

Zero is assumed for minutes and seconds if not entered.

If INS is in NAV, its position and altitude will be sent to the GPS in INIT and displayed next to L1.

2. L1 line selection switch - Depress.

With valid data in the scratchpad and GPS in the INIT mode, depressing L1 will cause the scratchpad data to be displayed to the right of the text at L1.

(b) GPS altitude data insertion.

1. If altitude data is in error, enter valid altitude data into scratchpad.
2. L2 line selection switch - Depress. With valid data in the scratchpad and GPS in the INIT mode, depressing L2 will cause the scratchpadded data to be displayed to the right of the text at L2. Valid altitude data is 1 thru 5 digits with a range of 0 - 99999.

NOTE

The units of altitude for GPS are feet MSL.

(c) GPS time data insertion.

1. If time data in in error, enter valid UTC time data into scratchpad.
2. L3 line selection switch - Depress.

With a valid time entered in the scratchpad and GPS in the INIT mode, depressing L3 will cause the scratchpadded data to be displayed to the right of the text at L3. Valid time is HH MM SS, where:

HH = Hour of the day (0 - 23)

MM = Minutes after the hour (0 - 59

SS = Seconds after the minute (0 - 59)

NOTE

Zero is assumed for minutes and seconds if not entered.

3. Day of year (DOY) data insertion.
4. Enter valid day of year (DOY) data into scratchpad.
5. L4 line selection switch - Depress.

With a day of the year (DOY) entered in the scratchpad and GPS in the INIT mode, depressing L4 will cause the scratchpadded data to be displayed to the right of the text at L4. Valid day of the year data is 1 through 3 digits in the range of 1 through 365.

(d) Year data insertion.

1. If year is wrong, enter valid year data into scratchpad.
2. L5 line selection switch - Depress. With a year entered in the scratchpad and GPS in the INIT mode, depressing L5 will cause the scratchpadded to be displayed to the right of the text at L5. Valid year data is 1 or 2 digits in the range 0 through 99.

(3) GPS quick start-up mode. The QUICK start-up mode is the mode which is normally automatically selected by the ASE/ACS. When the QUICK start-up mode is complete, the QUICK legend below the NAV INIT text is removed to cue the crew that the GPS is ready for normal navigation. The transition from QUICK start to navigate mode occurs when 3 or more satellites are being tracked and the figure of merit is less than 9.

Figure of merit (FOM) is a single digit from 1 to 9. It represent estimated position error (EPE) in feet as follows**:**

FOM = 1, then EPE < 82
FOM = 2, then EPE < 164
FOM = 3, then EPE < 246
FOM = 4, then EPE < 328
FOM = 5, then EPE < 642

FOM = 6, then EPE < 1640
FOM = 7, then EPE < 3280
FOM = 8, then EPE < 16404
FOM = 9, then EPE < 16404

(4) GPS normal start-up mode. If there is a large difference between the initial GPS position and the INS alignment position (approximately 54 NM or larger), the ASE/ACS selects the NORMAL start-up mode. When auto selected, the legend NORMAL appears below the text NAV INIT and the ASE/ACS will place the GPS in the INIT mode; send the INS latitude, longitude, and datum to the GPS; and reselect the NAV mode. When the NORMAL start-up mode is complete, the NORMAL legend below the NAV INIT text is removed to cue the crew that the GPS is ready for normal navigation. The transition from NORMAL start to navigate mode occurs when 3 or more satellites are being tracked and the figure of merit is less than 9.

(5) GPS cold start-up mode. If the GPS almanac data is more than 5000 hours old, the GPS initiates a COLD start-up mode. When this happens, the legend COLD will appear below the text NAV INIT and the GPS will initiate a search for a good satellite to download almanac data (this process can take up to 13 minutes). The total time to complete the COLD start-up is totally dependent on satellite visibility. If COLD start-up is initiated and satellite number 14 (the first in the search sequence) is visible and good, the whole almanac downloading and start-up sequence should be completed in less than 20 minutes. When the COLD start-up mode is complete, the COLD legend below the NAV INIT text is removed to cue the crew that the GPS is ready for normal navigation. The transition from COLD start to navigate mode occurs when 3 or more satellites are being tracked and the figure of merit is less than 9.

(6) Map datum entry. With a local map datum entered in the scratchpad and GPS in the INIT mode, depressing R2 will cause the scratchpadded data to be displayed to the left of the text at R2. A valid datum is any number from 1 through 47 except 20. Datum cross reference is shown in table 3-7. Map datum default is 47.

3-29. CHALS USE OF GPS AND INS.

a. CHALS Concept. CHALS (Communication High Accuracy Airborne Location System), is an emitter location system that provides timely, high accuracy locations required for targeting and to support emitter associations and battlefield situation assessment. CHALS provides this capability through coherent processing of differential doppler (DD) and time difference of arrival (TDOA) information received at a ground facility from the aircraft. CHALS receivers aboard the aircraft will receive and digitize emitter signals. The data will be transmitted over the data link to the GR/CS integrated processing facility (IPF). There, CHALS processors will perform the required computations to produce accurate emitter locations. The precise navigation required is provided by the inertial navigation system (INS) and the global positioning system (GPS). GPS also provides the primary means of time synchronizing the CHALS receivers (signal conditioners or SC's) aboard the aircraft. A backup for the GPS is provided by the data link. The resultant emitter reports will be sent to GR/CS by CHALS.

b. GPS (and INS) movement. The accurate and timely navigation (position and velocity) is provided by integrating an INS with a GPS, and integrating both (through a series of intermediaries) with a CHALS ground based navigation processor (NP). The SC, data link, and CHALS HSSP (high speed signal processor) form the communication link. The critical airborne interfaces for CHALS navigation and time synchronization include the following:

(1) INS to GPS and CHALS:

Acceleration

Velocity

Position

Altitude

(2) GPS to CHALS:

Time mark pulse (time synchronization)

Navigation data block (position, velocity, and time)

Error state vector data block (9 element ESV, time)

TM/covariance data block (time, TM time, covariance)

Status data block (status including DOP's and FOMN)

Section IV. RADAR AND TRANSPONDER

3-30. RADAR AND TRANSPONDER EQUIPMENT GROUP DESCRIPTION.

The radar and transponder group consists of a weather radar, lightning sensor system, transponder, and encoding altimeter indicator. The transponder and radar group includes an identification, position, emergency tracking system, and a radar and lightning sensor system to locate potentially dangerous weather areas.

3-31. WEATHER RADAR SYSTEM (WC-650).

The weather radar system is a light weight, X-band digital radar with alphanumerics designed for weather detection and analysis and ground mapping. The radar system is controlled from the radar control panel (fig. 3-29), located on the pedestal extension (fig. 2-12). Radar information is displayed on the pilot's and copilot's EHSI.

NOTE

The weather radar may display false echoes and spikes on all ranges when the VHF-FM (SINCGARS) transceiver is transmitting.

The primary purpose of the system is to detect storms along the flight path and give the pilot a color visual indication of there rainfall intensity. After proper evaluation, the pilot can chart a course to avoid these storm areas.

Figure 3-30 depicts a typical EFIS weather test pattern (120 degree scan).

WARNING

The system performs only the functions of weather detection or ground mapping. It should not be used nor relied upon for proximity warning or anti-collision protection.

Output power is radiated during test mode.

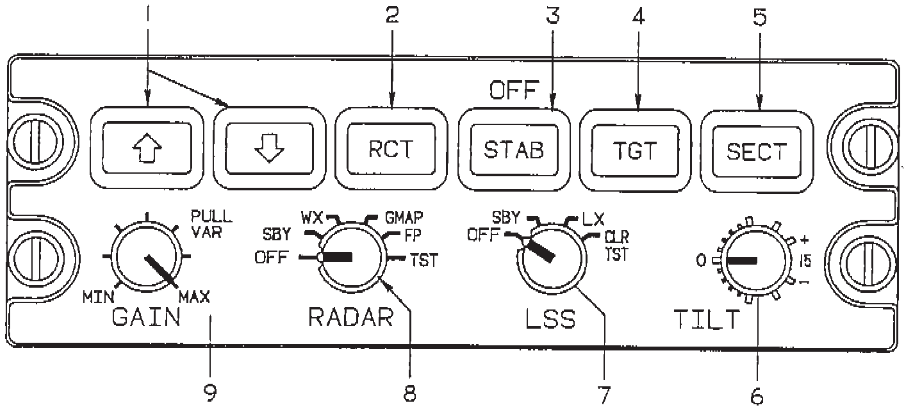
CAUTION

If the radar system is to be operated in any mode other than standby while the aircraft is on the ground: Direct the nose of the aircraft so that the antenna scan sector is free of large metallic objects such as hangars or other aircraft for a distance of 100 feet (30 meters).

Do not operate during refueling of aircraft or defueling operation within 100 feet (30 meters).

Do no operate if personnel are standing too close to the 270-degree forward sector of the aircraft (fig. 3-31).

Operating personnel should be familiar with FAA AC 20-68B.



1. Range Switches
2. Rain Echo Attenuation Compensation Technique Pushbutton Selector Switch
3. Attitude Stabilization Pushbutton Selector Switch
4. Target Alert Pushbutton Selector Switch
5. Sector Scan Angle Pushbutton Selector Switch
6. Antenna Tilt Angle Control
7. Lightning Sensor System Mode Selector Switch
8. Radar System Mode Selector Switch
9. Radar Receiver Gain Control

Figure 3-29. Weather Radar/Lightning Sensor System Control Panel

In the weather detection mode, precipitation intensity levels are displayed in four colors, contrasted against a deep black background. Areas of very heavy rainfall will appear in magenta, heavy rainfall in red, less severe in yellow, light rain in green, and little or no rainfall in black (background). The correlation of precipitation intensity and the color of displayed weather is shown in table 3-12.

Range marks with identifying numerics, displayed in white, are provided to facilitate evaluation of storm cells.

Selection of the ground mapping (GMAP) function will cause system parameters to be optimized to improve resolution and enhance identification of small targets at short range. The reflected signal from ground surfaces will be displayed as magenta, yellow, or cyan (most to least reflective).

a. Radar Control Panel Controls, Indicators, and Functions:

(1) Range switches. Two momentary-contact pushbutton switches (placarded with an up arrow on the left switch, and a down arrow on the right), are used to select the operating range of the radar (and the lightning sensor system). By depressing the switches, ranges of 5, 10, 25, 50, 100, 200, and 300 nautical miles with corresponding range marks may be selected. Ranges of 600 and 1200 nautical miles are available if the radar system mode selector switch is in the FP position.

(2) Rain echo attenuation compensation technique pushbutton selector switch. The rain echo attenuation compensation technique (REACT) pushbutton selector switch, placarded RCT, is used to enable or disable the REACT function of the radar system. When the RCT mode has been activated, receiver gain is automatically adjusted according to received signal strength. When receiver is in calibrated range, displayed colors are as in weather mode. When calibration range is exceeded, background will be in blue for the affected areas. Signals in the uncalibrated range will be displayed as a level three (red). REACT mode may be activated in all radar ranges. When activated, RCT will be annunciated on the EHSI.

(3) Attitude stabilization pushbutton selector switch. The alternate-action, attitude stabilization pushbutton selector switch, placarded STAB is used to enable or disable attitude stabilization of the radar image. When stabilization is selected off, an OFF annunciator above the STAB switch will illuminate.

(4) Target alert pushbutton selector switch. The alternate-action, target alert pushbutton selector switch, placarded TGT is used to enable or disable the radar target alert feature. When the target alert function has

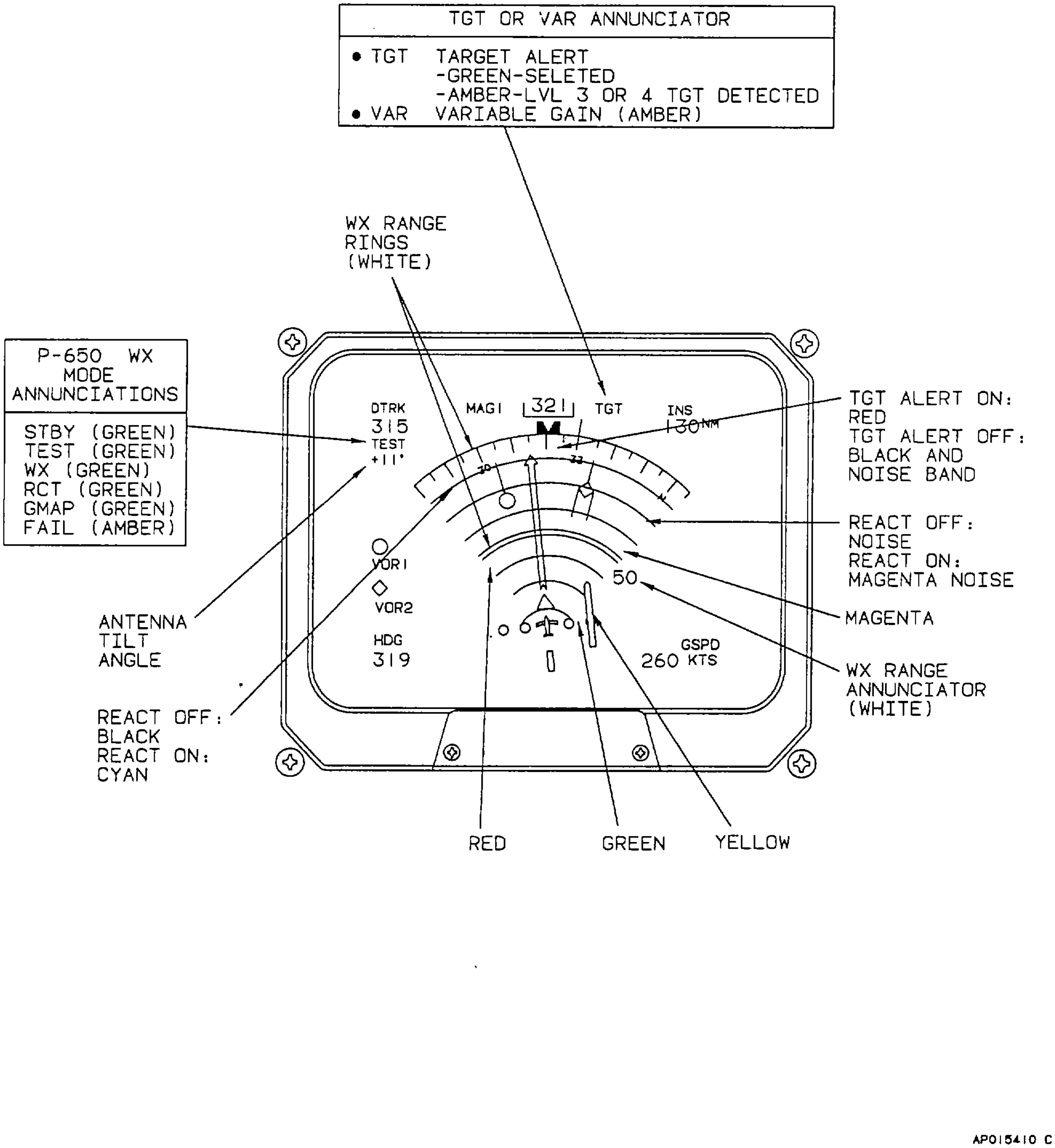


Figure 3-30. EFIS Weather Test Pattern (Typical, 120-Degree Scan)

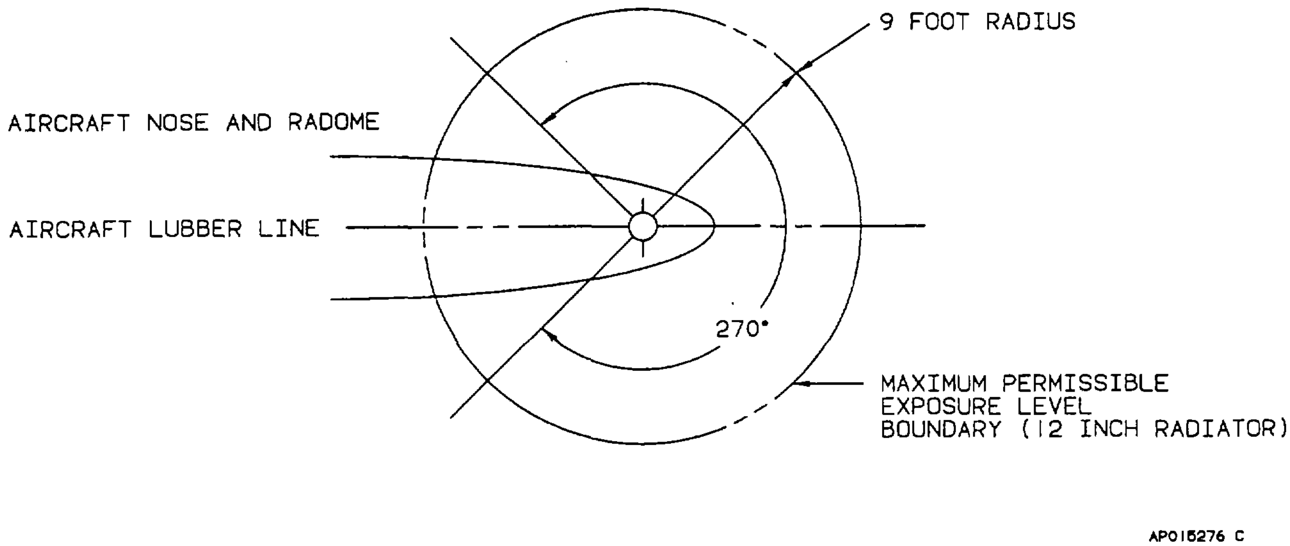


Figure 3-31. Maximum Permissible Exposure Level

Table 3-12. Video Integrated Processor VS, .Aircraft Radar Return Levels

Display Level	Rainfall Rate (mm/Hr)	Rainfall Rate (Inches/Hr)	Video Integrated Processor (VIP) Categorizations			Maximum Calibrated Range (NM)
			Storm Category	**VIP Level**	**Rainfall Rate (mm/HR) (inches/HR)**	
			Extreme	6	Greater than 125 (5)	175
4 (Magenta)	Greater than 52	Greater than 2.1	Intense	5	50-125 (2-5)	
3 (Red)	Greater than 12 12-52	Greater than 0.5 0.5-2.1	Very Strong	4	25-50 (1-2)	175
			Strong	3	12-25 (0.5-1)	
2 (Yellow)	4-12	0.17-0.5	Moderate	2	2.5-12 (0.1-0.5)	175
1 (Green)	1-4	0.04-0.17	Weak	1	0.25-2.5 (0.01-0.1)	175
0 (Black)	Less than 1	Less than 0.04				—

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been selected, TGT (green) will be enunciated on the EHSL. When the target alert feature has been selected, the area beyond the selected range and 7.5 degrees on either side of aircraft heading is monitored for radar returns of level 3 (red) or greater. If a level 3 or greater return is detected and triggers the system, TGT will be enunciated in amber on the EHSL. Target alert is selectable in all but the 300 nautical-mile range.

(5) Sector scan angle pushbutton selector switch. The alternate-action, sector scan angle pushbutton selector switch is used to select either the normal 14 looks per minute 120-degree scan or the faster update 28 looks per minute 60-degree sector scan.

(6) Antenna tilt angle control. The rotary antenna tilt angle control, placarded TILT, is used to select the angle of the antenna beam with relation to earth plane. Clockwise rotation tilts the beam upward from 0 to 15 degrees. Counterclockwise rotation tilts the beam down-ward from 0 to 15 degrees. The scale range between +5 degrees and -5 degrees is expanded for ease of use.

(7) Lightning sensor system mode selector switch.

(a) OFF. Disables lightning sensor system.

(b) STBY. In the standby (STBY) mode, lightning data is not displayed. However, the receiving and processing equipment is active and lightning strikes are being counted and accumulated.

*(*c) LX. The LX mode is the normal working mode of the lightning sensor system. Lightning strikes are collected, processed, and displayed.

(*d) CLR/TST.* When clear/test is selected, all memory of past strikes and symbols are erased. After 3 seconds the system enters the test mode.

In the test mode, simulated lightning signals are fed into the test loop in the antenna and a lightning strike is simulated at a bearing of 45 degrees at 25 nautical miles. A lightning alert is also generated along the outermost range ring at a bearing of 45 degrees. This simulated strike will progress in severity through level three within 15 seconds of entry into the test mode. If the mode selector is left in the CLR/TST mode, the alert and strike symbols will reduce in severity and disappear. The lightning rate symbol will disappear after approximately 2 minutes.

NOTE

The lightning sensor system antenna is used in this test and as a result, any real lightning activity that occurs while the test is in operation may also be displayed.

(8) Radar system mode selector switch.

(a) OFF. Turns the radar system off.

(b) SBY. Places the radar system in standby. This is a ready state with the antenna scan stopped, the transmitter inhibited, and the memory erased. STBY will be displayed on the EHSI.

(c) WX. Selecting WX places the radar system in the weather detection mode. WX (green) will be enunciated on the EHSL. The system is fully operational and all internal parameters are set for enroute weather detection. Automatic or variable gain control may be used. Radar display levels are depicted in four colors as described in figure 3-31. If WX is selected prior to the expiration of the initial system warm-up period (approximately 45 seconds), WAIT green) will be enunciated on the EHSI. In wait mode, the transmitter and antenna scan is inhibited and the memory is erased. Upon completion of the warm-up period, the system will automatically switch to WX mode.

(d) GMAP. Selecting GMAP places the radar system in the ground mapping mode. The system is fully operational and all internal parameters are set to enhance returns from the ground and reduce returns from weather targets.

CAUTION

Weather type targets are not calibrated when the radar is in the GMAP mode. Because of this, the pilot should not use the GMAP mode for weather detection.

As a constant reminder that GMAP has been selected, the GMAP legend is displayed and the color scheme is changed to cyan, yellow, and magenta. Cyan represents the least reflective return, yellow is a moderate return, and magenta is a strong return. If ground mapping is selected prior to the expiration of the warm-up period (approximately 45 seconds), a white WAIT legend will be displayed. In the WAIT mode, the transmitter and antenna scan will be inhibited and the memory is erased. Upon completion of the warm-up period, the system will automatically switch to the GMAP mode.

(e) FP. Selection of the FP position places the radar system in the flight plan mode permitting the display of navigation data on the EFIS with radar data omitted. This position allows an extended MAP display range (up to 1200 nautical miles) to be selected for navigation data.

(f) TEST. Selection of TEST position selects test mode and puts a test pattern on the screen to verify system operation. TEST will be annunciated on the EHSI in the radar mode field. TEST mode is inhibited when system is in forced standby mode.

(9) Radar receiver gain control. This control (placarded GAIN, MIN - MAX) is used the adjust receiver gain when gain is variable. Pulling out on gain control makes gain control variable. A fully automatic gain control is provided when the gain control is in the preset (pushed in) position.

b. Weather Radar Normal Operation. Radar turn-on procedure.

1. Radar system mode selector switch - OFF.
2. Radar receiver gain control - Preset (pushed in) position.
3. Antenna tilt angle control - +15 degrees.
4. Weather (WX) pushbutton selector switch (display controller) - Depress to select weather display mode on the EHSI.
5. Radar mode selector switch - SBY or TEST.

NOTE

When power is first applied, the radar will be in the WAIT mode for 45 seconds to allow the magnetron to warm up.

c. Weather Radar Modes of Operation.

(1) Standby mode. When SBY has been selected with the radar system mode selector switch, the radar antenna will be stowed in a tilt-up position and will be neither scanning nor transmitting. Standby should be selected any time it is desirable to keep power on the system without transmitting.

(2) Forced standby. Provisions are included in the weather radar controller to place the system into the forced standby mode when the radar is operating and weight is on the aircraft's wheels. The forced standby mode is a safety feature that stops the radar from transmitting on the ground to eliminate the microwave radiation hazard. In the forced standby mode, the transmitter and antenna scan are both inhibited and the memory erased.

Forced standby may be overridden (restoring normal operation) by simultaneously depressing both range switches on the radar control panel.

(3) Weather detection mode. Normal weather detection mode is selected by placing the radar system mode selector switch to the WX position, and selecting WX on the display controller. To assist the pilot in categorizing storms, the radar receiver gain is calibrated in the WX mode with the GAIN control in the preset position. The radar is not calibrated when variable gain is being used. Calibration is restored if rain echo attenuation compensation technique (RCT) or target alert (TGT) is selected. In the weather detection mode precipitation is displayed in five levels as black, green, yellow, red, and magenta.

In order to permit the user to interpret the display, targets are displayed in various colors. Each color represents a specific target intensity. The relationship between the colors on the display and the national weather service video integrated processor (VIP) level is shown in table 3-12. Rain echo attenuation compensation technique may be used in the WX mode to compensate for the attenuation of the radar signal as it passes through a storm. It does this by increasing or decreasing the gain of the receiver as weather is detected. Depressing the RCT pushbutton switch on the weather radar selects and deselects the rain echo attenuation compensation technique (REACT) circuitry and selects and deselects the blue field display which indicates that the receiver is at maximum gain and the reference levels are at final values. Any returns detected beyond this point are displayed as magenta (Selecting RCT prevents variable gain from operating).

(4) Ground mapping mode. Ground mapping mode is selected by setting the radar system mode selector switch to the GMAP position. The TILT control is then used to tilt the antenna down until the desired amount of terrain is displayed. The degree of tiltdown will depend upon the aircraft altitude and the selected range. In the GMAP mode the receiver characteristics are altered to provide equalization of ground-target reflection versus range. As a result, leaving the gain control in the depressed (preset) position will generally provide the desired mapping display. However, the pilot may desire to decrease the gain manually by selecting manual gain control and rotating the GAIN control. With experience, the pilot will develop the ability to interpret the color display patterns that indicate water regions, coast lines, hilly or mountainous regions, cities, or even large structures.

(5) Fault monitoring. Critical functions in the receiver/transmitter/antenna are continuously monitored.

3-32. LIGHTNING SENSOR SYSTEM (LSZ-850).

WARNING

The lightning sensor system is to be used for hazardous weather avoidance, not weather penetration.

The lightning sensor system (LSS) is used to detect and locate areas of lightning activity within a 100 nautical mile radius around the aircraft The system provides the operator with a visual display of the position and rate of occurrence of the lightning activity on the EHSL. The lightning sensor system detects both visible and high energy invisible electromagnetic and electrostatic discharges (lightning) indicating areas of turbulent activity. After evaluating the LSS display, and its relation to precipitation as indicated by the weather radar display, the operator can effectively plan the proper course to avoid hazardous weather. The lightning sensor system consists of a receiver/processor, an antenna, a mode selector switch (located on the radar control panel, fig. 3-29), and the pilot's and copilot's EHSL. The system is powered by a 2-ampere circuit-breaker placarded LSS, located on the overhead circuit breaker panel (fig. 2-7). Because the system is a passive device (it does not transmit), it can be operated safely on the ground. Weather in all directions around the aircraft may be monitored, even before starting engines.

a. Lightning Sensor System Mode Selector Switch (fig 3-28).

(1) OFF. Disables lightning sensor system.

(2) SBY. In the standby (SBY) mode, lightning data is not displayed. However, the receiving and processing equipment is active and lightning strikes are being counted and accumulated.

*(*3) LX. The LX mode is the normal working mode of the lightning sensor system. Lightning strikes are collected, processed, and displayed.

(4) CLR/TST. When clear/test is selected, all memory of past strikes and symbols are erased. After 3 seconds the system enters the test mode.

In the test mode, simulated lightning signals are fed into the test loop in the antenna and a lightning strike is simulated at a bearing of 45 degrees at 25 nautical miles. A lightning alert is also generated along the outermost range ring at a bearing of 45 degrees. This simulated strike will progress in severity through level three within 15 seconds of entry into the test mode. If the mode selector is left in the CLR/TST mode, the alert and strike symbols will reduce in severity and disappear. The lightning rate symbol will disappear after approximately 2 minutes.

NOTE

The lightning sensor system antenna is used in this test, and as a result, any real lightning activity that occurs while the test is in operation may also be displayed.

b. Lightning Sensor System Display. The LSS shows areas of lightning activity on the EHSI with symbols. Each lightning symbol represents the center of a circular area with a radius of nine nautical miles. Three different lightning symbols are used to represent three different rates of occurrence of the lightning within each 18 nautical-mile diameter circle. The lightning rate symbols represent the lightning rates-of-occurrence during the last two minutes. The symbol's location on the display represents the average position of the lightning that has occurred during the last two minutes inside each 18 nautical-mile diameter area. Lightning may not be occurring at the center of the symbol. Because it is easier for the LSS to detect lightning at close distances than at far distances, the number of lightning strokes required for each rate symbol is adjusted for distance to the storm. Figure 3-32 shows the number of strokes required for each symbol versus range to the storm. Figure 3-33 shows the three rate-of-occurrence symbols.

c. Lightning Alert System. It is possible to see a lightning flash visually, and see no change in the display. This is normal, because, unless one of the rate thresholds are crossed, there will be no change in the symbol, other than a slight position update. The lightning alert function shows the operator that the unit is operational, and shows real-time lightning activity. The lightning alert function places a magenta rate-one symbol near the outer range mark of the display, at the proper bearing, for each lightning flash (fig. 3-33). The lightning alert symbol is displayed for five seconds, and gives the operator confidence that the system is functional even though there may be no change in the white lightning rate symbols. It is also an indicator of real-time activity.

d. Lightning Sensor System Mode Annunciations. The following mode annunciations may appear on the EHSI display.

(1) LX/F (amber). Indicates that self-test has detected a fault.

*(*2) LXIS *(green).* Indicates that the system is in the standby (SBY) mode.

(3) LX/CL (green). Indicates that the system is in the clear (CLR) mode. This annunciator will appear for approximately 3 seconds after the CLR/TST mode has been selected. After this time the mode annunciator will switch to LX/T.

(4) LX/T *(green).* Indicates that the system is in the test (CST) mode. This annunciator may be replaced with LXMN.

(5) LXmn (amber). In the CLR/TST mode an amber LXn will be displayed, where mn is a two digit failure code. Table 3-8 explains these codes.

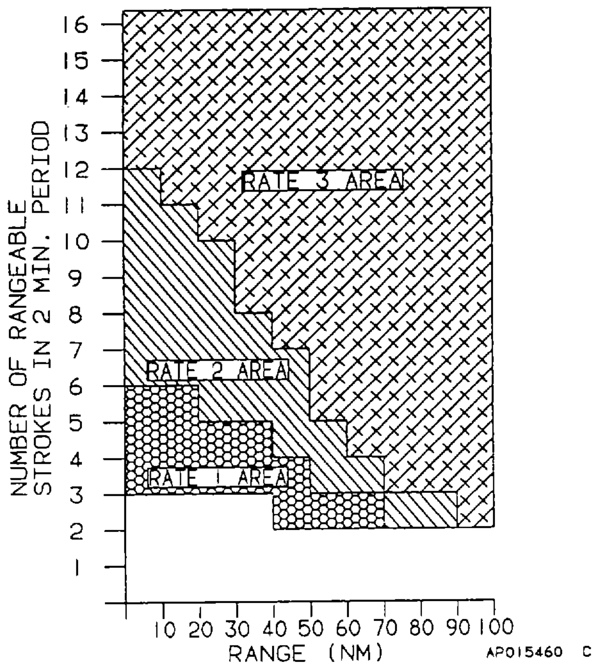

Figure 3-32. Lighting Strokes Required per Symbol vs. Range to Storm

(6) LX/I (green). Indicates that the receiver is inhibited by the XMIT INH input during transmission by communications transmitters. No lightning may be received during this condition.

(7) LH/H (green). Indicates that heading input has been deselected by the HDG VALID input.

(8) LX/C (green). Indicates that the system is in the self-calibration mode. This will revert to the selected mode approximately 10 seconds after power has been applied.

(9) LX/I (green). The number of computed lightning rate symbols exceeds the capability of the display system.

(10) LX (green). Indicates that the system is in the normal operating mode.

NOTE

If two or more of the above situations are true at the same time, the annunciation which is highest on the above list will be displayed.

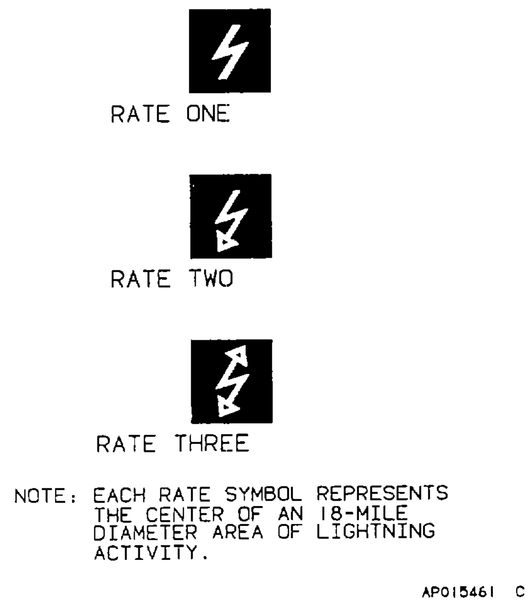

Figure 3-33. Lightning Rate of Occurrence Symbols

e. Self Calibration Mode. During approximately the first 8 seconds after power is applied, the system performs a self-calibration process to cancel out variations in antenna gain and cable loss (LX/C will be displayed on the EHSI). As soon as this is complete, the letter C will be removed from the display. If strong interfering signals outside the aircraft, or equipment malfunction prevent the calibration of the system, it will revert to preset calibration factors, in which case the C will not be removed from the display. In this case the operator should select the TST mode and evaluate the test display. Interference signals can be caused by other systems on the aircraft, by adjacent ground installations such as power transformers, or by nearby aircraft. If sources outside the aircraft cause the C to remain displayed, they will not be present after takeoff, and the LSS mode selector switch should be switched to OFF and set back to the LX mode to force recalibration for greater accuracy. If the C display persists after takeoff, TST mode should be selected again to re-evaluate the system.

f. *Self-Test.*

1. Range switches (radar control panel, fig. 3-29) - Select range of 50 nautical miles or greater.
2. Lightning sensor system (LSS) mode selector switch (radar control panel) - CLR/TST. Verify that all lightning rate symbols are erased from display.

NOTE

After 3 or 4 seconds, simulated lightning test pulses are sent to the display.

3. Verify that a rate symbol is displayed at 25 nautical miles, at 45 degrees to right of center. This symbol will take approximately 5 to 7 seconds to build up.

NOTE

This time will be extended to approximately 15 seconds if TST is selected immediately from OFF, due to lightning processor initialization.

The symbol's range may vary by as much as 5 nautical miles if strong local interference is present.

4. Verify that a magenta lightning alert symbol is displayed at maximum selected range, at 45 degrees right of center. This must remain on display for 3 to 7 seconds.

5. To restart the test switch to LX mode and back to CLR/TST mode.

If the power-on test or the on line built-in test equipment detects a fault, either prior to or during the operation of self test, the system will switch the displayed mode symbol to an amber LX/F. A special fault message may be obtained by switching to the CLR/TST mode. In the CLR/TST mode an amber LXmn will be displayed, where mn is a failure code that may be interpreted according to table 3-13.

g. Lightning Sensor System Normal Operation.

1. LSS mode selector switch (radar control panel) -LX

2. Range switches (radar control panel) - Set desired range.

NOTE

If radar system mode selector switch is set to OFF, LSS range will revert to 50 nautical miles.

3-33. TRANSPONDER SET (APX-100).

a. Description. The transponder system receives, decodes, and responds to interrogations from air traffic control (ATC) radar to allow aircraft identification, altitude reporting, position tracking, and emergency tracking. The system receives a frequency of 1030 MHz and transmits preset coded reply pulses on a frequency of 1090 MHz at a minimum peak power of 200 watts. The range of the system is limited to line-of-sight. The transponder system consists of a combined receiver/transmitter/control panel (fig. 3-34) located in the pedestal extension; a pair of remote switches, one in each control wheel; and two antennas, located on the underside and top of the fuselage. The system is protected by the 3-ampere TRANSPONDER, and 35-ampere AVIONICS MASTER PWR No. 1 circuit breakers on the overhead circuit breaker panel (fig. 2-7).

b. Transponder Controls, Indicators, and Functions (fig. 3-34).

(1) TEST-GO indicator. illuminates to indicate successful completion of built-in-test (BIT).

(2) TEST-MON indicator. Illuminates to indicate system malfunction or interrogation by a ground station.

(3) ANT switch. Selects desired antenna for signal input

(a) TOP. Selects upper antenna.

(b) DIV. Selects diverse (both) antennas.

(c) BOT. Selects lower antenna.

(4) RAD TEST-OUT switch. Enables reply to TEST mode interrogations from test set.

(5) MASTER CONTROL. Selects system operating mode.

(a) OFF. Deactivates system.

(b) STBY. Activates system warm-up (standby) mode.

(c) NORM. Activates normal operating mode.

(d) EMER. Transmits emergency reply code.

(6) STATUS ANT indicator. Illuminates to indicate the BIT or MON fault is caused by high VSWR in antenna.

(7) KIT. Illuminates to indicate the BIT or MON fault is caused by external computer.

(8) STATUS ALT indicator. Illuminates to indicate the BIT or MON fault is caused by the altitude digitizer.

Table 3-13. Lightning Sensor System Failure Codes

LX FAIL CODE (mn)	HARDWARE/FIRMWARE FAILURE
00	No LX system failure (not displayed)
01	Power supply out-of-tolerance
02	Invalid configuration
03	Reserved
04	Data Processor RAM failure
05	Data Processor Checksum failure
06	Data Processor shared RAM failure
07	Reserved
08	Reserved
09	I/O Processor RAM failure
0A	I/O Processor Checksum failure
0B	I/O Processor shared RAM failure
0C	H_N out-of-range
0D	H_W out-of-range
0E	Reserved
0F	H_{NLF} out-of-range
10	H_{WLF} out-of-range
11	E_{LF} out-of-range
12	No data from antenna

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(9) IDENT - MIC - OUT. Selects source of air-craft identification signal.

(a) IDENT. Activates transmission of identification pulse (IP).

(b) MIC. Enables either control wheel POSIDENT switch to activate transmission of ident signal from transponder.

(c) OUT. Disallows outgoing signal.

(10) MODE 4 reply annunciator light. Illuminates to indicate a reply has been made to a valid Mode 4 interrogation.

(11) MODE 4 AUDIO OUT switch. Selects monitor mode for mode 4 operation.

(a) AUDIO. Enables sound and sight monitoring of mode 4 operation.

(b) LIGHT. Enables monitoring REPLY indicator for mode 4 operation.

(c) OUT. Deactivates monitor mode.

(12) MODE 3/A code selectors. Select desired reply codes for mode 3/A operation.

(13) MODE 2 code selectors. Select desired reply codes for mode 2 operation. The cover over mode select switches must be slid forward to display the selected mode 2 code.

(14) MODE 1 code selectors. Select desired reply codes for mode 1 operation.

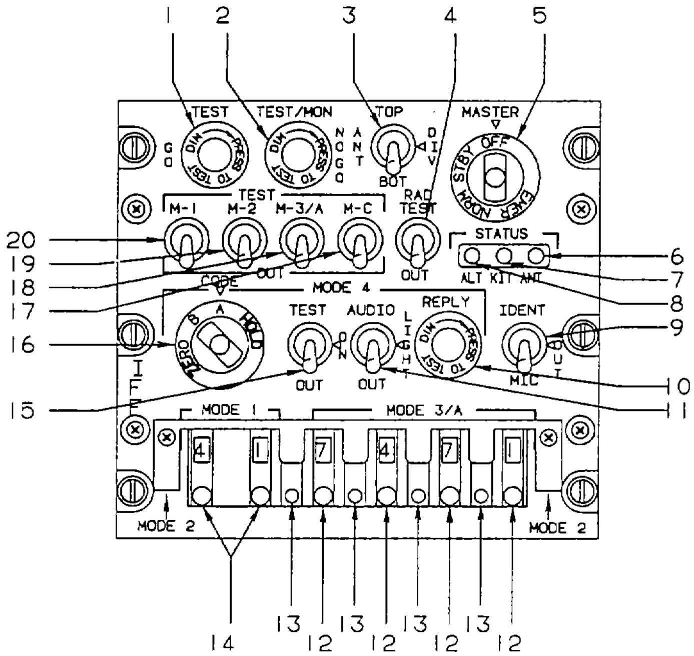
(15) MODE 4 TEST-ON-OUT switch. Selects test mode of Mode 4 operation.

(a) TEST. Activates built-in-test of mode 4 operation.

(b) ON. Activates mode 4 operation.

(c) OUT. Disables mode 4 operation.

(16) MODE 4 code control. Selects preset mode 4 code.



1. TEST-GO Indicator
2. TEST/MON, NO GO Indicator
3. Antenna Switch
4. RAD TEST-OUT Switch
5. MASTER Control
6. STATUS ANT Indicator
7. STATUS KIT Indicator
8. STATUS ALT Indicator
9. IDENT MIC-OUT Switch
10. MODE 4 REPLY Indicator
11. MODE 4 AUDIO-LIGHT-OUT Switch
12. MODE 3/A Code Selectors
13. MODE 2 Code Selectors
14. MODE 1 Code Selectors
15. MODE 4 TEST-ON-OUT Switch
16. MODE 4 Code Selector
17. M-C TEST Switch
18. M-3/A TEST Switch
19. M-2 TEST Switch
20. M-1 TEST Switch

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Figure 3-34. Transponder *Control Panel*

(17) M-C, M-3A, M-2, and M-1 switches. Select test or reply mode of respective codes.

(a) TEST. Activates self-test of selected code. Transponder can also reply.

(b) ON. Activates normal operation.

(c) OUT. Deactivates operation of selected code.

(18) POS IDENT pushbutton (control wheels, fig. 2-22). When pressed, activates transponder identification reply.

c. Transponder - Normal Operation.

(1) Turn-on procedure: MASTER switch - STBY. Depending on type of receiver installed, TEST/MON NO GO indicator may illuminate. Disregard this signal.

(2) Test procedure:

NOTE

Make no checks with the master switch in EMER, or with M-3/A codes 7600 or 7700 without first obtaining authorization from the interrogating station(s).

1. Allow set two minutes to warm up.
2. Select codes assigned for use in modes 1 and 3/A by depressing and releasing the pushbutton for each switch until the desired number appears in the proper window.
3. Lamp indicators - Operate press-to-test feature.
4. M-1 switch - Hold in TEST. Observe no annunciators illuminate.
5. M-1 switch - Return to ON.
6. Repeat steps 4 and 5 for the M-2, M-3/A and M-C mode switches.
7. MASTER control - NORM.
8. MODE 4 code control - A Set a code in external computer.
9. MODE 4 AUDIO OUT switch - OUT.

(3) Modes 1, 2, 3/A, and/or 4 operating procedure:

NOTE

If the external security computer is not installed, a NO GO annunciator will illuminate any time the Mode 4 switch is moved out of the OFF position.

1. MASTER control - NORM.
2. M-1, M-2, M-3/A, and/or MODE 4 ON-OUT switches - ON. Actuate only those switches corresponding to required codes. The remaining switches should be left in OUT position.
3. MODE 1 code selectors - Set (if applicable).
4. MODE 3/A code selectors - Set (if applicable).
5. MODE 4 code control - Set (if required).
6. MODE 4 REPLY indicator - Monitor to determine when transponder set is replying to SIF interrogation.
7. MODE 4 AUDIO OUT switch - Set (as required to monitor mode 4 interrogations and replies).
8. MODE 4 audio and/or indicator - Listen and/or observe (for mode 4 interrogations and replies).
9. IDENT-MIC-OUT switch - Press to IDENT momentarily.
10. MODE 4 TEST-ON-OUT switch - TEST.
11. Observe that the TEST GO annunciator illuminates.
12. MODE 4 TEST-ON-OUT switch - ON.
13. ANT switch - BOT.
14. Repeat steps 4, 5 and 6. Observe that TEST GO indicator illuminates.
15. TOP-DIV-BOT-ANT switch - TOP.
16. Repeat step 14.
17. TOP-DIV-BOT-ANT switch - DIV.
18. Repeat step 14.
19. When possible, obtain the cooperation of an interrogating station to exercise the TEST mode. Execute the following steps:
20. RAD TEST-OUT switch - RAD TEST.
21. Obtain verification from interrogating station that TEST MODE reply was received.
22. RAD TT-OUTI switch - OUT.

(4) Transponder set identification-position operating procedure: The transponder set can make identification-position replies while operating in code Modes 1, 2, and/or 3/A, in response to ground station interrogations. This type of operation is initiated by the operator as follows:

1. Modes 1, 2 and/or 3/A - ON, as required.
2. IDENT-OUT-MIC switch - Press momentarily to IDENT, when directed.

NOTE

Holding circuits within the transponder receiver-transmitter will transmit identification-position signals for 15 to 30 seconds. This is normally sufficient time for ground control to identify the aircraft's position. During the 15 to 30 second period, it is normal procedure to acknowledge via the aircraft communications set that identification/ position signals are being generated.

Set any of the M1, M2, M3/A, M-C, or MODE 4 switches to OUT to inhibit transmission of replies in undesired modes.

With the IDENT-OUT-MIC switch set to the MIC position, the POS IDENT button on either control wheel must be depressed to transmit identification pulses.

(5) Shutdown procedure:

1. To retain Mode 4 code in external computer during a temporary shutdown:
2. MODE 4 CODE switch - Rotate to HOLD.
3. Wait 15 seconds.
4. MASTER control - OFF.
5. To zeroize the Mode 4 code in the external computer, turn MODE 4 CODE switch to ZERO.
6. MASTER control - OFF. This will automatically zeroize external computer unless codes have been retained (step 1 above).

3-34. PILOT'S BAROMETRIC ALTIMETER INDICATOR (BA-141).

The pilot' s barometric altimeter indicator (fig. 3-35), is a servoed unit which displays altitude information from the air data computer. Altitude is displayed by a 10,000 foot counter, a 1000 foot counter, a 100 foot counter, and a single needle pointer (coupled with the 100 foot counter) which indicates hundreds of feet on a circular scale in 20 foot increments. Below an altitude of 10,000 feet, a diagonal striped symbol will appear on the 10,000 foot counter. The barometric pressure knob allows ground supplied altimeter setting to be manually set. Altimeter setting is displayed in inches of mercury and millibars on barometric counters.

a. Controls, Indicators and Functions.

(1) Failure warning flag. The failure warning flag, placarded OFF, comes into view when the error between the altitude displayed and the signal received is too great, the air data computer goes invalid, or the barometric altimeter loses primary power.

(2) Altitude alert annunciator. The altitude alert annunciator, placarded ALT, is illuminated when aircraft is within 1000 feet of preselected altitude during capture maneuver and extinguishes when aircraft is within 250 feet of preselected altitude. After capture, annunciator will illuminate if aircraft departs more than 250 feet from the selected altitude.

(3) Altitude scale. *U*sed in conjunction with altitude indicator needle to indicate aircraft altitude in hundreds of feet Subdivided into 20 foot increments.

(4) Barometric pressure counter-drum indicator (inches of mercury). Indicates barometric pressure in inches of mercury that has been set by the barometric pressure setting knob.

(5) Barometric pressure counter-drum indicator (millibars). Indicates barometric pressure in millibars that has been set *by* the barometric pressure setting knob.

(6) Barometric pressure setting knob. *U*sed to manually set barometric pressure displayed in the MB pressure displayed in the IN HG and MB windows.

(7) Altitude indicator needle. Used *in* conjunction with altitude scale to display aircraft altitude in hundreds of feet.

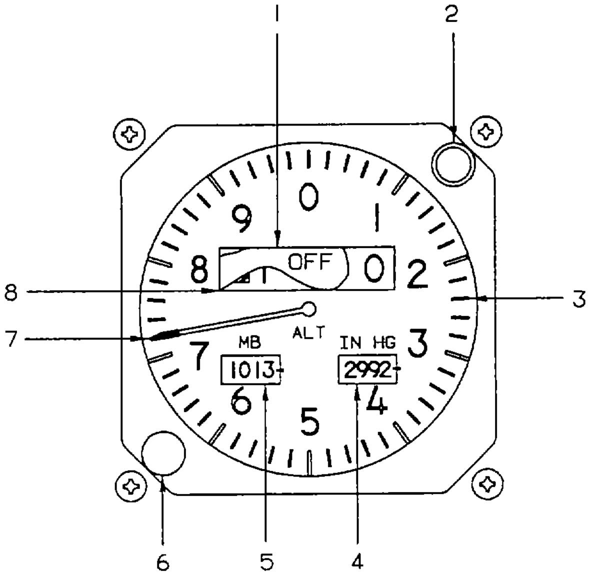
(8) Counter-drum altitude display. Indicates air-raft altitude in tens of thousands, thousands, and hundreds of feet above sea level.

b. Altimeter Operating Procedure.

1. Barometric pressure setting knob - Set desired altimeter setting.
2. Failure warning flag - Check not visible.
3. Altitude indicator needle - Check operation.

NOTE

If the altimeter does not read within 70 feet of field elevation, when the correct local barometric setting is used, the altimeter needs calibration or internal failure has occurred. An error of greater than 70 feet also nullifies use of the altimeter for IFR flight.



1. Failure Warning Flag
2. Altitude Alert Annunciator
3. Altitude Scale
4. Barometric Pressure Counter-Drum Indicator Window (Inches of Mercury)
5. Barometric Pressure Counter-Drum Indicator Window (Millibars)
6. Barometric Pressure Setting Knob
7. Altitude Indicator Needle
8. Counter-Drum Altitude Display

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Figure 3-35. Pilot's Barometric Altimeter Indicator

CHAPTER 4

MISSION EQUIPMENT

Section I. MISSION AVIONICS

4-1. MISSION CONTROL PANEL.

a. Description. The mission control panel (fig. 4-1), mounted on the copilot's sidewall, consists of three sections. The top section contains the mission caution/advisory annunciator panel. The annunciator panel incorporates all mission annunciators along with three aircraft system annunciators (CABIN OVERTEMP, NO INS UPDATE, and INS UPDATE). The center section contains a digital DC volt/ammeter, digital AC volt/frequency meters (2), AC digital load meters (2), one antenna steering synchronizer control, and the antenna steering mode selector switch. The bottom section contains the mission equipment control switches and the mission equipment circuit breakers.

b. Mission Control Panel Controls, Indicators, and Functions.

(1) Mission annunciator panel. Mission annunciator panel functions are described in table 2-8.

(2) Battery voltmeter. A liquid crystal display indicator placarded VDC, which indicates aircraft battery voltage.

(3) Battery ammeter. A liquid crystal display indicator placarded AMPS, which indicates aircraft battery current.

(4) AC volt-frequency meters. Two liquid crystal display meters, placarded VAC FREQ indicate the voltage and frequency output of the # 1 and #2 three-phase inverters respectively. The meters indicate the voltage and frequency of either the A, B, or C phase of the inverters, depending on the position of the METERS switch.

(5) AC loadmeters. Two liquid crystal display meters placarded AC% LOAD, indicate the load in percent on the #1 and #2 three-phase inverters respectively. The meters indicate the load on either the A, B, or C phase of the inverters, depending on the position of the METERS switch.

(6) Data link antenna steering synchronizer control. Allows manually turning data link antenna to a desired azimuth with antenna steering mode selector switch in the MANUAL or GROUND position.

(7) Data link antenna azimuth indicator. The data link antenna azimuth indicator is a light emitting diode display placarded ANT AZIMUTH, which indicates antenna azimuth in degrees and decimals of a degree.

(8) Data link antenna steering mode selector switch. The data link antenna steering mode selector switch, placarded ANT STEERING, AUTO - MANUAL - GROUND, selects antenna steering mode.

(a) AUTO. Selects automatic antenna steering mode.

(b) MANUAL. Selects manual antenna steering mode with a 4° down antenna angle. MANUAL mode is used for manual antenna steering while airborne.

(c) GROUND. Selects manual antenna steering mode with a level antenna angle.

(9) Rotating boom antenna operating position control switch. The rotating boom antenna operating position control switch, placarded ANT ORIDE, OPR POS - AUTO, allows overriding antenna operating position on the ground or automatic operation. The antenna normally rotates to a vertical position when the landing gear is retracted and automatically rotates to a horizontal position when the landing gear is extended. Moving the switch to the OPR POS allows rotation of the antenna to the vertical position while on the ground.

(10) Mission equipment control switch. The mission equipment control switch, placarded MISSION CONTROL ORIDE - AUTO - OFF controls power to the mission equipment.

(a) ORIDE. The ORIDE (override) position is used to apply AC and DC power to the mission equipment when one generator has failed and the aircraft is not operating on external power.

(b) AUTO. The AUTO (automatic) position applies AC and DC power to the mission equipment. Power is automatically removed from the mission equipment if a generator fails, and the aircraft is not operating on external power.

(c) OFF. The OFF position removes power from the mission equipment.

(11) Radio altimeter switch. The radio altimeter switch, placarded RADIO ALT - ON, OFF, controls operation of the radio altimeter system. This switch allows turning off the radio altimeter system to reduce radio emissions from the aircraft.

(12) TDOA (CHAALS) system switch. The time direction of arrival (CHAALS) switch, placarded TDOA SYSTEM ON - OFF, controls operation of the TDOA system.

(13) TDOA (CHAALS) test switch. The time direction of arrival (CHAALS) test switch, placarded TDOA BIT ON, is used to initiate the TDOA built in test (BIT).

(14) Data link high voltage switch. The data link high voltage switch, placarded DATA LINK HV, ON - STBY - OFF, controls high voltage to the data link power amplifier.

(a) ON. Applies high voltage power to the data link power amplifier.

(b) STBY. The STBY (standby) position applies high voltage power to the data link power amplifier for warm up before ON is selected, and for cooldown before OFF is selected.

(c) OFF. Removes high voltage power from the data link power amplifier.

(15) Data link antenna select switch. The data link antenna select switch placarded DATA LINK ANT SEL - NOSE - AUTO - TAIL, is used to manually select the nose or tail data link antenna or to select automatic antenna selection.

(16) Three-phase AC bus cross tie switch. The three-phase AC bus cross tie switch, placarded 3Ø AC CONTROL BUS CROSS TIE ON/AUTO - OFF, controls the AC bus cross tie.

(a) Due to the additional AC loading in the RC-12N aircraft, a single three-phase inverter can no longer support all three-phase electrical loads. The automatic bus cross-tying feature should only be used if the threat allows the mission to continue without use of the ALQ-136 radar jammer and the ALQ-162 CW jammer. If the threat dictates constant protection of the ALQ-136 and ALQ-162, the automatic bus cross tie feature for the three-phase busses should not be used. Cross tying should only be implemented after the GRCS mission equipment is shut off.

(b) OFF. In the OFF position the AC busses will not be connected (no cross-tie).

(17) Three-phase AC inverter control switches. Two three-phase AC inverter control switches, placarded 3Ø AC CONTROL #1 and #2 INV RESET - ON - OFF, control operation of the three-phase inverters.

(a) RESET. When an inverter is off-line due either to a fault or to placing the inverter switch to the OFF position, the affected unit cannot have its output restored until the inverter switch is moved to the spring loaded RESET position, then to the ON position.

(b) ON. ON position selects inverter operation.

(c) OFF. OFF position turns off inverter.

(18) Three-phase AC external power switch. The three-phase AC external power switch, placarded 3ØAC CONTROL EXT PWR - RESET - ON - OFF, controls application of external three-phase AC power to the aircraft.

(a) RESET. The AC external power switch must be moved to the spring loaded RESET position, then to the ON position to bring AC external power on line.

(b) ON. ON position applies AC external power to the three-phase busses through the AC external power receptacle under the left wing.

(c) OFF. OFF position removes AC external power from the three-phase busses.

(19) Three-phase AC meter switch. The three phase meters switch, placarded METERS AØ - BØ - CØ controls which phase of the three-phase inverters is being measured by the AC voltage, frequency, and loadmeters.

(20) ASE control switch. The ASE control switch, placarded ASE SILENT - NORM - OFF, controls operation of the ASE.

(a) SILENT. When the SILENT position is selected, the transmitting elements of the ASE are placed in a passive mode.

(b) NORM. The NORM position allows normal ASE operation.

(c) OFF. The OFF position removes power from ASE equipment. When the ASE control switch is set back to NORM, the originally selected mode will again become active.

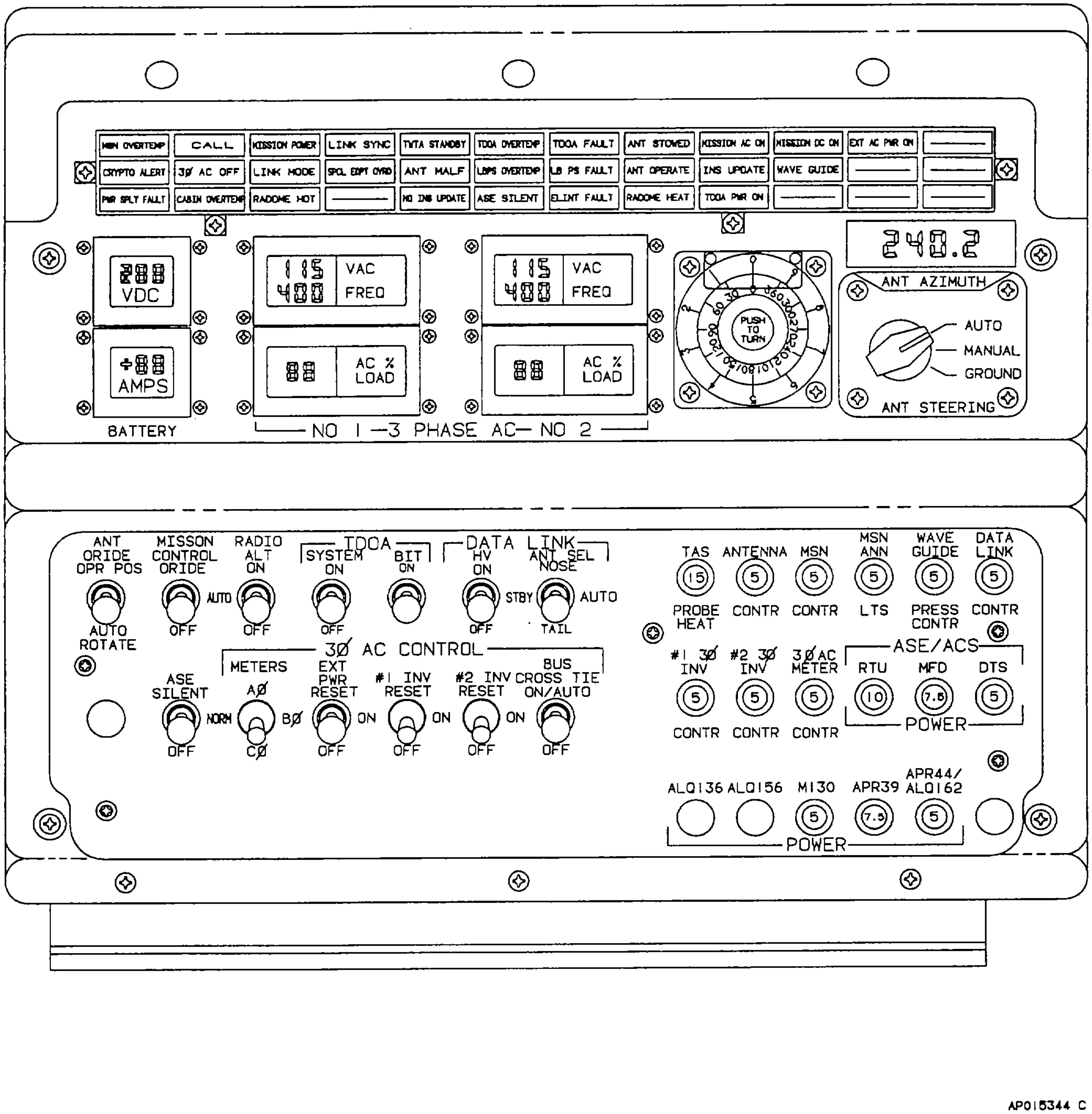

Figure 4-1. Mission Control Panel

Section II. AIRCRAFT SURVIVABILITY EQUIPMENT

4-2. M-130 FLARE AND CHAFF DISPENSING SYSTEM.

a. Description. The M-130 flare and chaff dispensing system provides effective survival countermeasures against radar guided weapons systems and infrared seeking missile threats. The system consists of two dispenser assemblies with payload module assemblies, two control wheel mounted chaff dispensing switches and two control wheel mounted flare dispensing switches, and associated wiring. The system is controlled by the aircraft survivability equipment/avionics control system (ASE/ACS) keyboard, located on the control pedestal extension (fig. 2-12). The flare and chaff dispensing system is powered by a 5-ampere circuit breaker, placarded M130 located on the mission control panel (fig. 4-1).

WARNING

Right engine nacelle dispenser is for chaff only.

(1) Dispenser assemblies. Two interchangeable dispenser assemblies are mounted on the aircraft. One is located in the aft portion of the right nacelle and the other is mounted on the right side of the fuselage. The dispenser in the nacelle is used for chaff only while the dispenser mounted on the fuselage can be used for either flares or chaff. The selector switch (placarded C-F) on the dispenser can be set for either chaff or flares. The unit also contains the sensor for the flare detector and the sequencing mechanism. The dispenser assembly breech plate has the electrical contact pins which fire the impulse cartridges.

(2) Payload module assemblies. A removable payload module assembly is provided for each dispenser assembly. Each payload module has 30 chambers which will accept either flares or chaff. Flares or chaffs are loaded into the rear-end (studded end) of the payload module, and secured in place by a retaining plate.

(3) Flare detector. The flare detector is provided to ensure that a flare is burning when it is ejected from the dispenser payload module. If the initial flare fails to ignite, the detector automatically fires another flare within 75 milliseconds. If the second flare fails to ignite, the detector will fire a third flare. If the third flare ignition is not detected, the detector will not fire another flare until the system is activated again by pressing the FLARE DISPENSE switch.

(4) Internal safety switch. The internal safety switch (with safety pin and yellow flag), mounted on the right rack behind the copilot, prevents firing of chaff or flares when the safety pin is inserted. The safety pin shall be removed only while the aircraft is in flight or during test of the system.

(5) Control wheel mounted flare dispenser switches. Two pushbutton switches placarded FLARE DISPENSE one located on the top right portion of the pilot's control wheel and the other located on the top left portion of the copilot's control wheel, activate the flare dispensing system when pressed. Depressing either one of the switches will fire a flare from the dispenser payload module each time it is pressed If a FLARE DISPENSE switch is held down, it will dispense a flare every 2.3 seconds until all flares are expended.

(6) Control wheel mounted chaff dispense switches. Two pushbutton switches placarded CHAFF DISPENSE, one located on the top left portion of the pilot' s control wheel and the other located on the top right portion of the copilot's control wheel, activate the chaff dispensing system when pressed.

(7) Wing mounted safety switch. A wing mounted safety switch (with safety pin and red flag), located on top of the right wing, just aft of the nacelle, prevents the firing of chaff or flares when the pin is inserted. This safety pin shall be inserted while the aircraft is on the ground and removed prior to flight or during system test.

(8) Ammunition for dispenser. Ammunition for the system consists of countermeasure chaff M1 and countermeasure flares M206. An impulse cartridge M796, fits into the base of either the flare or chaff and is electrically initiated to eject flares or chaff from the dispenser payload module.

(a) Countermeasure chaff M1. These units consist of a plastic case 8 inches in length and 0.97 inches square. The base of the chaff case is flanged to provide one-way assembly into the dispenser payload module. The chaff consists of aluminum coated fiberglass strands.

(b) Countermeasure flare M206. These units consist of an aluminum case 8 inches in length and 0.97 inches square. The base of the flare is flanged to provide one-way assembly into the payload module. The flare material consists of a magnesium and teflon composition. A preformed packing is required in the base of the flare unit prior to inserting the impulse cartridge.

(c) Impulse cartridge M796. This cartridge fits into the base of either the flare or chaff and is electrically initiated to eject flares or chaff from the dispenser payload module.

b. Normal Operation.

NOTE

The fairing should be removed from the fuselage if the aircraft is to be flown with the flare dispenser assembly removed.

(1) General. At the present time surface-to-air intermediate range guided missiles launched against the aircraft must be visually detected by the aircraft crew. Crew members must ensure visual coverage over the ground area where a missile attack is possible. The aircraft radar warning system will only alert the pilot and copilot when the aircraft is being tracked by radar-guided anti-aircraft weapons systems. It will not indicate the firing of weapons against the aircraft.

(2) Crew responsibilities. The pilot, or designated crew member, is responsible for removing the safety pin from the right wing before flight, and for replacing it immediately after flight. The pilot is responsible for removing the safety pin and arming the system, after the aircraft is airborne, and before landing, he is responsible for re-inserting the safety pin and selecting SAFE on the MFD. While airborne, the pilot and copilot are responsible for scanning the terrain for missile threats. When either pilot recognizes a missile launch, they will press the FLARE DISPENSE button to eject flares.

WARNING

Aircraft must be in flight to dispense flares.

(3) Conditions for firing. The dispenser system should not be fired unless a missile launch is observed or radar guided weapons systems are detected and locked on. If a system malfunction is suspected, aircraft commander may authorize attempts to dispense flares or chaff as a test in a non-hostile area.

(4) Firing procedure.

(a) Flares. Upon observing a missile launch the pilot or copilot (whoever sights the launch first) will fire a flare. If more than one missile launch is observed, the firing sequence should be continued until the aircraft has cleared the threat area.

(b) Chaff. Upon receiving an alert from the aircraft radar warning system, the pilot or copilot will fire the chaff and initiate an evasive maneuver. The number of burst/salvo and number of salvo/ program and their intervals is established by training doctrine and will be set on the MFD prior to takeoff (refer to TM 9-1095-206-13 & P for procedures on setting programmer). If desired, the operator may override the programmed operational mode and fire chaff countermeasures manually by selecting MANUAL on the MFD and pressing the dispenser switch.

(c) Firing responsibility. When the pilot or copilot observe a missile launch or radar warning indication, they will fire flares or chaff as required and assume command of the dispenser system. The other pilot must be advised that a missile launch has been observed or a radar warning signal has been received, and announcement made that flares or chaff have been fired.

4-3. SYSTEM DAILY PREFLIGHT/RE-ARM TEST.

The following test procedures shall be conducted prior to the first flight of each day and prior to each re-arming of the M-130 dispensers. Notify AVUM (aviation unit maintenance) if any improper indications occur during the tests.

WARNING

Ensure payload module is not connected to dispenser assembly at any time during the following test procedure.

a. Flare Dispenser (Right Fuselage) - Preliminary Procedure.

1. Flare dispenser assembly C-F selector switch - F (flare).

2. M-91 test set - Obtain and ensure that TEST SEQUENCE switch is in the START/HOME position.

3. Clean dust, foreign particles, or moisture from breech and mounting plate of dispenser.

4. Connect base plate of test set to breech of dispenser assembly. Secure both mounting studs uniformly, using 5/32-inch hexagonal wrench provided in test set carrying case.

5. Obtain test set power cable from loose tools and connect cable between exterior connection J1 (28V DC) on aircraft fuselage above trailing edge of wing and aircraft power +28V DC (J1) of test set.

6. Remove safety pins from on right equipment rack aft of copilot's seat, and on top skin of right wing.
7. Provide aircraft power to M-130 system by resetting the M-130 POWER circuit breaker.
8. ASE mode select switch on multifunction display (MFD, fig. 4-2) - Depress to call up ASE control page.
9. L3 line selector switch - Depress to set DISPENSER to ARM.
10. R5 line selector switch - Depress to call up ASE SETUP page.

b. *Flare Dispenser System Test Procedure.*

1. ASE mode selector switch - Depress to return to ASE control page.
2. Reinstall safety pins one at a time. PWR FAIL shall appear below DISPENSER on MFD.
3. Remove safety pins and verify DISPENSER is set to ARM on MFD.

NOTE

When the test set is installed on the dispenser assembly and 28 volts DC aircraft power has been applied, the sequencer switch inside of dispenser assembly resets, making an audible sound as it rotates. There will be no such sound if the sequencer switch has been previously reset or if switch is in position 12 or 24.

On test set, TS PWR ON annunciator (clear) illuminates and remains illuminated throughout the test sequence until aircraft power to test set (via test set power cable) is disconnected or shut off.

4. Perform the following operations on the M-91 test set.
   a. Press to test remaining three annunciators on test set Each annunciator will illuminate.

NOTE

Replace any annunciator that does not illuminate when pressed. If none of the indicating annunciators illuminate, return test set to AVUM (aviation unit maintenance).

   b. Rotate TEST SEQUENCE switch clockwise to the TS RESET position. No visual indication will occur.
   c. Rotate TEST SEQUENCE switch clockwise to SV SELF TEST position. STRAY VOLTAGE annunciator (red) will illuminate.
   d. Rotate TEST SEQUENCE switch clockwise to TS RESET position. STRAY VOLTAGE annunciator (red) will extinguish.
   e. Rotate TEST SEQUENCE switch clockwise to STRAY VOLT position. STRAY VOLTAGE annunciator (red) should not illuminate.
   f. Rotate TEST SEQUENCE switch clockwise to SYS NOT RESET position. SYS NOT RESET annunciator (amber) should not illuminate. If annunciator illuminates, press and release MANUAL SYSTEM RESET switch and SYS NOT RESET annunciator should extinguish.

NOTE

When the MANUAL SYSTEM RESET switch is pressed and released, and 28 volts DC power has been applied, the sequencer switch inside the dispenser assembly resets, making an audible sound as it rotates. If the sequencer switch has been previously reset or if the switch is in position 12 or 24, there will be no such sound.

   g. Rotate TEST SEQUENCE switch clockwise to next position, DISP COMP.

5. Press either FLARE DISPENSE switch once. For each depression the FLARE counter on DCP should count down in groups of three.
6. On MFD, depress L5 repeatedly until text reads RIPPLE FIRE ARMED. Within 7 seconds , depress a FLARE DISPENSE switch. Flare counter shall count down to 00 and ALL FLARES EXPENDED shall be displayed on MFD. DISPENSE COMPLETE lamp (green) on test set shall be illuminated.

NOTE

DISPENSER COMP lamp may fail to illuminate during the previous step due to improper connection between the base plate and breech plate. If this happens, remove and reinstall base plate to ensure proper connection and repeat FLARE DISPENSE tests. If this still does not result in proper operation, verify the C-F selector switch is in the F position.

7. Perform the following operations on the M-91 test set.
   a. Rotate TEST SEQUENCE switch counter-clockwise to SYS NOT RESET position.

SYS NOT RESET annunciator (amber) will illuminate. DISPENSER COMPLETE annunciator (green) will remain illuminated.

b. Reset FLARE counter to 30. ALL FLARES EXPENDED shall not be displayed. Do not depress MANUAL SYSTEM RESET switch.

NOTE

When the MANUAL SYSTEM RESET switch is pressed and released, and 28 volts DC power is being applied, the sequencer switch inside the dispenser assembly resets, making an audible sound as it rotates. If the sequencer switch has been previously reset or if the switch is in position 12 or 24, there will be no such sound.

c. Rotate TEST SEQUENCE switch counter-clockwise to STRAY VOLT position. STRAY VOLTAGE annunciator (red) should not illuminate.

d. Rotate TEST SEQUENCE switch counter-clockwise to START/HOME position.

NOTE

When the TEST SEQUENCE switch is turned to the START/HOME position, the DISPENSER COMPLETE annunciator will extinguish, the STRAY VOLTAGE annunciator will illuminate, and then will extinguish when passing through the TS RESET position.

8. Remove M-91 test set from right fuselage dispenser assembly.

c. Chaff Dispenser (Right Nacelle) - Preliminary Procedure.

1. C-F selector switch on dispenser - C (chaff).
2. Set TEST SEQUENCE switch on test set to START/HOME position.
3. Clean dust, foreign particles, or moisture from breech and mounting plate of dispenser.
4. Connect M-91 test set to breech assembly of right nacelle dispenser assembly. Secure both mounting studs uniformly tight using ball hexagonal key screwdriver provided in test set carrying case.
5. Obtain test set power cable from loose tools and connect cable between exterior connection J1 (28V DC) on aircraft fuselage above trailing edge of wing and aircraft power +28V DC (J1) of test set.
6. Remove safety pins from right equipment rack aft of copilot's seat, and on top skin of right wing.
7. Provide aircraft power to system by resetting M-130 POWER circuit breaker.
8. ASE mode select switch (multifunction display, fig. 4-2) - Depress to call up ASE control page.
9. L3 line selector switch - Depress to set DISPENSER to ARM.
10. L4 line selector switch - Depress to set CHAFF to MAN.
11. R5 line selector switch - Depress to call up ASE SETUP page.
12. ASE/ACS keyboard unit (fig. 4-3) - Key in 30 (30 will be displayed in scratchpad on MFD), then depress line select switch R1 to set CHAFF COUNT to 30.

NOTE

When the test set is installed on the dispenser assembly and 28 volts DC aircraft power is being applied, the sequence switch inside the dispenser assembly resets, making an audible sound as it rotates. There will be no such sound if the sequencer switch has been previously reset or if switch is in position 12 or 24.

d. Chaff Dispenser (Right Nacelle) System Test Procedure.

1. ASE mode selector switch - Depress to return to the ASE control page.
2. Reinstall safety pins one at a time. PWR FAIL shall appear below DISPENSER on MFD.
3. Remove the safety pins and verify DISPENSER is set to ARM on MFD.

NOTE

On test set, TS PWR ON annunciator (clear) illuminates and remains illuminated throughout the test sequence until aircraft power to test set (via test set power cable) is disconnected or shut off.

4. Perform the following operations on the M-91 test set.

a. Press to test all four annunciators on test set. Each annunciator will illuminate.

NOTE

Replace any annunciator that does not illuminate when pressed. If none of the indicating annunciators illuminate, return test set to AVUM (aviation unit maintenance).

b. Rotate TEST SEQUENCE switch clockwise to TS RESET position. No visual indication will occur.

c. Rotate TEST SEQUENCE switch clockwise to SV SELF TEST position. STRAY VOLTAGE annunciator (red) will illuminate.

d. Rotate TEST SEQUENCE switch clockwise to next position, TS RESET. STRAY VOLTAGE annunciator (red) will extinguish

e. Rotate TEST SEQUENCE switch clockwise to next position, STRAY VOLT. STRAY VOLTAGE annunciator (red) should not illuminate.

f. Rotate TEST SEQUENCE switch clockwise to next position, SYS NOT RESET. SYS NOT RESET annunciator (amber) should not illuminate. If annunciator illuminates, press and release MANUAL SYSTEM RESET switch and SYS NOT RESET annunciator should then extinguish.

NOTE

When the MANUAL SYSTEM RESET switch is pressed and released, and 28 volts DC power is being applied, the sequencer switch inside the dispenser assembly resets, making an audible sound as it rotates. If the sequencer switch has been previously reset or if the switch is in position 12 or 24, there will be no such sound.

g. Rotate TEST SEQUENCE switch clockwise to next position, DISP COMPL.

h. Press pilot's CHAFF DISPENSER switch once. Press copilot's CHAFF DISPENSER switch once. On MFD, for each depression, CHAFF counter should count down by an increment of one.

i. On MFD, depress L3 line selector switch until PRGM appears.

j. Depress pilot's CHAFF DISP switch once. On MFD, number shown on CHAFF counter should decrease by one.

k. On MFD, depress line select switch L4 to set CHAFF to PRGM.

l. Depress copilot's CHAFF DISP switch once. On MFD, CHAFF counter will read 29 minus SALVO COUNT multiplied by BURST COUNT as displayed on ASE setup page.

m. Repeatedly depress a CHAFF DISP switch until CHAFF counter reads 00 and ALL CHAFF EXPENDED is displayed on MFD. The DISPENSE COMPLETE lamp (green) on test set shall be illuminated.

NOTE

The DISPENSER COMP lamp may fail to illuminate during the previous step due to improper connection between the base plate and breechplate. If this happens, remove and reinstall base plate to ensure proper connection and repeat CHAFF DISPENSE tests. If this still does not result in proper operation, verify the C-F selector switch is in the C position.

5. Perform the following operations on the M-91 test set:

a Rotate TEST SEQUENCE switch counter-clockwise to SYS NOT RESET position. SYS NOT RESET annunciator (amber) will illuminate.

b. Press and release MANUAL SYSTEM RESET switch. SYS NOT RESET annunciator (amber) will extinguish and DISPENSE COMPLETE LAMP will remain illuminated.

c. Reset the CHAFF counter to 30. ALL CHAFF EXPENDED shall not be displayed on MFD. Do not depress MANUAL SYSTEM RESET switch.

NOTE

When the MANUAL SYSTEM RESET switch is pressed and released, and 28 volts DC power is being applied, the sequencer switch inside the dispenser assembly resets, making an audible sound as it rotates. If the sequencer switch has been previously reset or if the switch is in position 12 or 24, there will be no such sound.

d. Rotate TEST SEQUENCE switch counter-clockwise to STRAY VOLT position. STRAY VOLTAGE annunciator (red) should not illuminate.

e. Rotate TEST SEQUENCE switch counter-clockwise to START/HOME position.

NOTE

When turning the TEST SEQUENCE switch to the OFF position, the DISPENSER COMPLETE annunciator will extinguish, the STRAY VOLTAGE annunciator will illuminate and then will extinguish when the OFF position is reached.

6. Install safety pins.
7. Disconnect test set power cable.
8. Remove M-91 test set from dispenser assembly and restore in carrying case along with power cable and hexagonal wrench.
9. On MFD, depress L3 until SAFE appears.
10. Reset CHAFF counter to 30.
11. Disconnect aircraft power by pulling 5-ampere M130 circuit breaker located on mission control panel (fig. 4-1).
12. Proceed immediately to ammunition loading procedures.

4-4. AMMUNITION.

a. Ammunition Loading Procedure.

WARNING

Only one shipping container is to be opened at a time. If a shipping container has been opened and only partially emptied, the remaining contents will be secured in the container with an appropriate type of, packaging material or filler to adequately prevent jostling. All munitions in storage must be in their original shipping containers.

1. Place payload module assembly on work bench in approved safe area so that the retaining plate is facing up.
2. Remove retaining plate by unscrewing two retaining bolts.
3. Insert one flare (or chaff) at a time into each chamber of payload module.
4. Remove plastic dust cap from each chaff or flare.

CAUTION

Prior to insertion of an impulse cartridge, be sure there is a preformed packing in the flare cartridge. (There will be no preformed packing in chaff cartridges.) Reinstall any preformed packing that is inadvertently removed with dustcap. The loading of impulse cartridges into a flare or chaff shall be accomplished one at a time.

5. Insert one impulse cartridge into each flare (or chaff).
6. Install retainer plate assembly by screwing the two retainer bolts into payload module.

WARNING

The system must have been tested to ensure that there is no stray voltage and all aircraft power must be removed from the system prior to loading the payload module.

7. MFD - Bring up ASE page and depress L3 to change dispenser to SAFE.
8. On right equipment rack, ensure safety pins and flag assemblies are installed.
9. Slide payload module assembly into dispenser assembly and secure two stud bolts, using 5/32-inch hexagonal wrench.

b. Ammunition Unloading Procedure.

WARNING

All aircraft power to the dispenser system must be turned off prior to removal of payload module from dispenser assembly. Safety pin flag shall be installed on the right equipment rack prior to landing and the safety pin flag shall be installed in the wing-mounted safety switch immediately after landing.

1. MFD - Bring up ASE page and depress L3 to change dispenser to SAFE.
2. Assure safety pin and flag are inserted in right equipment rack and in wing mounted safety switch

WARNING

If there is an indication that a misfire occurred, notify emergency ordinance disposal personnel for disposition and disposal.

3. Remove module from dispenser assembly by unscrewing two stud bolts with a 5/32-inch hexagonal wrench and slide dispenser assembly out.
4. Remove retaining plate from payload module by unscrewing two retaining bolts.
5. Remove expended and unexpended impulse cartridges and flares (or chaff) from payload module.
6. Repack unexpended items in original containers and return to stores.

NOTE

Cracking of the chaff cartridge case upon firing is not unusual. This does not effect performance of the item and should not be reported as a malfunction.

4-5. RADAR SIGNAL DETECTING SET (AN/APR-39(V)1).

CAUTION

To prevent damage to the receiver detector crystals, assure that the AN/APR-39(V)1 antennas are at least 60 meters from active ground radar antennas or 6 meters from active airborne radar antennas. Allow an extra margin for new, unusual, or high power antennas.

The radar signal detecting set indicates the relative position of search radar stations. The radar signal detecting set is controlled through the aircraft survivability equipment/avionics control system (ASE/ACS). Audio warning signals are applied to the pilot's and copilot's headsets. The radar signal detecting set is protected by the 7.5 ampere circuit breaker placarded APR39, located on the mission control panel (fig. 4-1). The associated antennas are shown in figure 2-1. For operating instructions, refer to TM 11-5841-283-20.

4-6. RADAR SIGNAL DETECTING SET (AN/APR-39(V)2).

CAUTION

To prevent damage to the receiver detector crystals, assure that the AN/APR-39(V)2 antennas are at least 60 meters from active ground radar antennas or 6 meters from active airborne radar antennas. Allow an extra margin for new, unusual, or high power antennas.

The radar signal detecting set indicates the relative position of search radar emitters. Through graphic symbology, the type of tracking radar emitters may be identified. Unknown emitter origins are also depicted. Audio warning signals are applied to the pilot's and copilot's headsets. The radar signal detecting set is controlled through the aircraft survivability equipment/avionics control system (ASE/ACS). The radar signal detecting set is protected by the 7.5-ampere circuit breaker placarded APR39, located on the mission control panel (fig. 4-1). The associated antennas are shown in figure 2-1. Complete operating instructions are to be obtained from the appropriate manuals.

4-7. DATA TRANSFER SYSTEM.

The data transfer system allows the crew to retrieve mission data from the programmable cartridge and to store mission data back to the programmable cartridge. Operation of the system is through the aircraft survivability equipment/avionics control system (ASE/ACS). Depressing L1 when the UTILITY page is displayed will call up the DATA TRANSFER page.

4-8. AIRCRAFT SURVIVABILITY EQUIPMENT/AVIONICS CONTROL SYSTEM (ASE/ACS).

The aircraft survivability equipment/avionics control system (ASE/ACS) consists of a multifunction display (MFD, fig. 4-2), a keyboard unit (KU, fig. 4-3), and a remote terminal unit (RTU). The ASE/ACS is the primary way that the flight crew interfaces with the following systems:

UHF Transceiver (AN/ARC/164), (two each)

VHF-FM (SINCGARS, AN/ARC-201A)

Inertial Navigation System

Global Positioning System

Voice Security System (KY-58)

Flare and Chaff Dispenser System (M-130)

Radar Signal Detecting Set (AN/APR-39(V)1)

Radar Signal Detecting Set (AN/APR-39(V)2)

Radar Warning Receiver (AN/APR-44(V)3)

For operation of the Aircraft Survivability Equipment/ Avionics Control System (ASE/ACS) refer to the ASE/ ACS Operator's Manual and ASE/ACS Source Data for Operator's Flight Manual for the RC-12() Guardrail Common Sensor Aircraft, Honeywell, Inc. Publication Number D0774-3601-01-04, Revised 3 April 1995, Contract Number DAAB07-87-C-041.

a. Deleted.

b. Deleted.

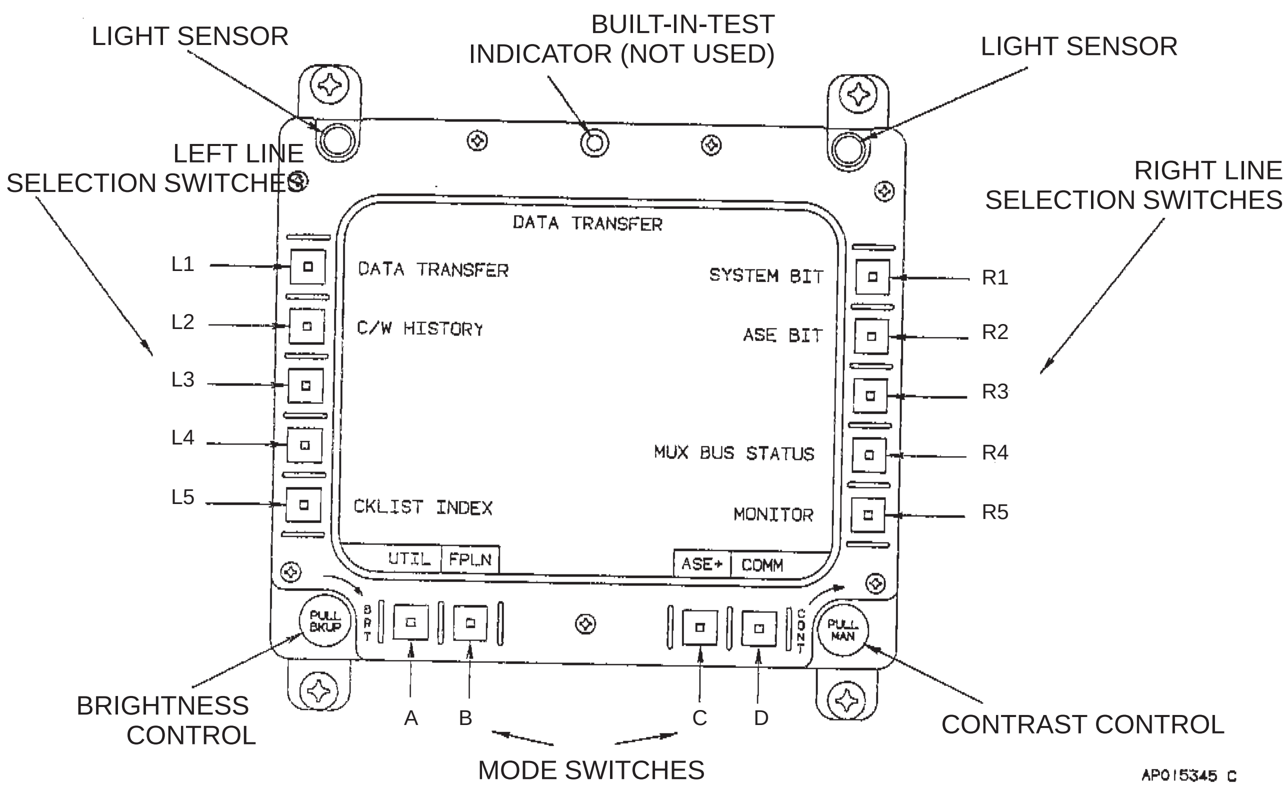

Figure 4-2. Multifunction Display (MFD)

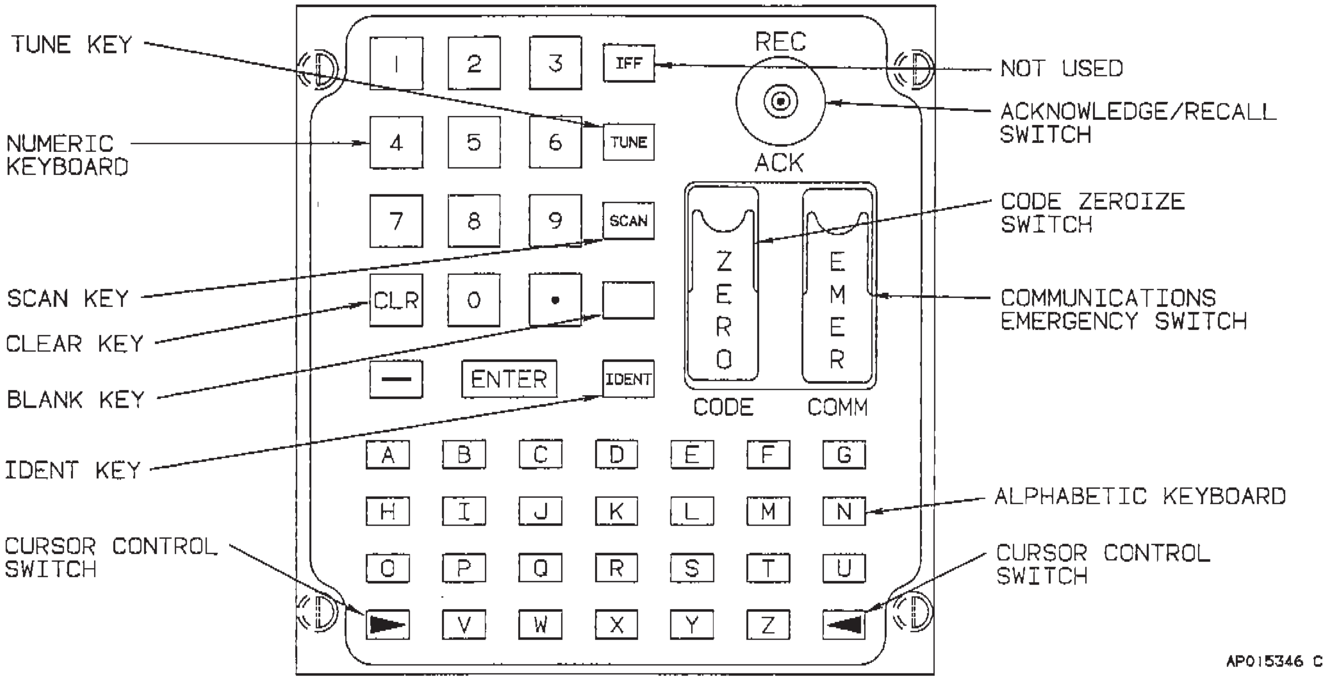

Figure 4-3. Keyboard Unit (KU)

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CHAPTER 5

OPERATING LIMITS AND RESTRICTIONS

Section I. GENERAL

5-1. PURPOSE.

This chapter identifies or refers to all important operating limits and restrictions that shall be observed during ground and flight operations.

5-2. GENERAL.

The operating limitations set forth in this chapter are the direct result of design analysis, tests, and operating experiences. Compliance with these limits will allow the pilot to safely perform the assigned missions and to derive maximum utility from the aircraft. Limits concerning maneuvers, weight, and center of gravity are also covered in this chapter.

5-3. EXCEEDING OPERATIONAL LIMITS.

Anytime an operational limit is exceeded, an appropriate entry shall be made on DA Form 2408-13. Entry shall state what limit or limits were exceeded, range, time beyond limits, and any additional data that would aid maintenance personnel in the maintenance action that may be required.

5-4. MINIMUM CREW REQUIREMENTS.

The minimum crew required for aircraft operation is two pilots. Additional crewmembers as required, will be added at the discretion of the commander, in accordance with pertinent Department of the Army regulations.

Section II. SYSTEM LIMITS

5-5. INSTRUMENT MARKINGS.

Instruments which display operating limitations are illustrated in figure 5-1. The operating limitations are color coded on the instrument faces. Color coding of each instrument is explained in the illustration.

5-6. INSTRUMENT MARKING COLOR CODES.

Operating limitations and ranges are illustrated by the colored markings which appear on the dial faces of engine, flight, and utility system instruments. Red markings indicate the limit above or below which continued operation is likely to cause damage or shorten life. The green markings indicate the safe or normal range of operation. The yellow markings indicate the range of operation. The yellow markings indicate the range when special attention should be given to the operation covered by the instrument. Operation is permissible in the yellow range, but should be avoided. White markings on the airspeed indicator denote the flap operating range. The blue marking on the airspeed indicator denotes best rate of climb with one engine inoperative, at maximum gross weight, maximum forward c.g., sea level standard day conditions.

5-7. PROPELLER LIMITATIONS.

The maximum propeller overspeed limit is 1870 RPM (transient, 20 seconds maximum). Propeller speeds above 1700 RPM indicate failure of the constant speed governor. Propeller speeds above 1802 RPM indicates failure of both the constant speed and overspeed governors.

5-8. STARTER LIMITATIONS.

The starters are limited to an operating period of 40 seconds ON, then 15 minutes OFF, 40 seconds ON, then 30 minutes OFF. Contact maintenance personnel for assistance if no engine start occurs during cycle noted in this paragraph.

5-9. AUTOPILOT LIMITATIONS.

a. An autopilot preflight check must be conducted and found satisfactory prior to each flight on which the autopilot is to be used.

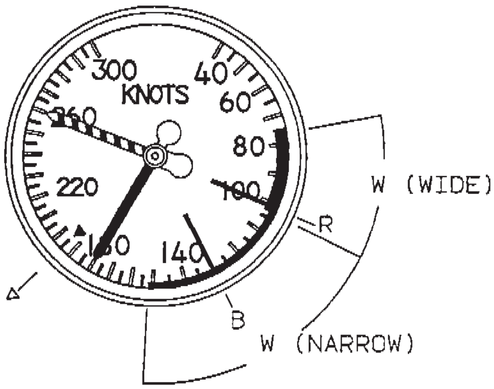
b. A pilot must be seated at one set of flight controls with the seat belt fastened when the autopilot is in operation.

c. Operation of the autopilot and yaw damper is prohibited during takeoff and landing, and below 200 feet above terrain. Maximum speed for autopilot operation is 248 KIAS to 11,500 feet, then 0.472 Mach to 35,000 feet.

5-10. FUEL SYSTEM LIMITS.

NOTE

Aviation gasoline (AVGAS) contains a form of lead which has an accumulative adverse effect on gas turbine engines. The lowest octane AVGAS available (less lead content) should be used. If any AVGAS is used, the operating time must be entered on DA Form 2408-13-1. Operating time on AVGAS is computed on the basis of quantity used and average consumption.



AIRSPEED

R/W — 248 KIAS MAXIMUM V_{mo} (.472 MACH)

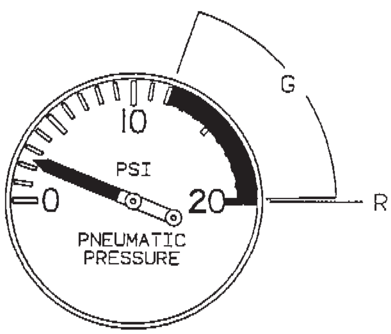
NOTE
MAXIMUM ALLOWABLE AIRSPEED (RED STRIPED) POINTER IS SELF ADJUSTING WITH ALTITUDE

R — 101 KIAS MINIMUM SINGLE-ENGINE CONTROL SPEED (V_{mca})

B — 130 KIAS ONE-ENGINE INOPERATIVE BEST RATE-OF-CLIMB (V_{yse})

W — 76-151 KIAS FULL FLAP OPERATING RANGE

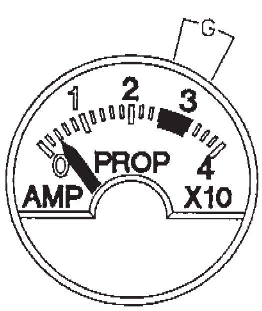
W — 197 KIAS MAXIMUM APPROACH FLAP EXTENSION SPEED



PNEUMATIC PRESSURE

G — 12-20 PSI NORMAL OPERATING RANGE

R — 20 PSI MAXIMUM



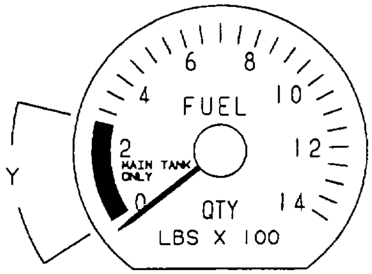
PROPELLER DEICER AMMETER

G — 26-32 AMPERES NORMAL OPERATION

COLOR CODES	
R = RED	B = BLUE
G = GREEN	W = WHITE
Y = YELLOW	BK = BLACK

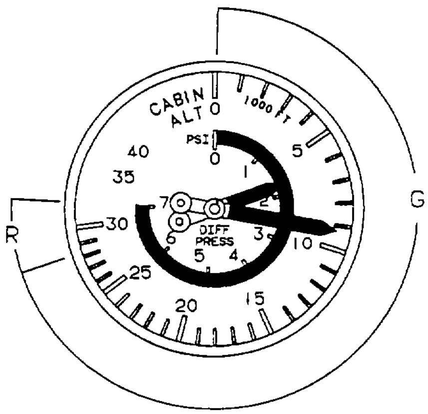
AP015466 C

Figure 5-1. Instrument Markings (Sheet 1 of 4)



FUEL QUANTITY

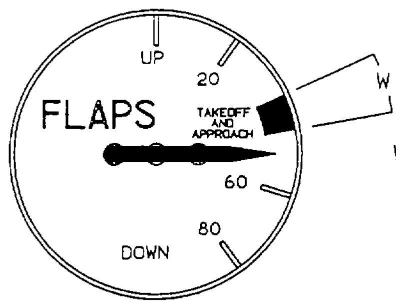
Y 0-265 LBS NO TAKEOFF RANGE



CABIN ALTIMETER AND DIFFERENTIAL PRESSURE

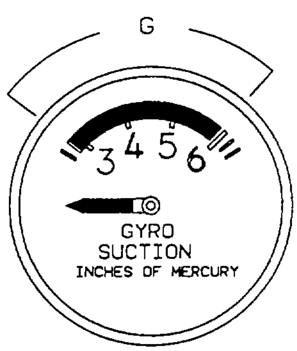
G 0-6.5 PSI NORMAL RANGE

R 6.5 PSI MAXIMUM



FLAP POSITION INDICATOR

W 40% TAKEOFF AND APPROACH

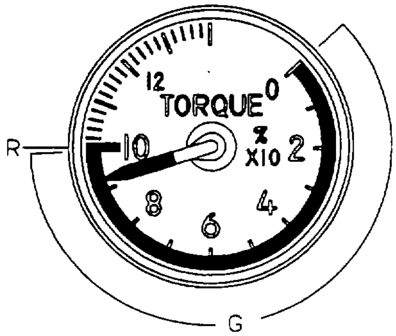


GYRO SUCTION

G 2.8 TO 5.9 INCHES OF MERCURY
NORMAL OPERATING RANGE

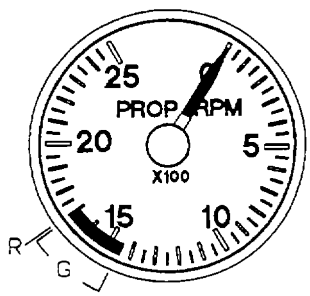
AP015467 C

Figure 5-1. Instrument Markings (Sheet 2 of 4)



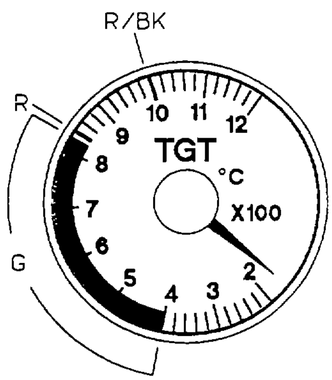
TORQUE

G	0 - 100% NORMAL OPERATING RANGE
R	100% MAXIMUM 138% TRANSIENT (20 SECONDS)



PROPELLER TACHOMETER

G	1450 - 1700 RPM NORMAL OPERATING RANGE 1650 RPM MAXIMUM REVERSE (1 MINUTE)
R	1700 RPM MAXIMUM 1870 RPM TRANSIENT (20 SECONDS)



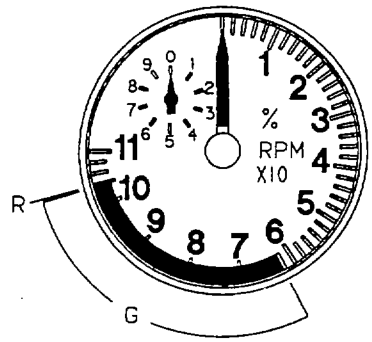
TURBINE GAS TEMPERATURE

G	400 - 830°C NORMAL OPERATING RANGE 750°C MAXIMUM LOW IDLE
R	840°C MAXIMUM TAKEOFF 760°C MAXIMUM REVERSE
R/BK	870°C MAXIMUM TRANSIENT (20 SECONDS) 1000°C MAXIMUM STARTING (5 SECONDS)

AP015468 C

Figure 5-1. Instrument Markings (Sheet 3 of 4)

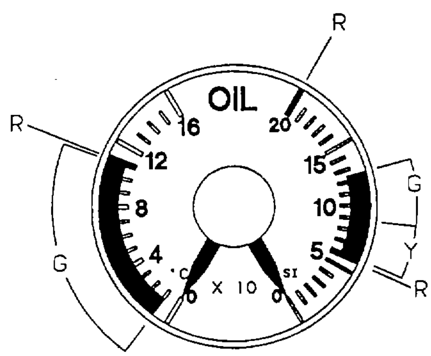
TURBINE TACHOMETER (N_1 SPEED)



G — 62 - 104% NORMAL OPERATING RANGE

R — 104% MAXIMUM

OIL TEMPERATURE AND PRESSURE



OIL TEMPERATURE SCALE

G — 10 - 105°C NORMAL OPERATING RANGE
10 - 105°C CRUISE CLIMB AND RECOMMENDED SPEED
-40 - 105°C STARTING, LOW IDLE, HIGH IDLE

R — 105°C MAXIMUM
110°C TRANSIENT (10 MINUTES)

OIL PRESSURE SCALE

R — 60 PSI MIMIMUM

Y — 60 - 90 PSI 54% TORQUE MAXIMUM

G — 90 - 135 PSI NORMAL OPERATING RANGE

R — 200 PSI MAXIMUM STARTING WITH COLD OIL

NOTE: ± 10 PSI FLUCTUATIONS ARE ACCEPTABLE

AP015472 C

Figure 5-1. Instrument Markings (Sheet 4 of 4)

a. Operating Limits.

(1) Operation with FUEL PRESS annunciator light illuminated is limited to 10 hours.

Log time (duration) FUEL PRESS light is illuminated on DA Form 2408-13-1.

(2) Crossfeed of AVGAS to an engine with a failed engine-driven boost pump is not authorized. Crossfeed of AVGAS to an engine with a failed engine-driven boost pump will result in less than minimum fuel pressure to the high pressure pump on that side.

(3) Takeoff torque may not be attainable during operations with AVGAS.

(4) AVGAS operation is limited to 150 hours.

(5) Crossfeed fuel will not be available from the side with an inoperative standby boost pump.

(6) The use of AVGAS requires the standby boost pumps to be used during all operations above 15,000 feet.

(7) Operation with JP4 requires the use of standby pumps above 30,000 feet.

b. Fuel Management. Auxiliary tanks will not be filled for flight unless the main tanks are full. Maximum allowable fuel imbalance is 300 lbs. Do not take off if fuel quantity gages indicate in yellow arc (less than 265 lbs. of fuel in each main tank). Crossfeed only during single engine operation.

CAUTION

Anti-icing additive must be properly blended with the fuel to avoid deterioration of the fuel cell. The additive concentration by volume shall be a minimum of 0.060% and a maximum of 0.15%.

JP-8 fuel per MIL-T-83133 has anti-icing additive per MIL-I-27686 blended in the fuel at the refinery and no further treatment is necessary. Some fuel suppliers blend in anti-icing additive, in their storage tanks. Prior to refueling, check with the fuel supplier to determine if fuel has been blended. To assure proper concentration by volume of fuel on board, blend only enough additive for the unblended fuel.

c. Fuel System Anti-Icing. Icing inhibitor conforming to MIL-I-27686 will be added to commercial fuel, not containing an icing inhibitor, during fueling operations, regardless of ambient temperatures. The additive provides anti-icing protection and also functions as a biocide to kill microbiological growth in the aircraft fuel system.

5-11. LANDING GEAR CYCLING AND BRAKE DEICE LIMITATIONS.

a. Hydraulic Landing Gear. While conducting training operations, the landing gear cyclic rate shall not exceed 5 complete (extension and retraction) cycles equally spaced in a 20 minute period, without allowing a 10 to 15 minute interval between the 20 minute time groupings. It is suggested the cycle rate should not exceed 10 cycles equal spaced in one (1) hour. This rate is to keep the power pack motor operations within an intermittent duty class.

b. Brake Deice. The following limitations apply to the brake deice system.

(1) The brake deice system shall not be operated at ambient temperatures above 15˚C.

(2) The brake deice system shall not be operated longer than 10 minutes (one timer cycle) with the landing gear retracted. If operation does not automatically terminate approximately 10 minutes after gear retraction, turn the brake deice switch OFF.

(3) Maintain 85% N_1 or higher during simultaneous operation of the brake deice and surface deice systems. If adequate pneumatic pressure cannot be provided for simultaneous operation of the brake deice and surface deice systems, turn OFF the brake deice system.

(4) The brake deice system shall be turned OFF during single engine operation, in order to maintain an adequate supply of systems pneumatic bleed air.

5-12. PITOT HEAT LIMITATIONS.

a. Pitot heat should not be used for more than 15 minutes while the aircraft is on the ground.

Section III. POWER LIMITS

5-13. ENGINE LIMITATIONS.

Observe limitations found in table 5-1 during operation of this aircraft, equipped with two Pratt and Whitney of Canada, Ltd. PT6A-67 engines. Each column is a separate limitation. The limits presented do not necessarily occur simultaneously. Whenever operating limits are exceeded, the pilot should record the value and duration of the condition encountered, in the aircraft log. Operation of the engines is monitored by instruments, with reference to the operating limits marked on the face of each instrument.

CAUTION

Engine operation using only the engine-driven fuel pump without boost pump fuel pressure is limited to 10 cumulative hours. All time in this category shall be entered on DA Form 2408-13 for the attention of maintenance personnel.

Use of aviation gasoline is time-limited to 150 hours of operation during any Time-Between-Overhaul (TBO) period. It may be used in any quantity with primary or alternate fuel.

5-14. OVERTEMPERATURE AND OVERSPEED LIMITATIONS.

a. Whenever limiting temperatures, listed in the Engine Operating Limitations chart (table 5-1), are exceeded and cannot be controlled by retarding the power levers, the engine will be shut down and a landing made as soon as possible.

b. During engine starting the temperatures and time limits listed in the Engine Operating Limitations chart (table 5-1) must be observed. When these limits are exceeded, the incident will be entered as an engine discrepancy in the appropriate maintenance forms. It is particularly important to record the amount and duration of overtemperature.

c. Whenever the prescribed engine overspeed limit or engine RPM operating limit is exceeded, the incident must be reported as an engine discrepancy in the appropriate maintenance forms. It is particularly important to record the maximum percent of RPM registered by the tachometer, and the duration of overspeed.

d. Continued engine operation above 810˚C will reduce engine life.

5-15. POWER DEFINITIONS FOR ENGINE OPERATIONS.

The following definitions describe the engine power ratings.

a. Takeoff Power. The maximum power permissible, limited to periods of five minutes duration.

b. Maximum Continuous Power. Maximum continuous power is the highest power rating not limited by time. Use of this rating is intended for emergency situations at the discretion of the pilot.

5-16. GENERATOR LIMITS.

Maximum generator load is limited for flight and variable during ground operations. Observe the limits shown in table 5-2 during ground operation.

Section IV. LOADING LIMITS

5-17. CENTER OF GRAVITY LIMITATIONS.

Center of gravity limits and instructions for computation of the center of gravity are contained in Chapter 6. The center of gravity range will remain within limits, providing the aircraft loading is accomplished according to instructions in Chapter 6.

Table 5-1. Engine Operating Limitations

OPERATING CONDITION	TORQUE % (1)	MAXIMUM OBSERVED TGT °C	GAS GENERATOR RPM N_1%	PROP RPM N_2	OIL PRESS PSI (10)	OIL TEMP °C (2) (3)
STARTING	--	1000(4)	--	--	200 (max)	-40 (min)
LOW IDLE	--	750(5)	62 (min)	1000 (min)	60 (min)	-40 to 110
HIGH IDLE	--	--	(6)	1000 (min)	--	--
TAKEOFF (5 MIN.)	100	840	104	1700	90 to 135	10 to 110
MAX. CONT.	100	830	104	1700	90 to 135	10 to 105
MAX CRUISE	(7)(9)	810	104	(9)	90 to 135	10 to 105
MAX CLIMB	(7)(9)	810	104	(9)	90 to 135	10 to 105
NORMAL CRUISE	(7)(9)	800	104	(9)	90 to 135	10 to 105
NORMAL CLIMB						
MAX REVERSE	75	760	88	1650	90 to 135	10 to 105
TRANSIENT	138(8)	870(8)	104	1870(8)	40 (min) 200 (max) (8)	-40 to 110

NOTES:

The limits presented do not necessarily occur simultaneously. Whenever operation limits are exceeded the pilot will record the value and duration of the condition encountered on DA Form 2408-13.

(1) Torque limit applies within range of 1000 to 1700 propeller RPM (N_2). Below 1000 RPM, torque is limited to 54%.

(2) An engine oil temperature of 74° C to 80° C is recommended.

(3) Oil temperature limits are -40° C to 105° C. However, temperatures of up to 110° C are permitted for a maximum time of 10 minutes.

(4) These values are time limited to 5 seconds.

(5) High TGT at ground idle may be corrected by reducing accessory load and/or increasing N_1 RPM.

(6) At approximately 72% N_1.

(7) Cruise torque values shall be set per Chapter 7. Operating the engines during cruise at higher torque values than those listed in Chapter 7 will reduce engine life.

(8) These values are time limited to 20 seconds.

(9) Torque limited to 94% when operating at 1500 RPM (N_2). Torque limited to 83% when operating at 1700 RPM (N_2).

(10) Oil Pressures below 90 PSI are undesirable, under emergency conditions, a lower oil pressure limit of 60 PSI is permissible at reduced power, not to exceed 54% torque.

Table 5-2. Generator Load Limits

GENERATOR LOAD	MINIMUM GAS GENERATOR RPM - N_1
0 to 95%	65%
95 to 100%	70%

5-18. WEIGHT LIMITATIONS.

WARNING

The ability to experience loss of engine power and successfully stop, continue the takeoff, or climb, before or after gear retraction is not assured for all conditions. Thorough mission planning must be accomplished prior to takeoff by analysis of maximum takeoff weight permitted by takeoff distance, accelerate-stop, positive one engine inoperative climb at lift off, accelerate-go, takeoff climb gradient, and climb performance. This data will describe performance capabilities for critical mission decisions.

Max. Ramp Weight - 16,320 lbs

Max. Takeoff Weight - 16,200 lbs, or as limited by the Maximum Takeoff Weight Permitted by Enroute Climb Requirements graph in Chapter 7.

Max. Landing Weight- 15,400 lbs

Max. Zero Fuel Weight - 13,100 lbs

5-19. CABIN AIRSTAIR DOOR WEIGHT LIMITATION.

The maximum weight that may be placed on the steps of the cabin airstair door is 300 pounds.

5-20. TOILET WEIGHT LIMITATION.

The maximum weight of a person occupying the toilet during takeoff or landing shall not exceed 238 pounds.

Section V. AIRSPEED LIMITS, MAXIMUM AND MINIMUM

5-21. AIRSPEED LIMITATIONS.

All placarded airspeeds, and airspeed indicator readings contained in procedures, text, and illustrations throughout this Operator's Manual are given as indicated airspeed (LAS) unless otherwise noted.

5-22. MAXIMUM ALLOWABLE AIRSPEED.

Refer to Flight Envelope Chart (fig. 5-2) to determine limiting airspeeds at maximum gross weight under various conditions. The maximum allowable airspeed is 248 KIAS below 11,500 feet and M_{mo} of 0.472 Mach as indicated by the maximum allowable airspeed pointer (red striped) between 11,500 feet to 35,000 feet.

5-23. LANDING GEAR EXTENSION/EXTENDED SPEED.

The airspeed limit for extending the landing gear and for flight with the landing gear extended is 179 KIAS.

5-24. LANDING GEAR RETRACTION SPEED.

The airspeed limit for retracting the landing gear is 160 KIAS.

5-25. WING FLAP EXTENSION SPEEDS.

The airspeed limit for APPROACH extension (40%) of the wing flaps is 197 KIAS. The airspeed limit for full DOWN extension (100%) of the wing flaps is 151 KIAS. If wing flaps are extended above these speeds, the flaps or their operating mechanisms may be damaged.

5-26. MINIMUM SINGLE ENGINE CONTROL AIRSPEED (V_{MCA}).

The minimum single engine control airspeed (V_{mca}) at sea level standard conditions is 101 KIAS.

5-27. MAXIMUM DESIGN MANEUVERING SPEED.

The maximum design maneuvering speed is 167 KIAS.

Section VI. MANEUVERING LIMITS

5-28. MANEUVERS.

a. *The following maneuvers are prohibited.*

(1) Spins.

(2) Aerobatics of any kind.

(3) Abrupt maneuvers above 167 KIAS.

(4) Any maneuver which results in a positive load factor of 3.02G's or a negative load factor of 1.21 g's with wing flaps in up or approach; or a positive load factor of 2.0 g's, or 0 g's with flaps down.

b. Recommended turbulent air penetration airspeed is 150 KIAS.

5-29. BANK AND PITCH LIMITS.

a. Bank limits are 60° left or right.

b. Pitch limits are 30° above or below the horizon.

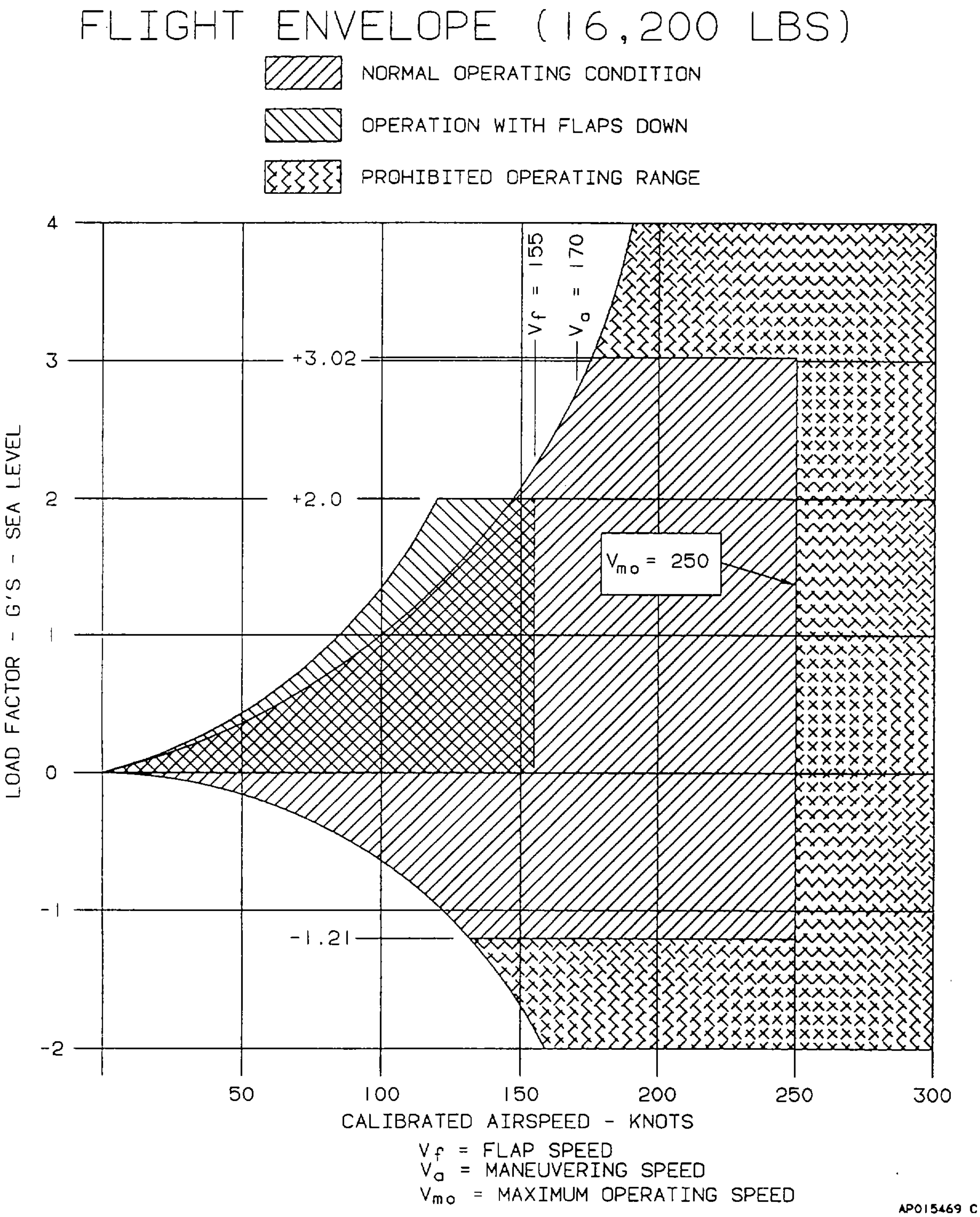


Figure 5-2. Flight Envelope

Section VII. ENVIRONMENTAL RESTRICTIONS

5-30. ALTITUDE LIMITATIONS.

The maximum altitude that the aircraft may be operated at is 35,000 feet. When operating with inoperative yaw damp, the altitude limit is 17,000 feet.

5-31. TEMPERATURE LIMITS.

a. The aircraft shall not be operated when the ambient temperatures are warmer than ISA +37˚C at sea level to 25,000 feet, or ISA +31˚C above 25,000 feet.

b. Engine ice vanes shall be extended for operations in ambient temperatures of +5˚C or below when flight free of visible moisture cannot be assured.

c. Minimum free air temperature for operation of deicing boots shall be -40˚C.

5-32. FLIGHT UNDER IMC (INSTRUMENT METEOROLOGICAL CONDITIONS).

This aircraft is qualified for operation in instrument meteorological conditions.

5-33. ICING LIMITATIONS (TYPICAL).

WARNING

While in icing conditions, if there is an unexplained 30% increase of torque needed to maintain airspeed in level flight, a cumulative total of two or more inches of ice accumulation on the wing, an unexplained decrease of 15 knots IAS, or an unexplained deviation between pilot's and copilot's airspeed indicators, the icing environment should be exited as soon as practicable. Ice accumulation on the pitot tube assemblies could cause a complete loss of airspeed indication.

The following conditions indicate a possible accumulation of ice on the pitot tube assemblies and unprotected airplane surfaces. If any of these conditions are observed, the icing environment should be exited as soon as practicable.

a. Total ice accumulation of two inches or more on the wing surfaces. Determination of ice thickness can be accomplished by summing the estimated ice thickness on the wing prior to each pneumatic boot deice cycle (e.g. four cycles of minimum recommended 1/2-inch accumulation.

b. A 30 percent increase in torque per engine required to maintain a desired airspeed in level flight (not to exceed 85 percent torque) when operating at recommended holding speed.

c. A decrease in indicated airspeed of 15 knots after entering the icing condition (not slower than 1.4 power off stall speed) if maintaining original power setting in level flight. This can be determined by comparing pre-icing condition entry speed to the indicated speed after a surface and antenna deice cycle is completed.

d. Any variations from normal indicated airspeed between the pilot's and copilot's airspeed indicators.

5-33A. ICING LIMITATIONS (SEVERE).

WARNING

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in a build-up on protective surfaces exceeding the capability of the ice protections system, or may result in ice forming aft of these protected surfaces. This ice may not shed using ice protection systems, and may seriously degrade the performance and controllability of the airplane.

a. During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following visual cues. If one or more of these visual cues exists, immediately request priority handling from air traffic control to facilitate a route or an altitude change to exit the icing conditions:

(1) Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.

(2) Accumulation of ice on the upper (or lower, as appropriate) surface of the wing aft of the protected area.

(3) Accumulation of ice on the propeller spinner farther aft than normally observed.

b. Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when any of the visual cues specified above exist, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

NOTE

All icing detection lights must be operative prior to flight into icing conditions at night. This supersedes any relief provided by the master minimum equipment list (MMEL) or equivalent.

5-33B. CROSSWIND LIMITATIONS.

WARNING

Landing with wind conditions in excess of the demonstrated crosswind component may result in damage to the aircraft. This should only be attempted during emergency situations.

The maximum demonstrated crosswind component is 20 knots at 90 degrees. Landing the aircraft in a crab will result in side loads on the landing gear and should be recorded on DA Form 2408-13-1. Refer to Chapter 8 for crosswind landing techniques.

5-34. OXYGEN REQUIREMENTS.

a. Oxygen requirements will be in accordance with AR 95-1.

b. Oxygen system data/duration tables are found in Chapter 2.

5-35. CABIN PRESSURE LIMITS.

Maximum cabin differential pressure is 6.5 PSI.

5-36. CRACKED CABIN WINDOW/WINDSHIELD.

If a crack occurs in any side window or windshield, aircraft operation is limited to 25,000 feet or less and cabin pressurization of 4.0 PSI or less as required to complete the flight. The aircraft shall not be flown again until maintenance actions are conducted unless proper authorization is obtained for a ferry flight to a location where a maintenance action can be performed.

If a crack develops in any side window or windshield in flight, refer to Chapter 9, Emergency Procedures.

Section VIII. OTHER LIMITATIONS

5-37. MAXIMUM DESIGN SINK RATE.

The maximum design landing sink rate is 500 feet per minute. with a normal flare initiated just prior to touchdown.

5-38. INTENTIONAL ENGINE OUT SPEED.

Intentional inflight engine cuts below the safe one engine inoperative speed (V, $_{sse}$ - 115 KIAS) are prohibited.

5-39. LANDING ON UNPREPARED RUNWAY.

CAUTION

Except in an emergency, propellers should be moved out of reverse below 40 knots to minimize propeller blade erosion. and during crosswind to minimize stress imposed on propellers, engines. and airframe. Care must be exercised when reversing on runways with loose sand or dust on the surface. Plying gravel will damage propeller blades and dust may impair the pilot's forward visibility at low aircraft speeds.

The aircraft has demonstrated landings on hard smooth runways. Hard braking, i.e., skidding tires while operating on other than smooth runways, can result in damage to the landing gear. Operations from unimproved runways (rocks, potholes, mud. deteriorated surfaces) are prohibited. When landing on other than dry surfaces. use discretionary propeller reverse to stop the aircraft on the available runway.

Section IX. REQUIRED EQUIPMENT FOR VARIOUS CONDITIONS OF FLIGHT

5-40. REQUIRED EQUIPMENT LISTING.

a. A Required Equipment for Various Conditions of Flight listing (table 5-3), is provided to enable the pilot to identify those systems/ components required for flight. For the sake of brevity, the listing does not include obviously required items such as wings, rudder, flaps, engines. landing gear, etc. It is important to note that ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRCRAFT AND NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE.

b. It is the final responsibility of the pilot to determine whether the lack of. or inoperative status of a piece of equipment on the aircraft will limit the conditions under which the aircraft may be operated.

(1) (-) Indicates item may be inoperative for the specified flight condition.

(2) (*) Refers to remarks and/or exceptions column for explicit information or reference.

NOTE

The pilot shall ensure that all items required for flight by AR 95-1 are operative.

c. The pilot is responsible for exercising the necessary operational control to assure that no aircraft is flown with multiple items inoperative, without first determining that any interface or interrelationship between inoperative systems or components will not result in a degradation in the level of safety and/or cause an undue increase in crew workload.

d. The exposure to additional failures during continued operation with inoperative systems or components must also be considered in determining that an acceptable level of safety is being maintained. The list may not deviate from requirements of the Operators Manual limitations section, emergency procedures or safety of flight messages.

Table 5-3. Required Equipment Listing

SYSTEM and/or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	Remarks and/or Exceptions
ELECTRICAL POWER						
AC Volts/Frequency Meter	2	2	2	2	2	
Battery	1	1	1	1	1	
Battery Charge Annunciator	1	1	1	1	1	
DC Generator	2	2	2	2	2	
DC Generator Annunciator	2	2	2	2	2	One may be inoperative provided corresponding loadmeter is monitored.
DC Load Meter	2	2	2	2	2	One may be inoperative provided operating generator loadmeter is monitored.
Inverter	2	2	2	2	2	
Inverter Warning Annunciator	1	1	1	1	1	May be inoperative provided both inverters are operative.
DC Voltmeter	2	2	2	2	2	One may be inoperative provided corresponding loadmeter and generator warning light is monitored.
ENVIRONMENTAL						
Bleed Air Fail Annunciators	2	2	2	2	2	
Altitude Warning Annunciator (Cabin)	1	1	1	1	1	May be inoperative provided aircraft remains unpressurized.
Cabin Rate of Climb Indicator	1	1	1	1	1	Cabin altitude remains in accordance with AR95-1.
Differential Pressure/Cabin Altitude Indicator	1	1	1	1	1	
Duct Overtemp Annunciator	1	1	1	1	1	
Outflow Valve	1	1	1	1	1	
Pressurization Controller	1	1	1	1	1	
Safety Valve	1	1	1	1	1	
Bleed Air Shutoff Valve	2	2	2	2	2	
FIRE PROTECTION						
Engine Fire Detector System Including Annunciators	2	2	2	2	2	
Engine Fire Extinguishers	2	2	2	2	2	

Table 5-3. Required Equipment Listing - Continued

SYSTEM and/or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	Remarks and/or Exceptions
FLIGHT CONTROLS						
Flap Position Indicator	1	1	1	1	1	May be inoperative provided that the flap travel is visually inspected prior to takeoff.
Flap System	1	1	1	1	1	
Flap Warning Horn	1	1	1	1	1	
Trim Tab Position Indicator (Rudder, Aileron, Elevator)	3	3	3	3	3	
Yaw Damp System	1	1	1	1	1	May be inoperative for flight at and below 17,000 feet.
Rudder Boost System	1	1	1	1	1	
FUEL						
Engine Driven Boost Pump	2	2	2	2	2	
Fuel Crossfeed System Including Annunciator	1	1	1	1	1	
Standby Fuel Boost Pump	2	2	2	2	2	Both required for operation on aviation gasoline above 15,000 feet.
Fuel Pressure Annunciator	2	2	2	2	2	
Fuel Quantity Indicating System Including Annunciators	2	2	2	2	2	
Firewall Fuel Shutoff System Including Annunciators	2	2	2	2	2	
Jet Transfer Pump	2	2	2	2	2	Required if aux tanks contain fuel.
Motive Flow Valve	2	2	2	2	2	Required if aux tanks contain fuel.
Fuel Flow Indicator	2	2	2	2	2	One may be inoperative provided fuel quantity gages are operative.
ICE AND RAIN PROTECTION						
Antenna Deice System	0	0	0	0	1	
Alternate Static Air Source	1	1	1	1	1	
Engine Auto Ignition and Annunciators	2	2	2	2	2	
Engine Ice Vane System	2	2	2	2	2	
Engine Inlet Lip Heat Indicator	0	0	0	0	2	Four annunciators must be operative.
Heated Fuel Vent	2	2	2	2	2	
Heated Windshield (Left)	0	0	0	0	1	Right side may be inoperative.
Pitot Heat (Left)	1	1	1	1	2	Right side must be operative during icing conditions.

Table 5-3. Required Equipment Listing - Continued

SYSTEM and/or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	Remarks and/or Exceptions
Pneumatic Pressure Indicator	0	0	1	1	1	
Propeller Deicer System	0	0	0	0	1	
Stall Warning Heater	0	0	0	0	1	
Surface Deicer System	0	0	0	0	1	
Wing Ice Light	0	2	0	2	2	
LANDING GEAR						
Landing Gear Position Indicator Lights	3	3	3	3	3	One of the three may be inoperative provided gear handle light is monitored.
Landing Gear Handle Light	1	1	1	1	1	
Landing Gear Aural Warning	1	1	1	1	1	
Landing Gear Hydraulic Power Pack	1	1	1	1	1	
Brake Deice Shutoff Valve	2	2	2	2	2	
Hydraulic Fluid Low Annunciator	1	1	1	1	1	
Emergency Extension Hand Pump	1	1	1	1	1	
LIGHTS						
Cockpit and instrument Lighting System	0	1	0	1	0	Lights must illuminate all instruments and controls.
Cabin Door Annunciator	1	1	1	1	1	
Landing Lights	0	1	0	1	0	
Position Lights	0	3	0	3	0	
Anti-collision Light System	1	1	1	1	1	System will be operated in accordance with AR 95-1.
NAVIGATION INSTRUMENTS						
Airspeed Indicator (Left)	1	1	1	1	2	Right side must be operative during icing conditions.
Altimeter	2	2	2	2	2	
Magnetic Compass	1	1	1	1	1	
Outside Air Temperature Gage	1	1	1	1	1	
Standby Attitude Indicator	1	1	1	1	1	AR 95-1
Turn and Slip Indicator	1	1	1	1	1	AR 95-1
Vacuum System	1	1	1	1	1	AR 95-1
Electronic Flight Instrument System	0	1	2	2	2	During IFR day, IFR night, or icing conditions, one EFIS display is required at the pilot and copilot station.

Table 5-3. Required Equipment Listing - Continued

SYSTEM and/or COMPONENT	VFR DAY	VFR NIGHT	IFR DAY	IFR NIGHT	ICING CONDITIONS	Remarks and/or Exceptions
OXYGEN						
Oxygen System	1	1	1	1	1	
Oxygen Masks	2	2	2	2	2	
PROPELLERS						
Autofeather System Including Annunciators	1	1	1	1	1	
Propeller Reversing System	2	2	2	2	2	Annunciators may be inoperative.
Propeller Governor Test Switch	1	1	1	1	1	
Propeller Overspeed Governor	2	2	2	2	2	
Propeller Pitch Annunciators	2	2	2	2	2	
ENGINE INDICATIONS						
TGT Indicator	2	2	2	2	2	
Tachometer (Gas Generator)	2	2	2	2	2	
Tachometer (Propeller)	2	2	2	2	2	
Torque Indicator	2	2	2	2	2	
ENGINE OIL						
Chip Detector System Including Annunciators	2	2	2	2	2	
Oil Pressure	2	2	2	2	2	
Oil Temperature Indicator	2	2	2	2	2	
Oil Pressure Annunciator	2	2	2	2	2	

NOTE

The above equipment list does not include all specific flight instruments and communications/navigation equipment required by FAR parts 91 and 135 Operating Requirements.

CHAPTER 6

WEIGHT/BALANCE AND LOADING

Section I. GENERAL

6-1. EXTENT OF COVERAGE.

Sufficient data has been provided so that, knowing the basic weight and moment of the aircraft, any combination of weight and balance can be computed.

6-2. CLASS.

Army model RC-12N aircraft are in Weight and Balance Class 1. When operating in a passenger/cargo configuration, the aircraft weight and balance classification becomes a Class 2. Additional directives governing weight and balance classifications 1 and 2 aircraft forms and records are contained in AR 95-3, TM 55-1500-342-23, and DA PAM 738-751.

6-3. AIRCRAFT COMPARTMENTS AND STATIONS.

The aircraft is separated into two compartments associated with loading. These compartments are the cockpit and the cabin. Figure 6-1 shows the general description of aircraft compartments.

Section II. WEIGHT AND BALANCE

6-4. PURPOSE.

The data to be inserted on weight and balance charts and forms are applicable only to the individual aircraft, the serial number of which appears on the title page of the booklet entitled WEIGHT AND BALANCE DATA supplied by the aircraft manufacturer and on the various forms and charts which remain with the aircraft. The charts and forms referred to in this chapter may differ in nomenclature and arrangement from time to time, but the principles on which they are based will not change.

6-5. CHARTS AND FORMS.

The standard system of weight and balance control requires the use of several different charts and forms. Within this chapter, the following are used:

1. Chart C - Basic Weight and Balance Record, DD Form 365-3.
2. Form F - Weight and Balance Clearance Form F, DD Form 365-4 (Tactical).

6-6. RESPONSIBILITY.

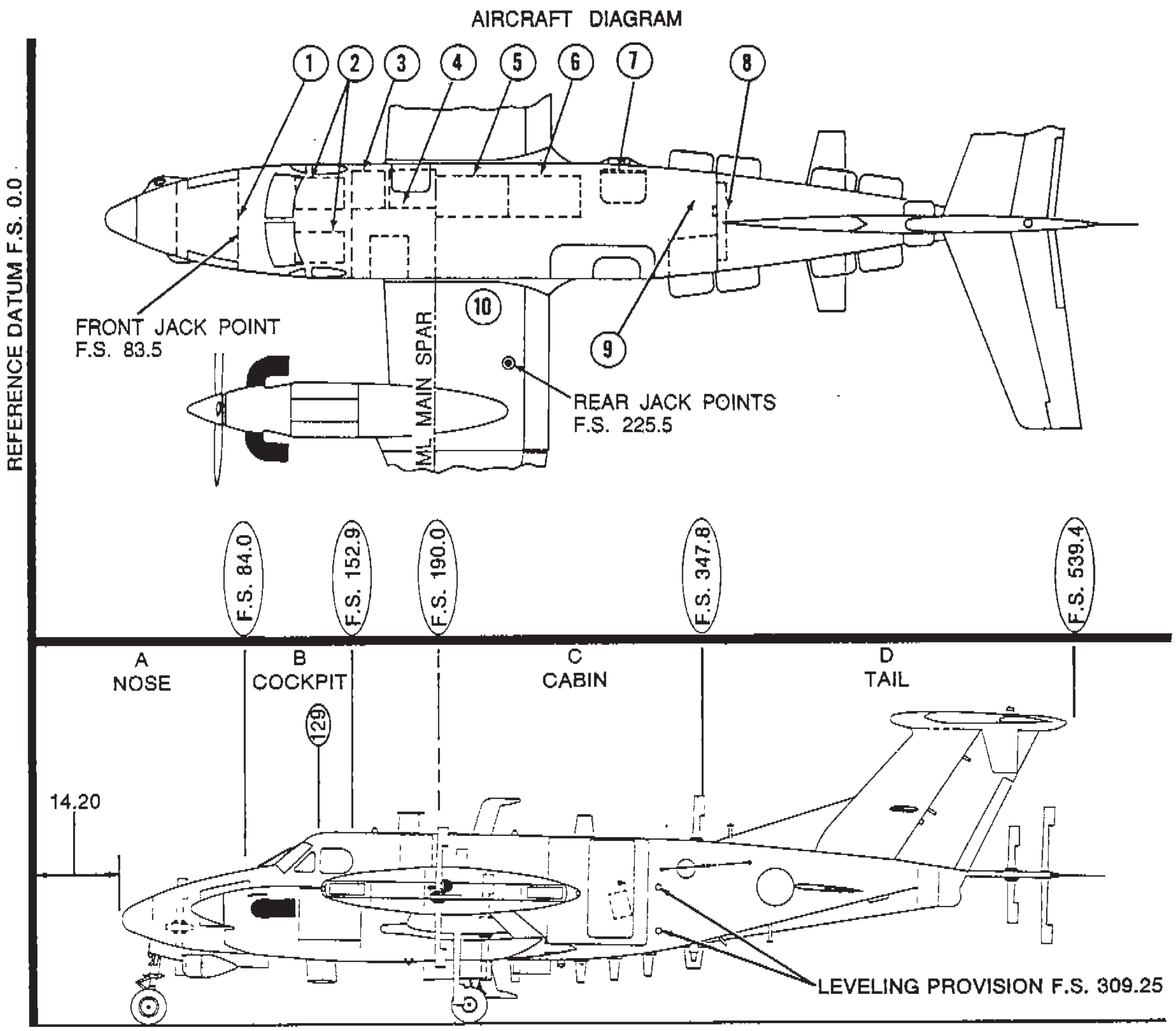
The aircraft manufacturer inserts all aircraft identifying data on the title page of the booklet entitled WEIGHT AND BALANCE DATA and on the various charts and forms. All charts, including one sample Weight and Balance Clearance Form F, if applicable, are completed at time of delivery. This record is the basic weight and balance data of the aircraft at delivery. All subsequent changes in weight and balance are compiled by the weight and balance technician.

6-7. CHART C - BASIC WEIGHT AND BALANCE RECORD, DD FORM 365-3.

Chart C is a continuous history of the basic weight and moment resulting from structural and equipment changes made in service. At all times, the last weight and moment/100 entry is considered the current weight and balance status of the basic aircraft.

6-8. WEIGHT AND BALANCE CLEARANCE, DD FORM 365-4 (TACTICAL).

Refer to TM 55-1500-342-23 for DD Form 365-4 instructions. Refer to table 6-1 through 6-5 for weight and balance data.



1 AVIONICS COMPARTMENT
2 PILOT AND COPILOT SEATS
3 MISSION AC DC POWER CABINET
4 EQUIPMENT RACK - INS, GPS & TACAN
5 MISSION CONSOLE
6 MISSION CONSOLE
7 LAVATORY
8 AVIONICS SHELVES AND OXYGEN BOTTLES
9 SURVIVAL KITS (3)
10 EQUIPMENT RACK

Figure 6-1. Aircraft Compartments and Stations

Table 6-1. Occupants - Useful Loads, Weights, and Moments

WEIGHT	CREW	LAVATORY
	F.S. 129	F.S. 292
	Moment/100	
80	103	234
90	116	263
100	129	292
110	142	321
120	155	350
130	168	380
140	181	409
150	194	438
160	206	467
170	219	496
180	232	526
190	245	555
200	258	584
210	271	613
220	284	642
230	297	672
240	310	701
250	323	730

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Table 6-2. Survivability Equipment - Weights and Moments

ITEM	WEIGHT	MOM/100
NACELLE DISPENSER (F.S. 214.7)		
Chaff Cartridges (30)	10	21
FUSELAGE DISPENSER (F.S. 288.6)		
Chaff Cartridges (30)	10	29
Flare Cartridges (30)	13	37

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Section III. FUEL/OIL

6-9. FUEL LOAD.

Fuel loading imposes a restriction on the amount of load which can be carried. The required fuel must first be determined, then that weight subtracted from the total weight of crew and fuel. Weight up to and including the remaining allowable capacity can be subtracted directly from the weight of crew and fuel. As the fuel load is increased, the loading capacity is reduced. Figure 6-2 depicts the density variation of aviation fuel.

6-10. FUEL AND OIL DATA

a. Usable Fuel Moment Tables. These tables (Table 6-3 and 6-4) show usable fuel moment/100 for US gallons (or pounds) of JP-4, JP-5 and JP-8.

b. Oil Data. Total oil weight is 52 pounds and is included in the basic weight of the aircraft

Table 6-3. Useful Load Weights and Moments Usable Fuel, 6.4 to 6.8 LB/GAL

GALLON	6.4 LB/GAL		6.5 LB/GAL		6.6 LB/GAL		6.7 LB/GAL		6.8 LB/GAL	
	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100
10	64	99	65	100	66	102	67	103	68	105
20	128	197	130	200	132	203	134	206	136	209
30	192	305	195	310	198	314	201	319	204	324
40	256	423	260	430	264	436	268	443	272	450
50	320	542	325	550	330	559	335	567	340	575
60	384	662	390	672	396	683	402	693	408	703
70	448	782	455	794	462	807	469	819	476	831
80	512	904	520	918	528	932	536	946	544	960
90	576	1023	585	1039	594	1055	603	1071	612	1087
100	640	1142	650	1160	660	1178	670	1196	680	1214
110	704	1260	715	1280	726	1300	737	1319	748	1339
120	768	1379	780	1400	792	1422	804	1443	816	1465
130	832	1496	845	1519	858	1543	871	1566	884	1589
140	896	1615	910	1640	924	1665	938	1690	952	1715
150	960	1734	975	1761	990	1788	1005	1815	1020	1842
160	1024	1852	1040	1881	1056	1910	1072	1939	1088	1968
170	1088	1971	1105	2002	1122	2033	1139	2064	1156	2095
180	1152	2090	1170	2122	1188	2155	1206	2188	1224	2221
190	1216	2209	1235	2244	1254	2279	1273	2313	1292	2348
200	1280	2328	1300	2365	1320	2401	1340	2437	1360	2473
210	1344	2447	1365	2486	1386	2524	1407	2562	1428	2600
220	1408	2567	1430	2607	1452	2647	1474	2687	1496	2727
230	1472	2686	1495	2728	1518	2770	1541	2812	1564	2854
240	1536	2806	1560	2850	1584	2894	1608	2938	1632	2982
250	1600	2926	1625	2971	1650	3107	1675	3063	1700	3109
260	1664	3045	1690	3093	1716	3140	1742	3188	1768	3236
270	1728	3164	1755	3213	1782	3263	1809	3312	1836	3361
280	1792	3283	1820	3334	1848	3386	1876	3437	1904	3488
290	1856	3402	1885	3455	1914	3508	1943	3562	1972	3615
300	1920	3521	1950	3576	1980	3631	2010	3686	2040	3741
310	1984	3641	2015	3698	2046	3754	2077	3811	2108	3868
320	2048	3760	2080	3819	2112	3878	2144	2936	2176	3995
330	2112	3880	2145	3940	2178	4001	2211	4062	2244	4123
340	2176	3999	2210	4062	2244	4124	2278	4178	2312	4249
350	2240	4119	2275	4184	2310	4248	2345	4312	2380	4376
360	2304	4244	2340	4310	2376	4377	2412	4443	2448	4509
370	2368	4365	2405	4434	2442	4502	2479	4570	2516	4638
380	2432	4489	2470	4560	2508	4630	2546	4700	2584	4770
384	2458	4540	2496	4610	2534	4680	2573	4752	2611	4823
400	2560	4748	2600	4822	2640	4896	2680	4970	2720	5043
410	2624	4879	2665	4955	2706	5031	2747	5107	2788	5182
420	2688	5009	2730	5087	2772	5166	2814	5244	2856	5321
430	2752	5140	2795	5220	2838	5300	2881	5380	2924	5460
440	2816	5270	2860	5353	2904	5435	2948	5517	2992	5598
450	2880	5401	2925	5485	2970	5569	3015	5654	3060	5737
460	2944	5531	2990	5618	3036	5704	3082	5790	3128	5876
470	3008	5662	3055	5750	3102	5839	3149	5927	3196	6014
480	3072	5793	3120	5883	3168	5973	3216	6064	3264	6155
490	3136	5923	3185	6016	3234	6108	3283	6200	3332	6292
500	3200	6054	3250	6148	3300	6243	3350	6337	3400	6431
510	3264	6184	3315	6281	3366	6377	3417	6474	3468	6571
520	3328	6315	3380	6413	3432	6512	3484	6610	3536	6708
530	3392	6445	3445	6546	3498	6647	3551	6747	3604	6847
540	3456	6576	3510	6679	3564	6781	3618	6884	3672	6987
542	3468	6602	3523	6705	3577	6808	3631	6910	3686	7014

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Table 6-4. Useful Load Weights and Moments Usable Fuel 6.9 to 7.1 LB/GAL

GALLON	6.9 LB/GAL		7.0 LB/GAL		7.1 LB/GAL	
	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100	WEIGHT	MOMENT 100
10	69	107	70	108	71	110
20	138	212	140	215	142	218
30	207	329	210	334	213	338
40	276	457	280	463	284	470
50	345	583	350	592	355	600
60	414	713	420	724	426	734
70	483	843	490	855	497	868
80	552	974	560	988	568	1002
90	621	1103	630	1119	639	1135
100	690	1232	700	1250	710	1268
110	759	1359	770	1378	781	1398
120	828	1487	840	1508	852	1530
130	897	1612	910	1636	923	1659
140	966	1740	980	1765	994	1791
150	1035	1869	1050	1896	1065	1923
160	1104	1997	1120	2026	1136	2055
170	1173	2126	1190	2157	1207	2187
180	1242	2254	1260	2286	1278	2319
190	1311	2383	1330	2417	1349	2452
200	1380	2509	1400	2546	1420	2582
210	1449	2638	1470	2676	1491	2715
220	1518	2767	1540	2807	1562	2847
230	1587	2896	1610	2938	1633	2980
240	1656	3026	1680	3070	1704	3114
250	1725	3155	1750	3200	1775	3246
260	1794	3284	1820	3331	1846	3379
270	1863	3410	1890	3460	1917	3509
280	1932	3539	1960	3591	1988	3642
290	2001	3668	2030	3721	2059	3774
300	2070	3796	2100	3851	2130	3906
310	2139	3925	2170	3982	2201	4039
320	2206	4054	2240	4113	2272	4171
350	2277	4184	2310	4244	2343	4305
340	2346	4311	2380	4374	2414	4436
350	2415	4440	2450	4505	2485	4569
360	2484	4575	2520	4642	2556	4708
370	2553	4706	2590	4774	2627	4843
380	2622	4840	2660	4910	2698	4980
384	2650	4893	2688	4964	2726	5035
400	2760	5117	2800	5193	2840	5267
410	2829	5258	2870	5336	2911	5411
420	2898	5401	2940	5478	2982	5556
430	2967	5540	3010	5621	3053	5701
440	3036	5682	3080	5763	3124	5845
450	3105	5823	3150	5906	3195	5992
460	3174	5962	3220	6049	3266	6135
470	3243	6104	3290	6191	3337	6281
480	3312	6245	3360	6336	3408	6424
490	3381	6385	3430	6477	3479	6570
500	3450	6526	3500	6620	3550	6715
510	3519	6666	3570	6764	3621	6861
520	3588	6807	3640	6905	3692	7004
530	3657	6948	3710	7048	3763	7149
540	3726	7088	3780	7192	3834	7295
542	3740	7117	3794	7220	3848	7323

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Table 6-5. Center of Gravity Limits (Landing Gear down) Restricted Category

WEIGHT CONDITION	FORWARD CG LIMIT	AFT CG LIMIT
16,200 LBS (MAXIMUM TAKE-OFF)	188.0	195.1
15,400 LBS (MAXIMUM LANDING)	186.0	195.1
13,100 LBS (MAXIMUM ZERO FUEL)	181.0	195.1
12,600 LBS OR LESS	179.0	195.1

NOTE:

The moment/100 for retraction of the landing gear is 61.6. Loadings based on wheels-down condition which fall within the limiting moments in the table, will be satisfactory for flight with landing gear retracted.

Section IV. CENTER OF GRAVITY

6-11. CENTER OF GRAVITY LIMITATIONS.

WARNING

When the mission gear is removed, the forward center of gravity limit is easily exceeded.

Center of gravity limitations are expressed in ARM inches which refers to a positive measurement from the aircraft's reference datum. The forward CG limit at 12,600 lbs., or less, is 179.0 ARM inches. The forward-sloping CG limit line is a straight line from 12,600 lbs. to 16,200 lbs, ending at fuselage station 188.0. At 16,200 lbs., or less, the aft CG limit is 195.1 ARM inches. The Center of Gravity Loading Diagram (fig. 6-3) is designed to establish forward and aft CG limitations. When the mission gear is removed, it may be necessary to add removable ballast or baggage in the aft baggage compartment.

Section V. CARGO LOADING

6-12. LOAD PLANNING.

The basic factors to be considered in any loading situation are as follows:

a. Cargo shall be arranged to permit access to all emergency equipment and exits during flight.

b. Floorboard structural capacity shall be considered in the loading of heavy or sharp-edged containers and equipment. Shorings shall be used to distribute highly condensed weights evenly over the cargo areas. Use of the floor seat tracks to support loads is encouraged where possible.

c. All cargo shall be adequately secured to prevent damage to the aircraft, other cargo, or the item itself.

6-13. LOADING PROCEDURE.

NOTE

The cabin airstair door is weight limited to a maximum of 300 pounds to prevent possible structural damage.

Loading of cargo is accomplished through the cabin door (21.5 in. X 50.0 in.) or the cargo door.

6-14. SECURING LOADS.

All cargo shall be secured with restraints strong enough to withstand the maximum force exerted in any direction. The maximum force can be determined by multiplying the weight of the cargo item by the applicable load factor. These established load factors (the ratio between the total force and the weight of the cargo item) are 1.5 to the side and rear, 3.0 up, 6.6 down, and 9.0 forward.

DENSITY VARIATION OF AVIATION FUEL

BASED ON AVERAGE SPECIFIC GRAVITY

FUEL	AVERAGE SPECIFIC GRAVITY AT 15°C (59°F)
AVIATION KEROSENE JET A (JP-5), JP-8 AND JET A-1	.819
JET B (JP-4)	.764
AV GAS GRADE 100/130	.706

NOTE: The Fuel Quantity Indicator is calibrated for correct indication when using Aviation Kerosene Jet A, Jet A1, JP-5 and JP-8. When using other fuels, multiply the indicated fuel quantity in pounds by .99 for Jet B (JP-4) or by .98 for Aviation Gasoline (100/130) to obtain actual fuel quantity in pounds.

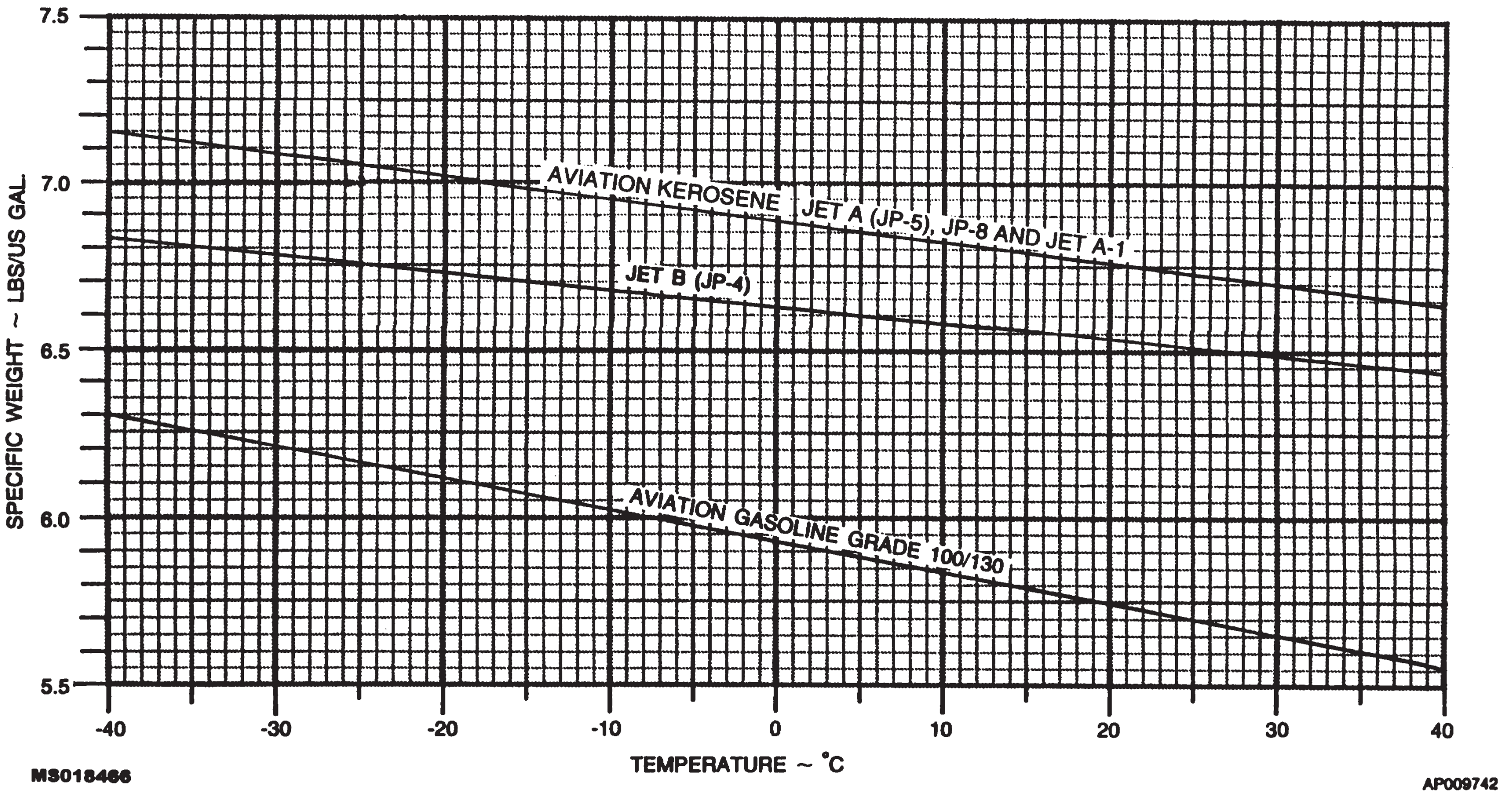

Figure 6-2. Density Variation of Aviation Fuel

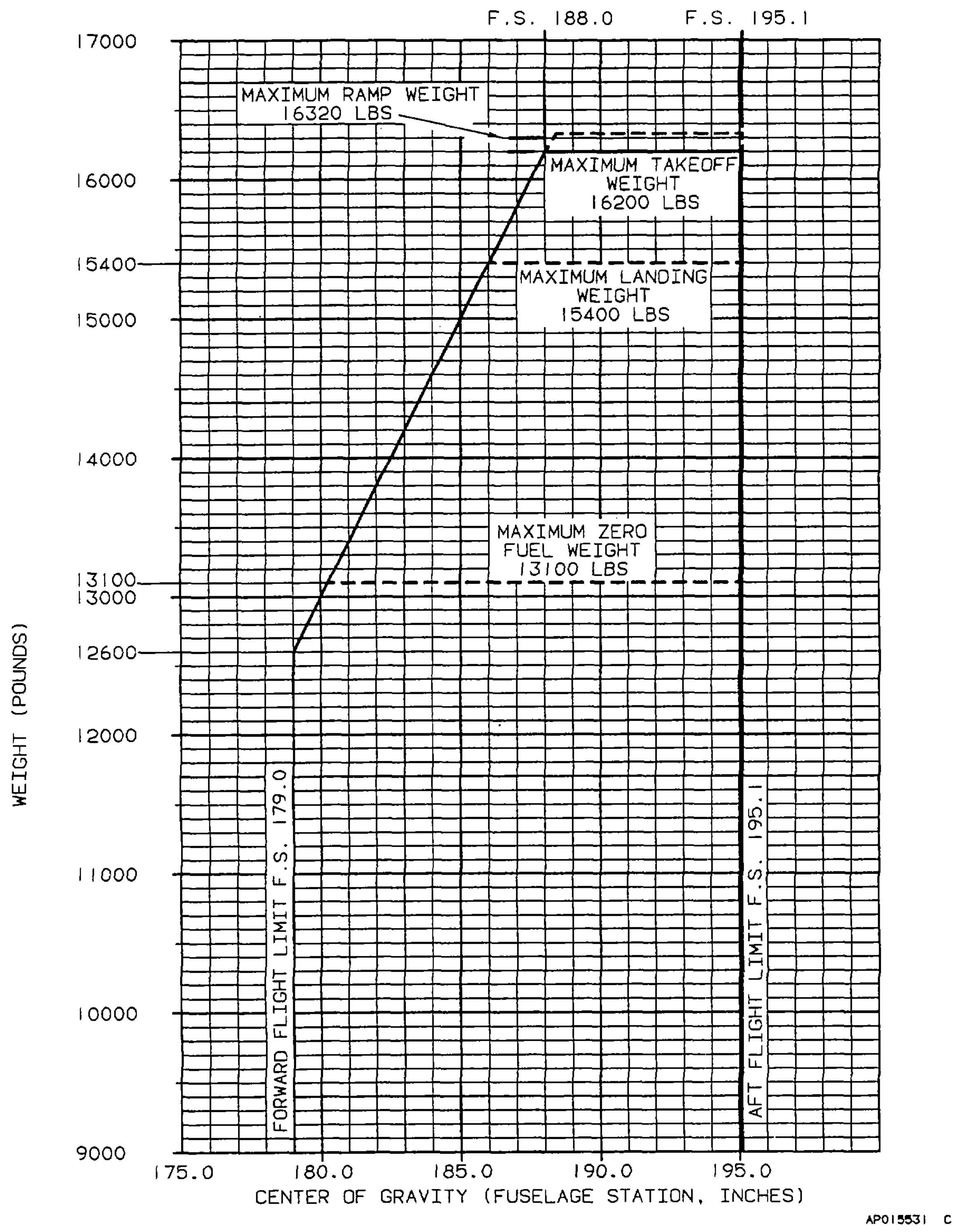

Figure 6-3. Center of Gravity Loading Diagram

Section VI. SURVIVABILITY EQUIPMENT

6-15. FLARE AND CHAFF DISPENSERS.

Refer to table 6-2 for flare and chaff dispenser weight and balance data.

CHAPTER 7
PERFORMANCE

FIGURE **PAGE NUMBER**

7-1. INTRODUCTION TO PERFORMANCE.

The graphs and tables in this chapter present performance information for takeoff, climb, flight planning, and landing at various parameters of weight, power, altitude, and temperature. Examples have been presented on performance graphs.

The performance data in this chapter is presented for aircraft equipped with Infra Red Reducing Exhaust Stacks and for aircraft equipped with Improved Constant Area Exhaust Stacks. The designator symbol IR identifies text and illustration performance data for the Infra Red Reducing Exhaust Stack configuration. The designator symbol CA identifies text and illustration performance data for the Improved Constant Area Exhaust Stack configuration. Notes have been added (with icons) to some charts to identify some performance differences. Data with no icon applies to both configurations and includes the example text (para. 7-3) and other calibration, correction, conversion, wind component, ice vane, and cruise graphs within this chapter. Refer to the Chapter 7 table of contents beginning on page 7-1 for locations of the required performance information.

7-2. HOW TO USE GRAPHS.

1. All airspeed and references to airspeeds in this chapter are indicated airspeeds unless otherwise noted.

2. A reference line indicates where to begin following the guidelines. Always project to the reference line first, then follow the guidelines to the next item by maintaining the same proportional distance between the guideline above and the guideline below the projected line. For instance, if the projected line intersects the reference line in the ratio of 30% down/70% up between the guidelines, then maintain this same 30%/70% relationship between the guidelines all the way to the next item.

3. The AIRSPEED CALIBRATION NORMAL SYSTEM TAKEOFF GROUND ROLL graph was used to obtain V1 and VR indicated airspeeds (IAS). All other indicated airspeeds were obtained by using the AIRSPEED CALIBRATION NORMAL SYSTEM graph.

4. The associated conditions define the specific conditions from which performance parameters have been determined. They are not intended to be used as instructions; however, performance values determined from charts can only be achieved if the specified conditions exist.

5. The full amount of usable fuel is available for all approved flight conditions.

6. Notes have been provided to approximate performance with the ice vanes extended. The effect will vary, depending upon airspeed, temperature, and altitude.

7-3. EXAMPLES.

The following examples present calculations for flight time, block speed, and fuel required for a proposed flight from Billings, Montana, to Casper, Wyoming, at flight level 250, using the conditions listed below, except as noted. The desired takeoff weight is 16,000 pounds, if possible.

a. Conditions. At Billings-Logan International (BIL):

Free Air Temperature ....59°F
Field Elevation ....3649 feet[1]
Altimeter Setting ....30.07 in. Hg
Wind ....2900 at 15 knots
Runway 34 Length ....5585 feet[1]
Gradient ....1.9% downhill[1]

[1]Source: DOD TERM USLIAAPVO1, 9 JAN 92.

Route of Trip: BIL - V19 - CPR

Route Segment Data: Table 7-1.

Table 7-1. Route Segment Data[2]

ROUTE SEG MENT	AVERAGE MAGNETIC COURSE	AVERAGE MAGNETIC VARIATION	D I S - TANCE NM	WIND AT FL 250 DIR./KNOTS	FAT AT FL 250 °C	MEA FEET	FAT AT MEA °C	ALTIMETER SETTING IN. HG
BIL-SHR	117°	15°E	91[3]	010°/45	-40	8000	0	29.97
SHR-CZI	139°	14°E	57	350°/65	-40	9000	-4	29.60
CZI-CPR	161°	13°E	69[3]	310°/50	-30	7600	0	29.48

[2]Source: DOD Low Altitude Enroute Chart L-9, 9 Jan 1992.
[3]Includes distance between airport and VORTAC, per DOD US IFR SUPPLEMENT 9 JAN 1992.

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At Natrona County International (CPR):

Free Air Temperature ....68°F
Field Elevation ....5348 feet[4]
Altimeter Setting ....29.27 in. Hg
Wind ....330° at 10 knots
Runway 30 Length ....8686 feet[4]
Gradient ....0 3% up[4]

[4]Source: DOD TERM USLIAPV03, 9 JAN 92.

b. Fahrenheit to Celsius Temperature Conversion. Convert reported field temperatures at the departure and destination airports from Fahrenheit to Celsius using the FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION graph. Enter the chart at the appropriate value on the °F scale, read up to the reference line and left to the corresponding value in °C.

Billings-Logan International 59°F ....15°C
Natrona County International 68°F ....20°C

c. Pressure Altitude. To determine the approximate pressure altitude at origin and destination airports, add 1000 feet to field elevation for each 1.00 in. Hg that the reported altimeter setting value is below 29.92 in. Hg, and subtract 1000 feet for each 1.00 in. Hg above 29.92 in. Hg. Always subtract 1000 feet for each 1.00 in. Hg above 29.92 in. Hg. Then multiply the answer by 1000 to find the difference in feet between field elevation and pressure altitude.

Pressure Altitude at BIL:

29.92

-30.07

-0.15

-0.15 x 1000 feet = -150 feet

Field Elevation ....3649 feet

Pressure Altitude Correction ....-150 feet

Field Pressure Altitude ....3499 feet

Pressure Altitude at CPR:

29.92

-29.27

+0.65

0.65 x 1000 feet = 650 feet

Field Elevation ....5348 feet

Pressure Altitude Correction ....+650 feet

Field Pressure Altitude ....5998 feet

d. Wind Components. Determine the headwind (tailwind) and crosswind component for the selected runway. Compute the angle between the reported wind at Billings-Logan International of 290° and the selected runway heading of 340° to be 50°. Locate the line for 50° angle between wind direction and flight path on the graph. Trace along the 50° line and locate the reported wind speed of 15 knots (the point midway between the 10 and 20 knot wind speed lines). Read left to obtain the headwind component and down to obtain the crosswind component.

Headwind Component ....10 knots

Crosswind Component ....12 knots

e. Takeoff Weight. The following examples illustrate the use of graphs which may restrict takeoff weight.

NOTE

Do not exceed the maximum takeoff weight limitation of 16,200 pounds.

(1) Maximum takeoff weight as limited by tire speed. Enter the graphs at 15°C, 3499 ft, 10 knots headwind component, and read:

Flaps Up ....Exceeds Structural Limit of 16,200 lbs
Flaps Approach ...Exceeds Structural Limit of 16,200 lbs

(2) Maximum takeoff weight to achieve positive one-engine-inoperative climb at lift-off. Enter the graphs at 3499 feet pressure altitude, 15°C, and read:

Flaps Up ....16,200 lbs

Flaps Approach ....16,200 lbs

(3) Maximum enroute weight for 50-ft/minute one-engine-inoperative climb. To determine the maximum takeoff weight, the weight of the fuel used to reach the MEA is added to the maximum enroute weight obtained from the SERVICE CEILING - ONE ENGINE INOPERATIVE graph. Use the TIME, FUEL, and DISTANCE to CRUISE CLIMB graph to determine the weight of the fuel used to climb. Use the CRUISE POWER tables to determine the weight of the fuel used to cruise to each MEA.

Enter the SERVICE CEILING - ONE ENGINE INOPERATIVE graph at the conditions for each enroute MEA. For example, enter the graph at the highest MEA altitude of 9000 feet, and trace right; enter again at the MEA FAT of -4°C, and trace up. Read the maximum enroute weight at the MEA at the intersection of the tracings.

Maximum enroute weight for 50-ft/min one-engine-inoperative climb:

8000 ft, 0°C....Exceeds Structural Limit of 16,200 lbs

9000 ft, -4°C...Exceeds Structural Limit of 16,200 lbs

7600 ft, 0°C..Exceeds Structural Limit of 16,200 lbs

Since these weights are all greater than the maximum takeoff weight limitation of 16,200 Ibs, there is no additional limitation to meet enroute weight requirements. Anytime the value is less than 16,200 Ibs, add the fuel required to climb, plus any fuel used in cruise before reaching each MEA, to determine the maximum allowable takeoff weight to meet the requirement for each route segment of the trp.

f. Minimum Static Takeoff Power (Ice Vanes Retracted). Enter the graph at 15°C FAT and 3499 feet pressure altitude:

Minimum Static Takeoff Power 93.7%

g. Takeoff Speeds. Tables are provided for take-off decision speed (VI), rotation speed (VR), takeoff safety speed (V2), and all-engines takeoff safety speed (V50.)

In order to determine the takeoff speeds for 15°C FAT, 3499 feet pressure altitude, and 16,000 pounds takeoff weight, enter the tables at 2000 ft and 4000 ft pressure altitude, 10°C and 20°C FAT, and 16,000 pounds takeoff weight, then interpolate to find the actual values for the specified conditions:

Flaps up ....Flaps Approach

V_1 ....116 KTS, 107 KTS
V_R ....22 KTS, 112 KTS
V_2 . ...127 KTS, 116 KTS
V_{50} ....140 KTS, 128 KTS

h. Minimum Field Length. The following example illustrates the use of graphs which may restrict takeoff weight due to field length available under existing conditions.

(1) Takeoff distance. Enter the graphs at 15°C, 3499 feet pressure altitude, 16,000 pounds, 1.9% downhill runway gradient, and 10 knots headwind component, and obtain the following results:

Takeoff Distance (FLAPS UP) ....4967 ft
Takeoff Distance (FLAPS APPROACH) ....3892 ft

(2) Accelerate-stop distance. Enter the graphs at 15°C, 3499 feet pressure altitude, 16,000 pounds, 1.9% downhill runway gradient, and 10 knots headwind component, and obtain the following results:

Accelerate-Stop Distance (FLAPS UP) ....5802 ft
Accelerate-Stop Distance (FLAPS APPROACH). 4739 ft

(3) Accelerate-go distance. Enter the graphs at 15°C, 3499 feet pressure altitude, 16,000 pounds, 1.9% downhill runway gradient, and 10 knots headwind component, and obtain the following results:

Accelerate-Go Distance (FLAPS UP) ....6583 ft
Accelerate-Go Distance (FLAPS APPROACH) .5357 ft

The minimum recommended runway length is the longest of the distances determined above for the selected flap setting. The accelerate-go distance (flaps up) would exceed the available runway length, so a flaps-approach takeoff must be calculated if it is desired to allow for the accelerate-go distance (which is not a regulatory requirement, but a recommended practice).

i. Takeoff Path One Engine Inoperative. Graphs are provided to estimate the horizontal distance required to reach a height of 1500 feet, or the minimum climb gradient required to clear an obstacle along the takeoff flight path. If clearance of obstacles beyond the runway is required, these results may restrict takeoff weight accordingly.

The takeoff distance extends from brake release to reference zero, which is the point at which the aircraft is 50 feet above the runway. The net takeoff flight path begins at liftoff and consists of the following segments:

1. The first segment climb extends from liftoff to the point where the landing gear completes the retraction cycle. The airspeed is maintained at V_2.

2. The second segment climb begins at the end of the first segment and extends to 500 feet above the runway. The airspeed during the second segment is V_2.

3. The acceleration and flap retraction segment consists of an acceleration from V_2 to V_{ENR} at a constant height of 500 feet. If a flaps-approach takeoff was made, begin flap retraction at V_{ENR}.

4. The third segment climb begins when one-engine-inoperative climb speed is reached and flaps are fully retracted at 500 feet, and

extends to 1500 feet above the runway. Airspeed is maintained at V_{ENR} during this segment.

j. Takeoff Path Profile (Flaps Approach). The following examples illustrate the use of the flaps-approach takeoff path graphs. Enter the graphs at 15°C FAT, 3499 feet pressure altitude, 16,000 pounds takeoff weight, 1.9% downhill runway gradient, and a 10-knot headwind component.

(1) Example 1 - close-in obstacle clearance: given:

Obstacle height Above Aircraft at Brake Release...88 feet

Obstacle Distance from Brake Release...16,294 feet

1. The obstacle horizontal distance from reference zero equals the obstacle distance from brake release less the accelerate-go distance to 50 feet AGL (16,294 ft - 5357 ft) = 10,937 feet = 1.8 nautical miles.
2. Determine the total height required to clear the obstacle by adding to the obstacle height the decrease in aircraft altitude during the takeoff procedure due to a downhill runway gradient.

1.9% gradient 5357 ft = 101.8 feet = 102 feet

The total height required to clear the obstacle is: 88 ft + 102 = 109 feet.

3. Obtain the required gradient to clear the obstacle from the Distant Takeoff flight Path Graph using the obstacle distance from reference zero found in step 1, and the total height determined in step 2: 1.28%.
4. Read the scheduled net gradient of climb from the NET TAKEOFF FLIGHT PATH - SECOND SEGMENT - FLAPS APPROACH graph: 1.94%.

Thus, the calculations indicate that a takeoff weight of 16,000 pounds will result in a net climb gradient greater than that required to clear the obstacle, even if an engine should fail at the most critical takeoff point.

(2) Example 2 - Obstacle clearance above 500 feet: given:

Obstacle Height Above Aircraft at Brake Release .600 feet.

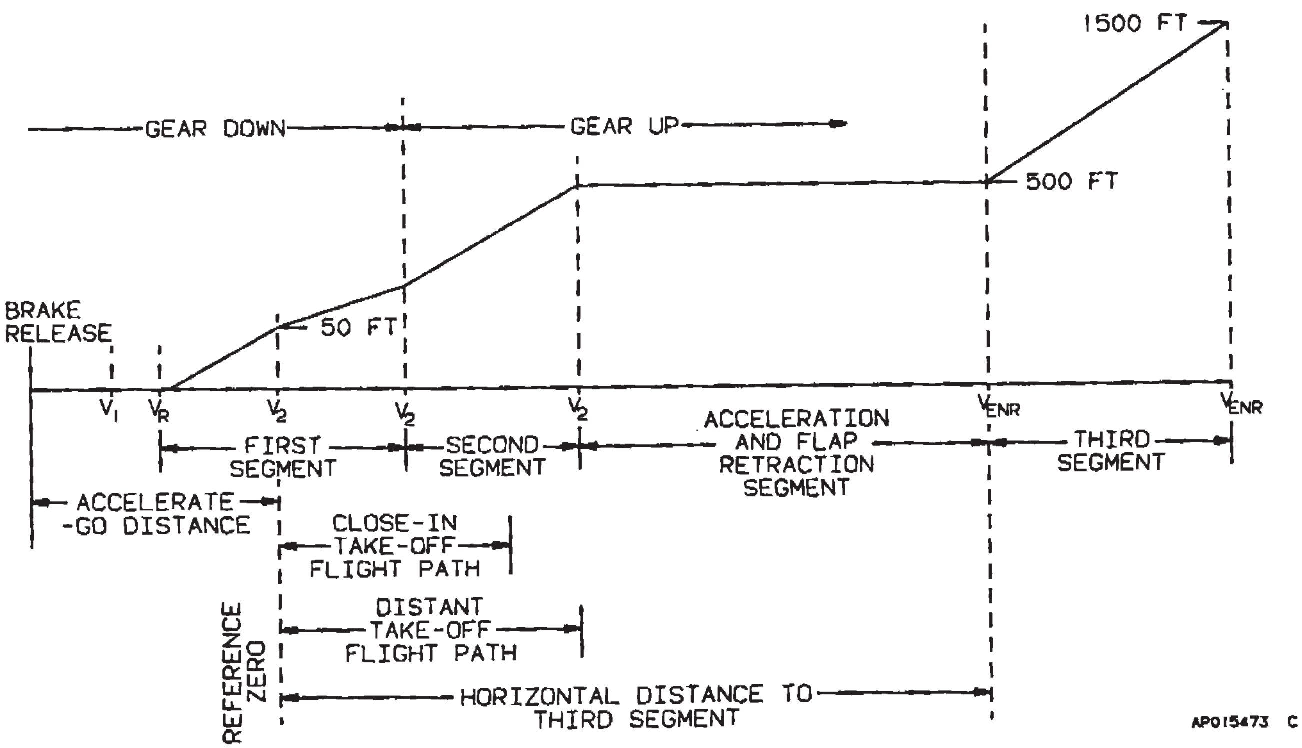

Figure 7-1. Takeoff Path Profile One Engine Inoperative

Obstacle Distance from Brake Release...10.71 nm

1. Obtain the accelerate-go distance to 50 feet AGL........5357 feet (0.88 nm).
2. Read the scheduled distance from the HORIZONTAL DISTANCE FROM REFERENCE ZERO TO THIRD SEGMENT CLIMB graph (FLAPS APPROACH)..................6.97 nm.
3. Add the results of steps 1 and 2 to obtain total distance to start of third segment climb, (0.88 nm + 6.97 nm) = 7.85 nm.
4. Distance to obstacle from start of third segment climb is obtained by subtracting results of step 3 from 10.71 nm. (10.71 - 7.85) = 2.86 nm.
5. Add to the obstacle height above the aircraft at brake release any decrease in aircraft altitude during the takeoff resulting from a downhill runway gradient.

The sum is the total height required to clear the obstacle.

(1.9% gradient / 100) x 5357 ft = 101.8 feet = 102 feet

The total height required to clear the obstacle is: 600 ft + 102 ft = 702 feet.

6. Required climb gradient to clear obstacle is obtained using the following formula:

% Gradient = (RH) x (F) / (D)

Where**:**

RH = Required Height (in feet) above 500 feet

F = A units conversion factor of 0.0165

D = Distance (in nautical miles) to obstacle from start of third segment

Therefore:

% Gradient = (702 - 500) (0.0165) / 2.86 = 1.1654% = 1.17%

7. Obtain (from the NET TAKE-OFF FLIGHT PATH - THIRD SEGMENT ONE-ENGINE INOPERATIVE graph) the scheduled third segment net gradient of climb of 1.47%. Since this gradient exceeds the required gradient of 1.17%, the calculations indicate that the obstacle will be cleared at a takeoff weight of 16,000 pounds even if an engine should fail at the most critical takeoff point.

k. Climb - Two Engines. Enter the graphs at -4˚C, 9000 feet pressure altitude, 15,500 pounds, and obtain the following results:

Climb - Two Engines (FLAPS UP)......2119 ft/min

Climb Gradient...5%

Climb - Two Engines (FLAPS APPROACH)..2031 ft/min

Climb Gradient...11.4%

l. Climb - One Engine Inoperative. Enter the graph at -4˚C, 9000 feet pressure altitude, 15,500 pounds, and obtain the following results.

Climb - One Engine Inoperative............264 ft/min

Climb Gradient..1.4%

m. Flight Planning Example. The following calculations provide information for flight planning. Calculations for flight time, block speed, and fuel requirements for the proposed flight are detailed below.

NOTE

For example purposes, the differences between MSL altitudes and pressure altitudes have been ignored in MEA calculations.

(1) ISA conversion. Enter the graph at the conditions indicated:

BIL

Pressure Altitude...................................3499 feet

FAT...15˚C

ISA Condition..ISA +7˚C

BIL-CZI

Pressure Altitude................................25,000 feet

FAT..-40˚C

ISA Condition...ISA -6˚C

CZI-CPR

Pressure Altitude................................25,000 feet

FAT..-30˚C

ISA Condition..ISA +5˚C

CPR

Pressure Altitude ....5998 feet
FAT...20°C
ISA Condition ....ISA +17°C

(2) Time, fuel, and distance to cruise climb. Enter the graph at 15°C, to 3499 feet pressure altitude, and to 16,000 pounds. Enter again at -40°C to 25,000 feet pressure altitude, and to 16,000 pounds. The following results are obtained:

Time to Climb ....24 - 2 = 22 min
Fuel to Climb ....389 - 48 = 341 lbs
Distance Traveled ....63 - 6 = 57 nm

(3) Time fuel, and distance to descend. Enter the graph at 25,000 feet, and enter again at 5998 feet, and find:

Time to Descend 17 - 4 = 13 min
Fuel Used to Descend 234 - 63 = 171 lbs
Distance to Descend 74 - 15 = 59 nm

(4) Cruise weight (estimated). For the following cruise segment examples, the estimated average cruise weight used was 15,600 pounds.

(5) Cruise tables. Enter the tables for NORMAL CRUISE POWER AT 1500 RPM for ISA -10°C, ISA, and ISA +10°C, and read the cruise speeds for 24,000 feet and 26,000 feet at 16,000 pounds and 14,000 pounds. Interpolate between these speeds for 25,000-foot values. Refer to table 7-2 (EXAMPLE CRUISE TRUE AIRSPEEDS) for the results.

Interpolate between the 25,000-foot speeds for ISA -6°C and ISA +50C at 15,600 pounds.

Cruise True Airspeed (ISA -6°C) ....233 knots
Cruise True Airspeed (ISA +5°C) ....223 knots

Similar computations can be made to interpolate for cruise torque setting and fuel flow.

Cruise Torque (ISA -6°C) 68.9%
Cruise Total Fuel Flow (ISA -6°C) ....780 lbs/hr
Cruise Fuel Flow/Eng (ISA -6°C) ....390 lbs/hr
Cruise Torque (ISA +5°C) 61%
Cruise Total Fuel Flow (ISA +5°C) ....718 lbs/hr
Cruise Fuel Flow/Eng (ISA +5°C) ....359 lbs/hr

(6) Cruise graphs. In addition to the cruise performance presented in tabular form, data representing a cruise weight of 14,000 pounds is presented in graphical form for quick reference.

NOTE

Use of these graphs for flight conditions other than 14,000 pounds gross weight may introduce errors.

(a) Cruise speeds. Enter the NORMAL CRUISE SPEEDS AT 1500 RPM graph at 25,000 feet, and read the true airspeeds for ISA -6°C and ISA +5°C:

Cruise True Air Speed (ISA -6°C) ....239 KTAS

Cruise True Air Speed (ISA +5°C) ....231 KTAS

(b) Cruise power setting. Enter the NORMAL CRUISE POWER AT 1500 RPM Graph at 25,000 feet, and read the recommended torque settings for ISA -6°C (-34°C IFAT) and ISA +5°C (-25°C IFAT):

ISA -60C (-35°C IFAT) 69%torque per engine

ISA +5°C (-25°C IFAT) 62%torque per engine

NOTE

For flight planning, enter the CRUISE POWER graphs at the forecast ISA condition; for enroute power settings, enter the graphs at the actual IFAT.

(c) Cruise fuel flow. Enter the FUEL FLOW AT NORMAL CRUISE POWER AT 1500 RPM graph at 25,000 feet, and read the fuel flow for ISA -6°C IFAT) and ISA +5°C (-24°C IFAT):

Table 7-2. Example Cruise True Airspeeds

ALT FEET	16,000 POUNDS			14,000 POUNDS		
	ISA - 10°C	ISA	ISA + 10°C	ISA - 10°C	ISA	ISA + 10°C
24,000	238	230	219	243	237	228
25,000	235.5	227	215.5	241.5	235	226
26,000	233	224	212	240	233	224

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ISA -6°C (-35°C IFAT)
Fuel Flow Per Engine ....362 lbs/hr
Total Fuel Flow ....724 lbs/hr

Time and fuel used were calculated at normal cruise power at 1500 RPM as follows:

Time = distance/ground speed
Fuel used = (time)(total fuel flow)

(7) Flight planning results. Refer to table 7-3 (EXAMPLE CRUISE RESULTS) for an illustration of the flight planning procedure.

NOTE

For flight planning, enter the Fuel Flow Graphs at the forecast ISA condition; for enroute fuel flow, enter the graphs at the actual IFAT.

Refer to table 7-4 (EXAMPLE TIME, FUEL, AND DISTANCE) for an illustration of the total flight planning results.

(a) Reserve fuel. Reserve Fuel is the amount of fuel required to fly at cruise altitude for 45 minutes at maximum range power. This example assumes the average cruise weight while using reserve fuel to be 15,000 pounds.

Enter the MAXIMUM RANGE POWER AT 1500 RPM tables for ISA and for ISA +10°C and interpolate to find the total fuel flow for 25,000 feet at 16,000 pounds and 14,000 pounds. Interpolate between these values for 15,000 pounds. In this example it is found that data is presented for MAXIMUM RANGE POWER AT 1500 RPM for ISA and ISA +100C at 24,000 feet and at 26,000 feet for 14,000 pounds, but not for 16,000 pounds. Consequently, it is not possible to determine a maximum range power torque, airspeed, or fuel flow for 15,000 pounds at 25,000 feet, since chart values may not be extrapolated. This means that either a lower altitude must be selected for the leg of the mission that would be using reserve fuel, or that the NORMAL CRUISE POWER AT 1500 RPM values must be used to determine power setting and the reserve fuel requirement. If no values are presented for the given conditions in the NORMAL CRUISE POWER AT 1500 RPM tables either select a lower altitude, or use the maximum cruise power at 1700 RPM table values to determine power setting and the reserve fuel requirement. In this example it is found that data is presented for the mission conditions in the NORMAL CRUISE POWER AT 1500 RPM tables, so that data can be used. Refer to table 7-5 (EXAMPLE FUEL FLOW) for an illustration of the reserve fuel determination procedure.

(8) Total fuel requirement. Expected fuel usage + reserve fuel = total fuel requirement. (916 lbs) + (539 lbs) = 1455 lbs.

(9) Zero-fuel weight limitation. For this example, the following conditions were assumed:

Ramp Weight ....16,120 lbs
Weight of Usable Fuel on Board ....3631 lbs
Zero Fuel Weight = (16,120 - 3631) ....12,489 lbs
Maximum Zero Fuel Weight (from Chapter 5 - LIMITATIONS) ....13,100 lbs

Table 7-3. Example Cruise Results

ROUTE SEGMENT	[1]DISTANCE	ESTIMATED GROUND SPEED	[2]TIME AT CRUISE ALTITUDE	[3]FUEL USED FOR CRUISE
	NM	KNOTS	MIN	LBS
BIL-SHR	34	254	8.0	104.41
SHR-CZI	57	294	11.6	151.22
CZI-CPR	10	256	2.3	28.05
TOTAL	101	---	21.9	283.68

[1] Time Distance required to climb or descend has been subtracted from segment distance.
[2] Time =Distance divided by Ground Speed.
[3] Fuel Used =Distance divided by Ground Speed, multiplied by total Fuel Flow.

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Table 7-4. Example Time, Fuel, and Distance

ITEM	TIME MIN	FUEL POUNDS	DISTANCE NM
Start, Runup, Taxi, and Takeoff Acceleration	0.0	120	0
Climb	22.0	341	57
Cruise	21.9	284	101
Descent	130	171	59
TOTAL	56 9	916	217
Block Speed: 217 NM Divided by 56 9 Minutes = 229 Knots.			

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Maximum zero fuel weight limitation will not be exceeded

Anytime the zero fuel weight exceeds the maximum zero fuel weight limit, the excess weight must be offloaded from payload only (i e., not from fuel). If desired, additional fuel may then be added. However, the foregoing calculations will remain unchanged only if the fuel added is equal in weight to the payload off-loaded, since only then will the ramp weight and takeoff weight remain the same as before.

n. Range and Endurance. Estimates of the effect of fuel load and power setting on aircraft range and endurance can be determined from the Range and Endurance Profile graphs. The range of a mission at normal cruise power can be determined by entering the RANGE PROFILE NORMAL CRUISE POWER graph at 25,000 feet, reading right to the anticipated fuel load and down to the resulting range. This chart indicates that a fuel load as low as 1500 pounds would be sufficient for the planned 217 nautical mile mission from Billings to Casper. The available range with full main and auxiliary tanks (3631 pounds) for a flight at 25,000 feet can be determined to be 910 nautical miles. If additional range is required, either a higher altitude or a lower power setting could be selected. To determine the range with a maximum fuel load, enter the RANGE PROFILE FULL MAIN AND AUX TANKS graph at 25,000 feet, read right to the desired power setting and down to the resulting range. This chart shows that for a full-fuel mission, range can be increased from 910 to 973 nautical miles by reducing power to maximum range power.

The aircraft endurance can be determined from the various endurance profile graphs in a similar manner.

It should be noted that these graphs are all based on standard day temperatures, and the range graphs are also based on zero wind If forecast temperatures differ from standard values or if headwinds are expected, a more rigorous mission analysis should be accomplished.

o. Landing Example.

(1) Weight. The estimated landing weight is determined by subtracting the fuel usage expected for the trip from the ramp weight:

Ramp Weight 16,120
Fuel Usage Expected for Total Trip ....(-)916 lbs
Landing Weight . ... 15,204 lbs
Maximum Landing Weight (Chapter 5 - LIMITATIONS) .... 15,400 lbs

Anytime the maximum landing weight limitation would be exceeded, off-load the excess from useful load prior to takeoff, or burn off the excess from excess fuel (i e., not from reserve fuel) before landing.

(2) Normal landing distance flaps down. Enter the graph at 20° C, 5998 feet, 15,204 pounds, 0.3% uphill runway gradient, 10 knots headwind component, and read the following:

Landing Distance Over 50-Foot Obstacle ……3437 ft

Table 7-5. Example Fuel Flow (lbs/hr)

WEIGHT POUNDS	ISA	ISA +5°C	ISA 10°C
16,000	747.0	---	688.0
15,000	748.0	718.75	689.5
14,000	749.0	---	691.0
Total Fuel Flow = 718.75 lbs/hr Reserve Fuel = 45 minutes x 718.75 lbs/hr =539 lbs			

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(3) Abnormal landing distances. The landing distances for one engine inoperative or flaps retracted can be determined as shown below.

Landing Distance - One Engine Inoperative - Flaps Down:

Enter the graph with the normal landing distance determined in paragraph (2) above and read the following:

Landing Distance - One Engine Inoperative - Over 50-Foot Obstacle - Flaps Down ....4152 feet

Landing Distance - Flaps Up:

Enter the graph with the normal landing distance of 3437 feet as determined in paragraph (2) above, a landing weight of 15,204 lbs, and read the following:

Flaps-Up Landing Distance Over 50-Foot Obstacle..5196 feet

Approach Speed .... 133 knots

(4) Climb - balked landing. Enter the graph at 20°C, 6400 feet (see note 2 on graph), 15,204 pounds, and read the following results:

Rate of climb .... 1422 ft/min

Climb Gradient 10.0%

p. Enroute Instrument Corrections. Errors are introduced to measured airspeed and temperature readings as a result of the aircraft speed. For this example, it has been assumed that the aircraft is established in level cruise flight between CZI and CPR.

Pilot's Indicated Airspeed ....158 KIAS
Indicated Pressure Altitude ....25,000 feet
Indicated Free Air Temperature ....-350C

(1) Airspeed calibration normal system Graph. Enter the flaps-up graph at the indicated airspeed value of 158 knots, read up reference line and trace left to obtain the following results:

Calibrated Airspeed .... 161 knots

(2) Altimeter correction normal system Graph. Enter the flaps-up graph at the indicated airspeed value of 158 knots, read up to the 25,000-foot reference line and trace left to obtain the following results:

Altimeter Correction . ...+51 feet

Add this result to the indicated pressure altitude value of 25,000 feet to obtain the corrected altitude.

Actual Pressure Altitude ....25,051 feet

(3) Indicated outside air temperature correction Graph. Enter the graph at the calibrated airspeed value of 158 knots, read right to the actual pressure altitude of 25,051 feet and down to obtain the following result:

Temperature Correction ....5.1°C

Compute the free air temperature by subtracting the temperature correction of 5.1°C from the indicated temperature of -35°C to obtain:

Free Air Temperature ....-40.1°C.

AIRSPEED CALIBRATION - NORMAL SYSTEM
TAKE-OFF GROUND ROLL

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.

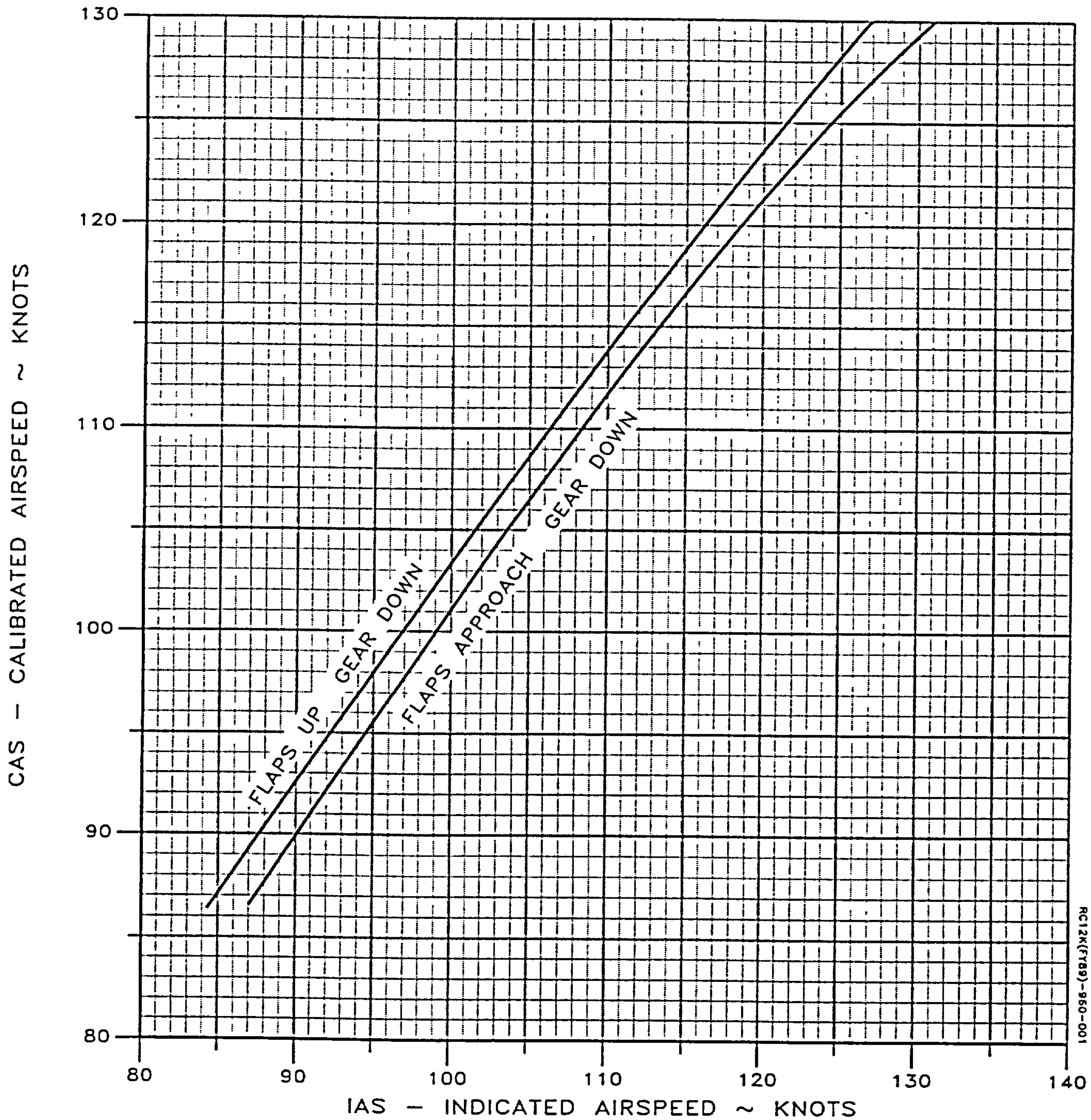


Figure 7-2. Airspeed Calibration - Normal System., Takeoff Ground Roll

AIRSPEED CALIBRATION - NORMAL SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.

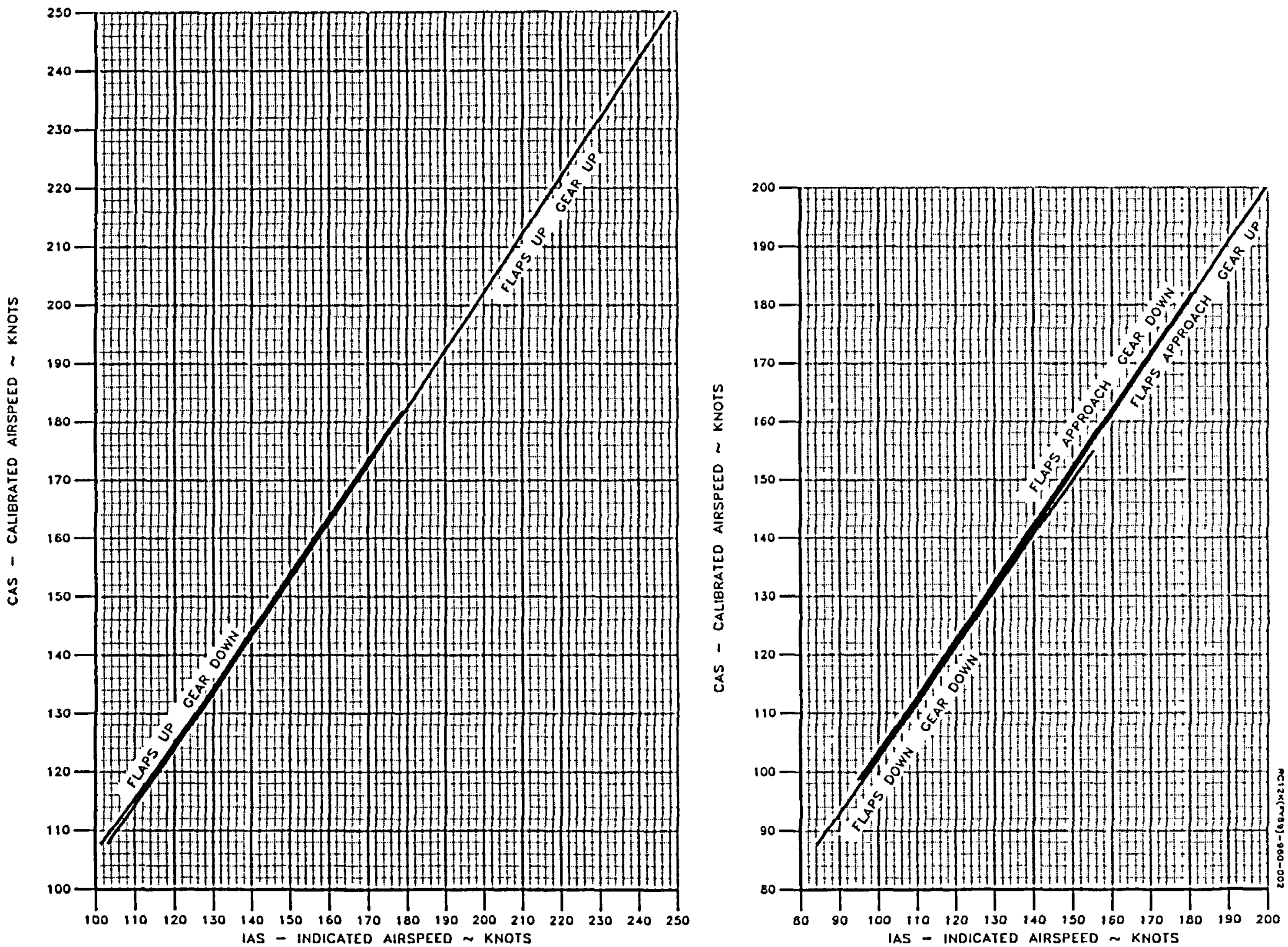


Figure 7-3. Airspeed Calibration - Normal System

ALTIMETER CORRECTION - NORMAL SYSTEM

NOTE: INDICATED AIRSPEED ASSUMES ZERO INSTRUMENT ERROR.

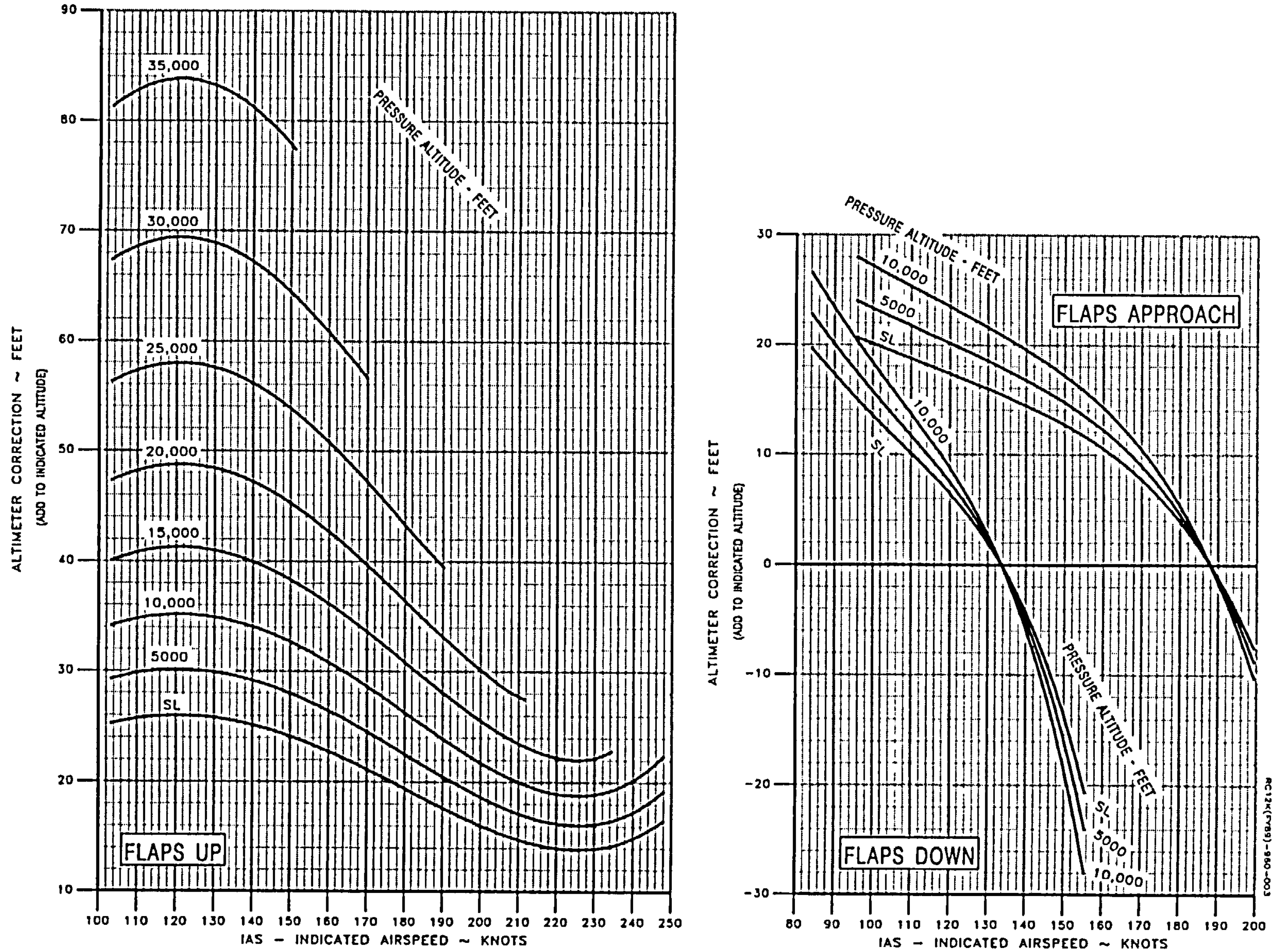


Figure 7-4. Altimeter Correction - Normal System

AIRSPEED CALIBRATION - ALTERNATE SYSTEM
APPLICABLE FOR ALL FLAP POSITIONS

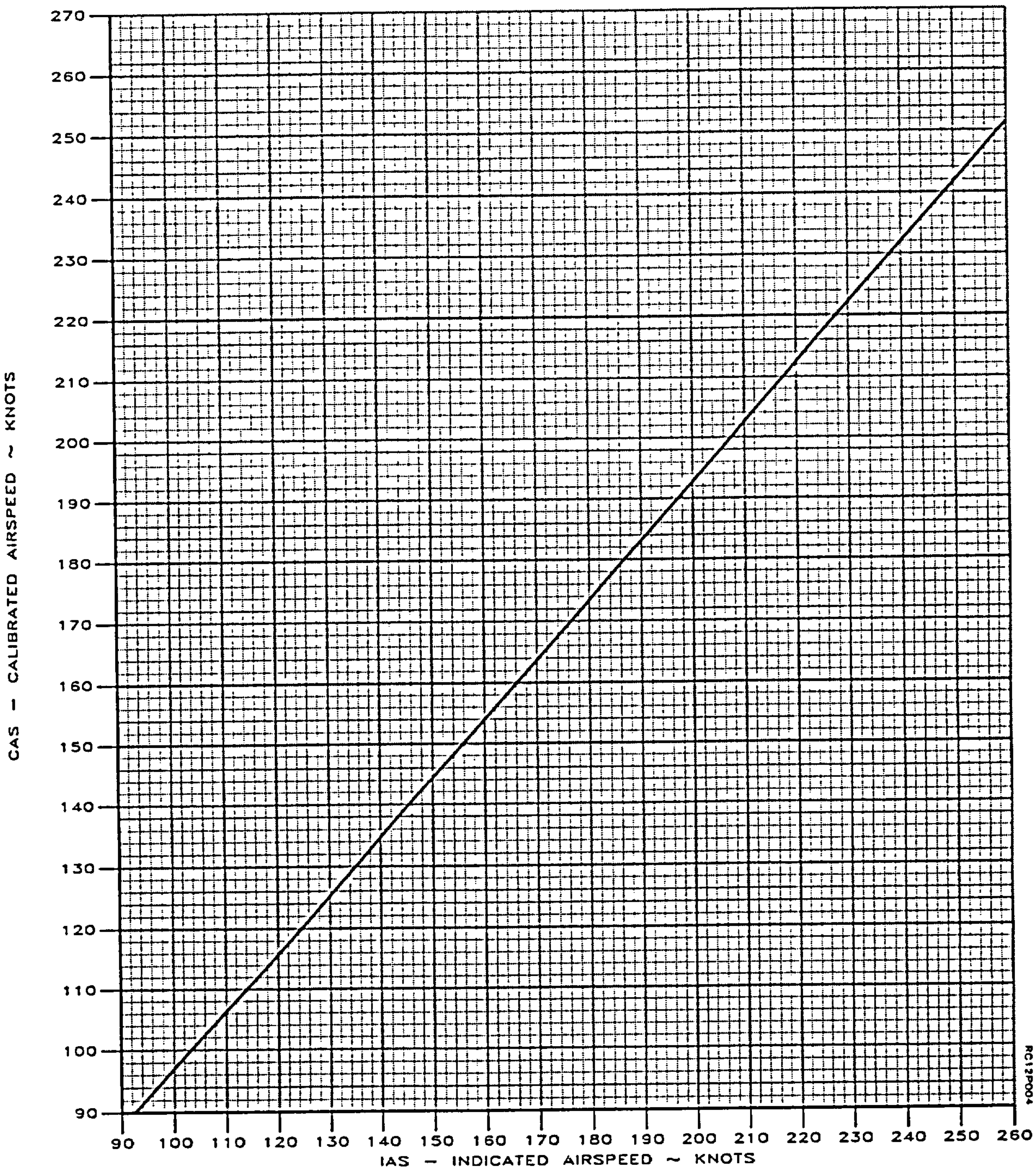


Figure 7-5. Airspeed Calibration - Alternate System

ALTIMETER CORRECTION - ALTERNATE SYSTEM

APPLICABLE FOR ALL FLAP POSITIONS

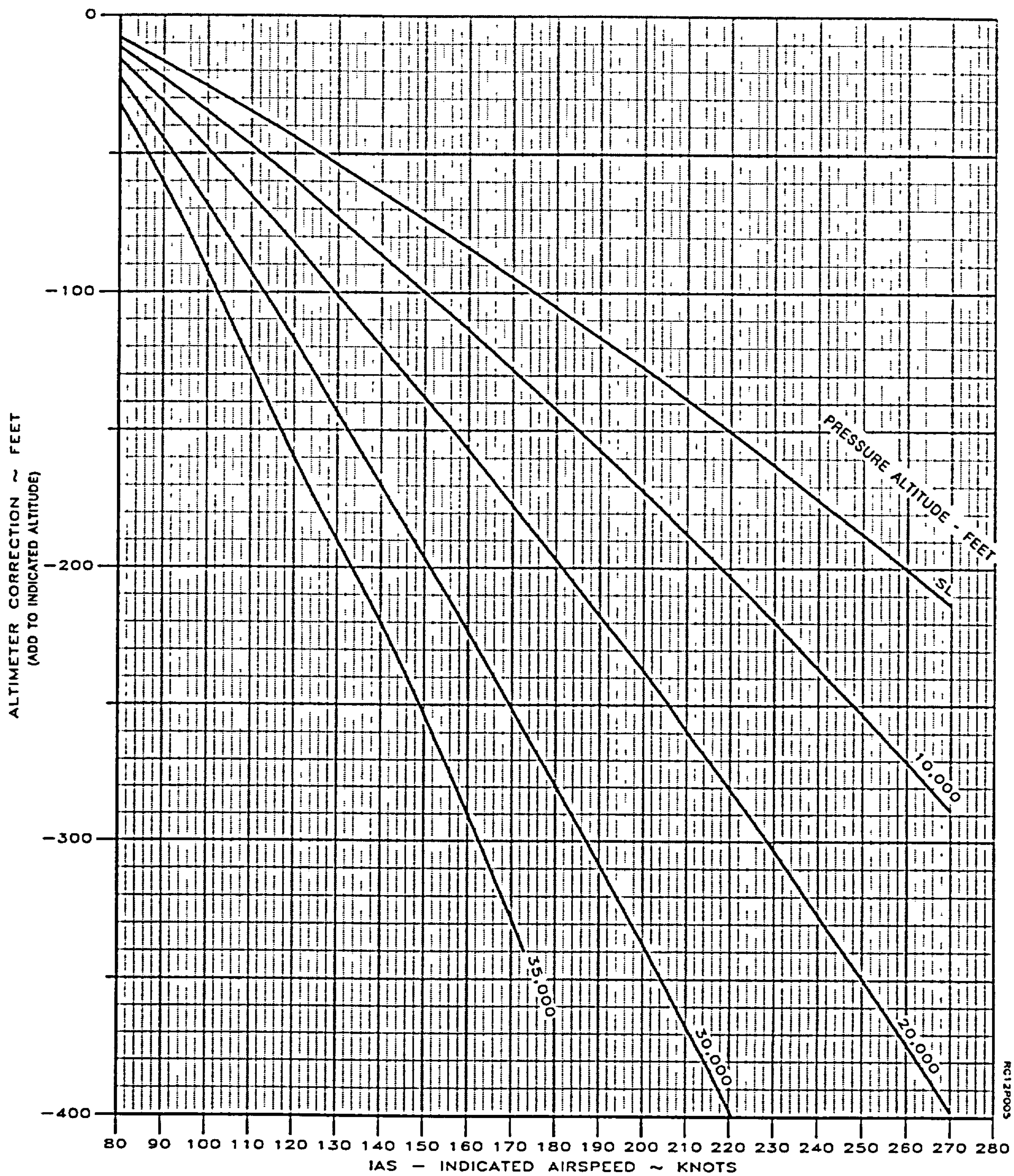


Figure 7-6. Altimeter Correction - Alternate System

INDICATED OUTSIDE AIR TEMPERATURE CORRECTION
STANDARD DAY (ISA)

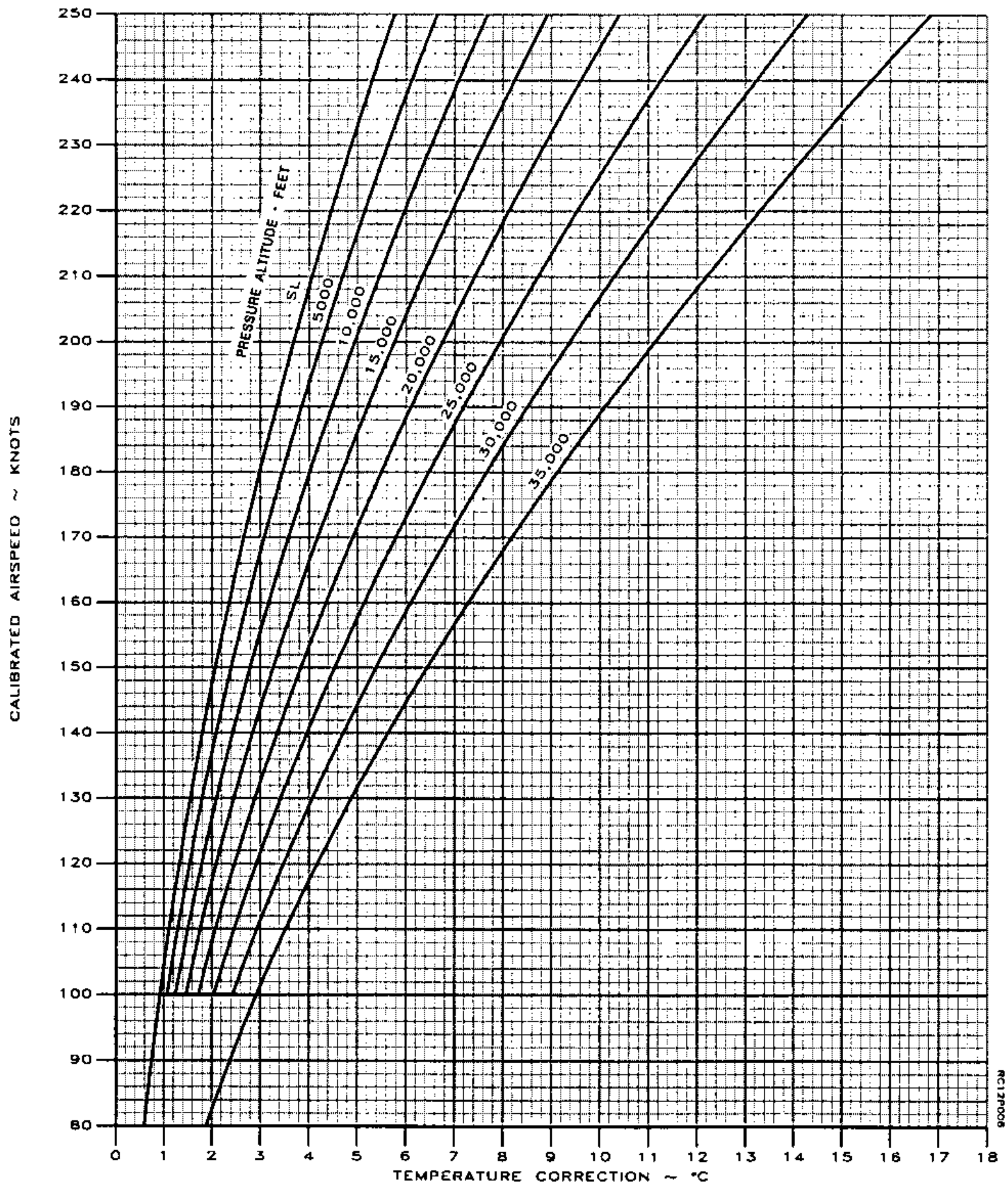


Figure 7-7. Indicated Outside Air Temperature Correction

ISA CONVERSION

PRESSURE ALTITUDE VERSUS FREE AIR TEMPERATURE

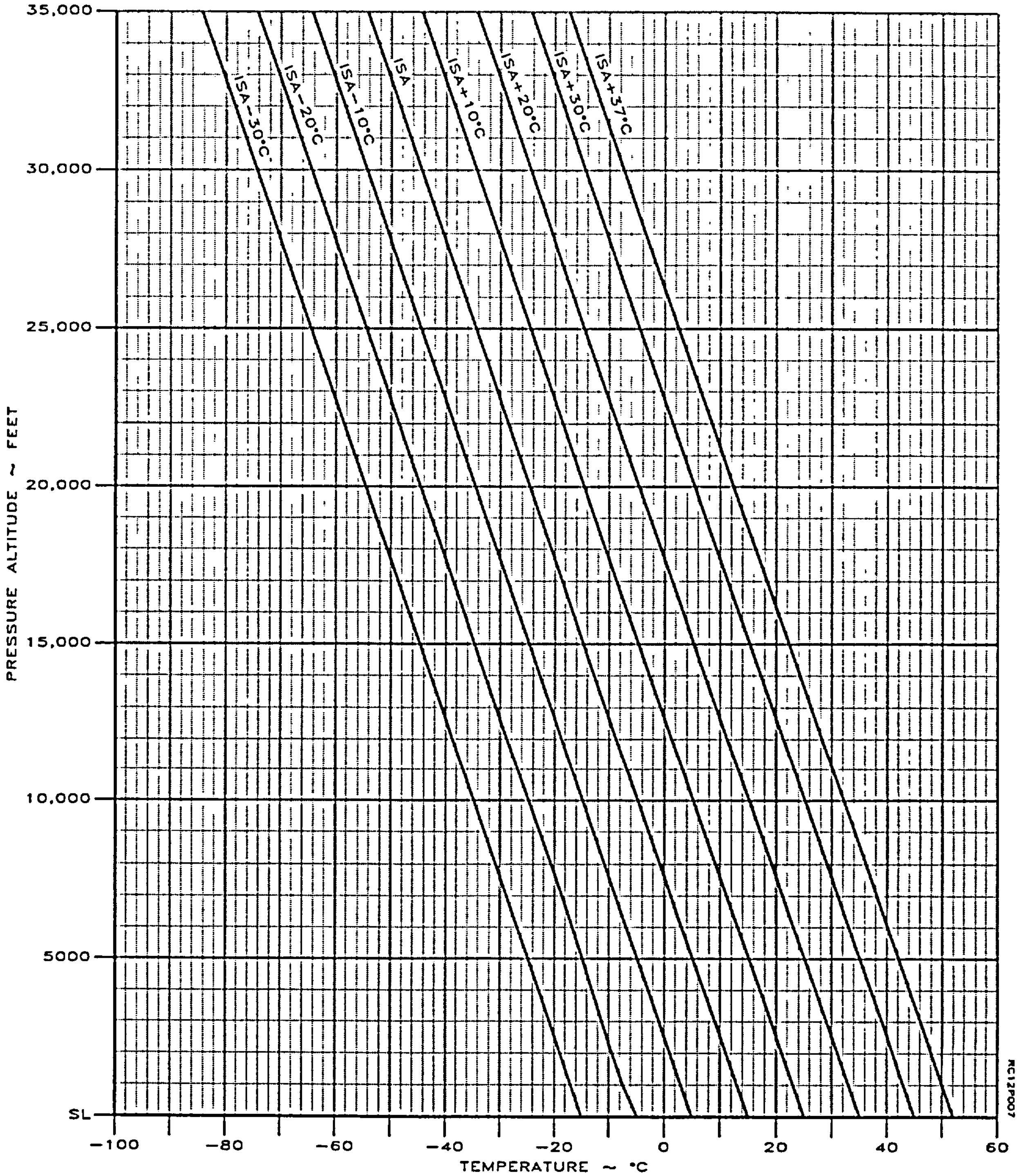


Figure 7-8. ISA Conversion

FAHRENHEIT TO CELSIUS TEMPERATURE CONVERSION

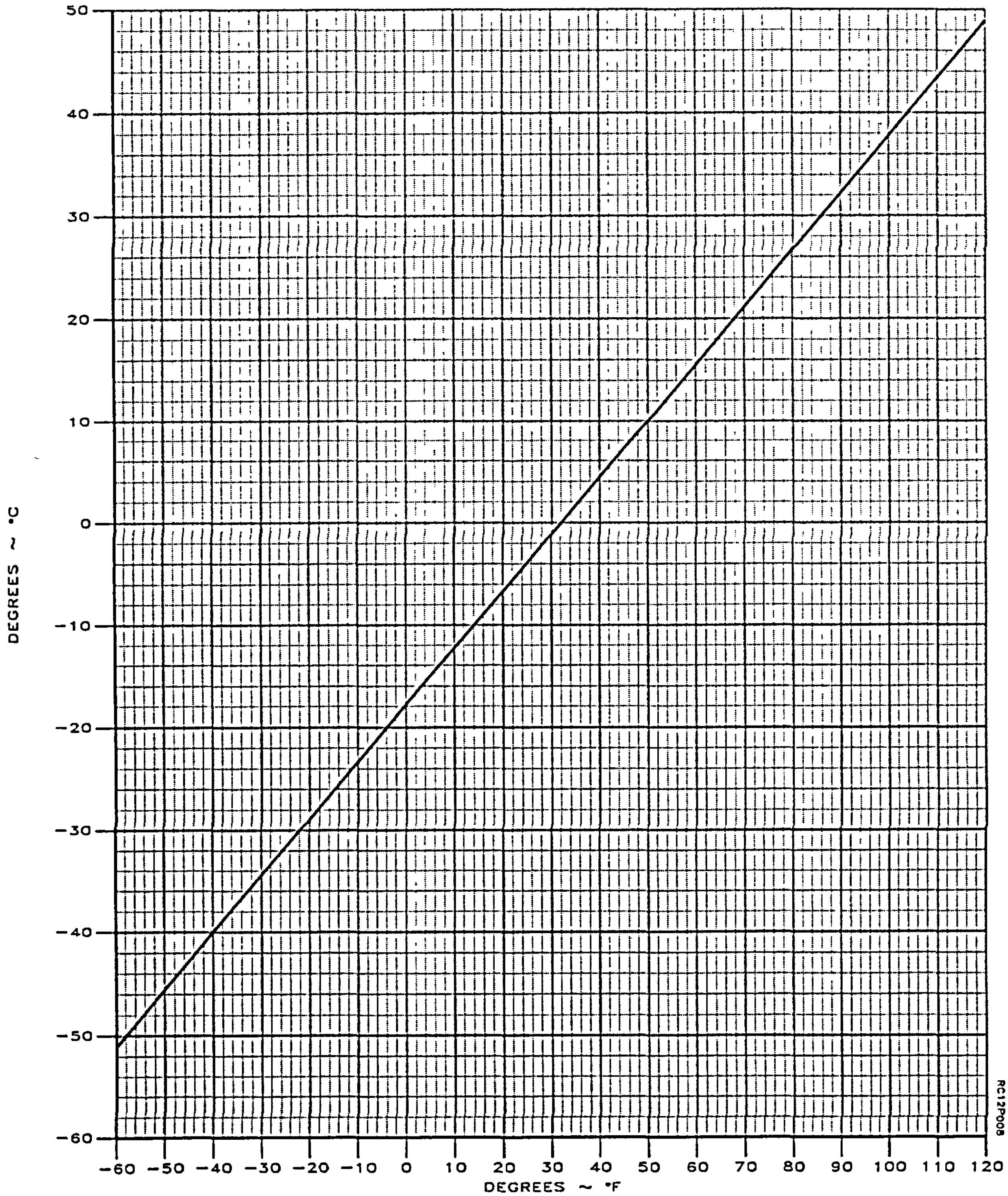


Figure 7-9. Fahrenheit to Celsius Temperature Conversion

STATIC TAKE-OFF POWER AT 1700 RPM
WITH ICE VANES RETRACTED

EXAMPLE:

FAT..15°C

FIELD PRESSURE ALTITUDE ....3499 FT

TAKE-OFF POWER ....93.7 %

NOTE: TORQUE WILL INCREASE WITH INCREASING AIRSPEED.

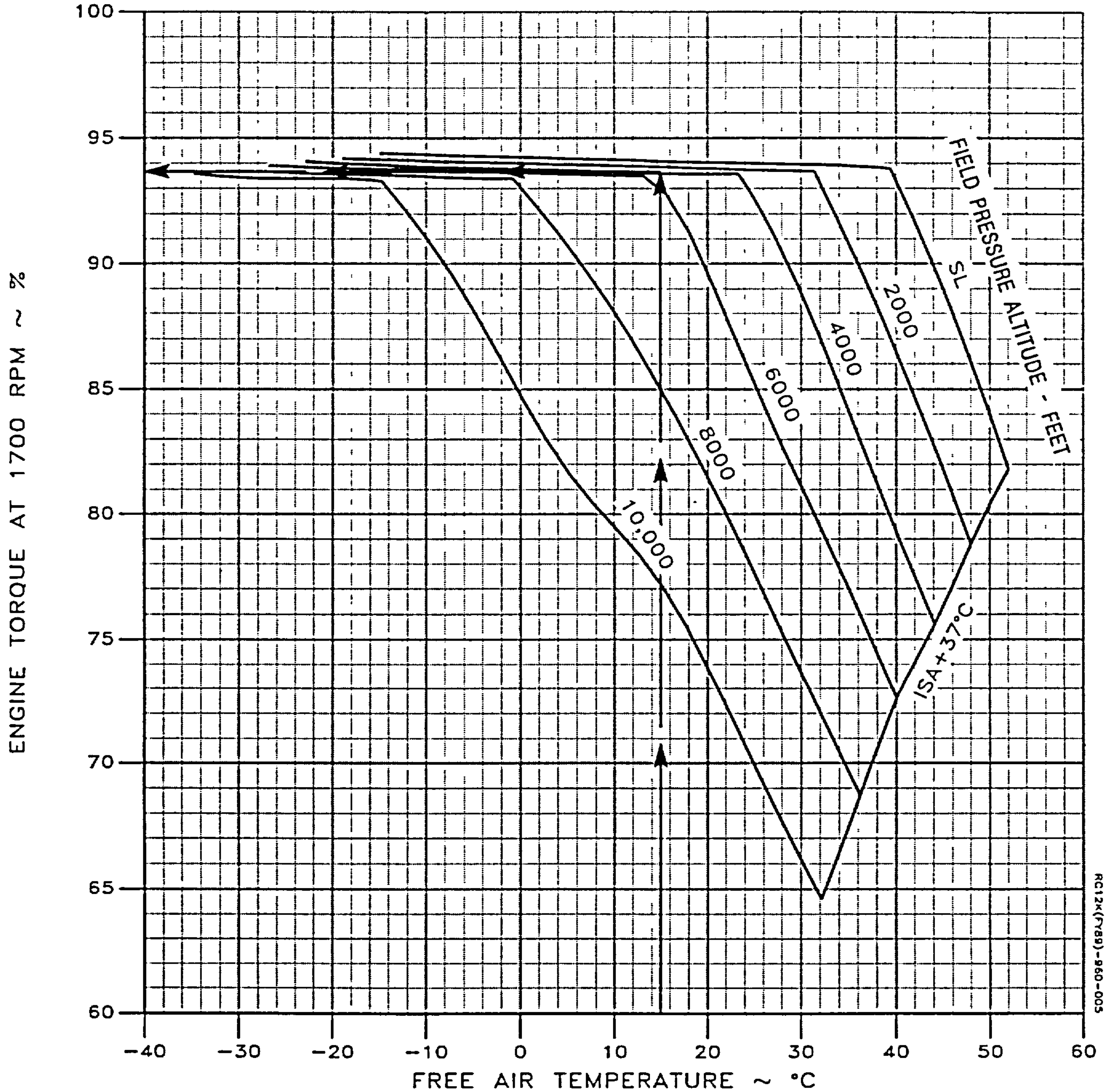


Figure 7-10. Static Take-off Power at 1700 RPM, Ice Vanes Retracted to IR

STATIC TAKE-OFF POWER AT 1700 RPM
WITH ICE VANES RETRACTED

NOTE: TORQUE WILL INCREASE WITH INCREASING AIRSPEED

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE .3499 FT
TAKE-OFF POWER 93.5%

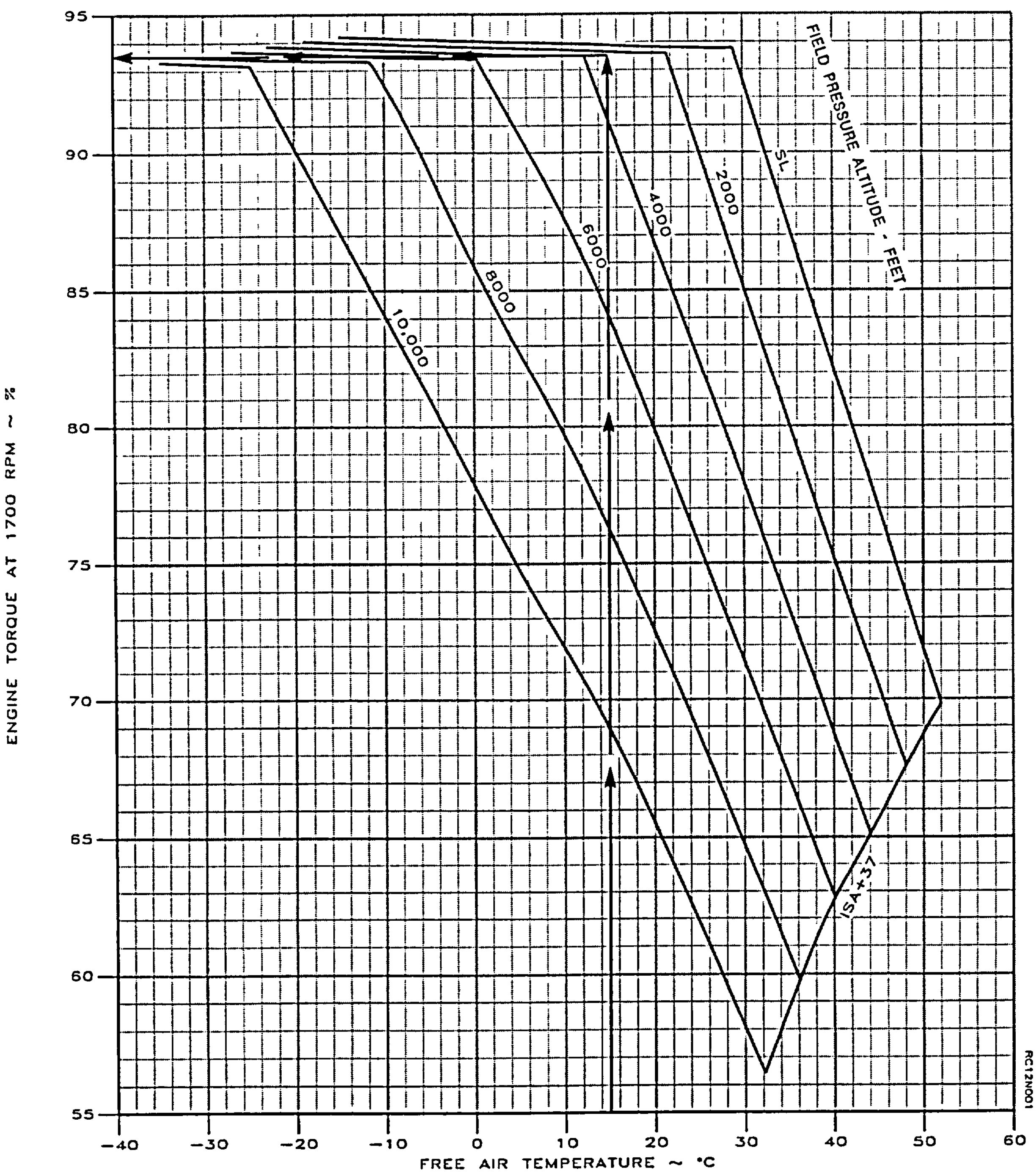


Figure 7-11. Static Take-off Power at 1700 RPM, Ice Vanes Retracted CA

STATIC TAKE-OFF POWER AT 1700 RPM WITH ICE VANES EXTENDED

NOTE: TORQUE WILL INCREASE WITH INCREASING AIRSPEED.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
TAKE-OFF POWER ....93.7 %

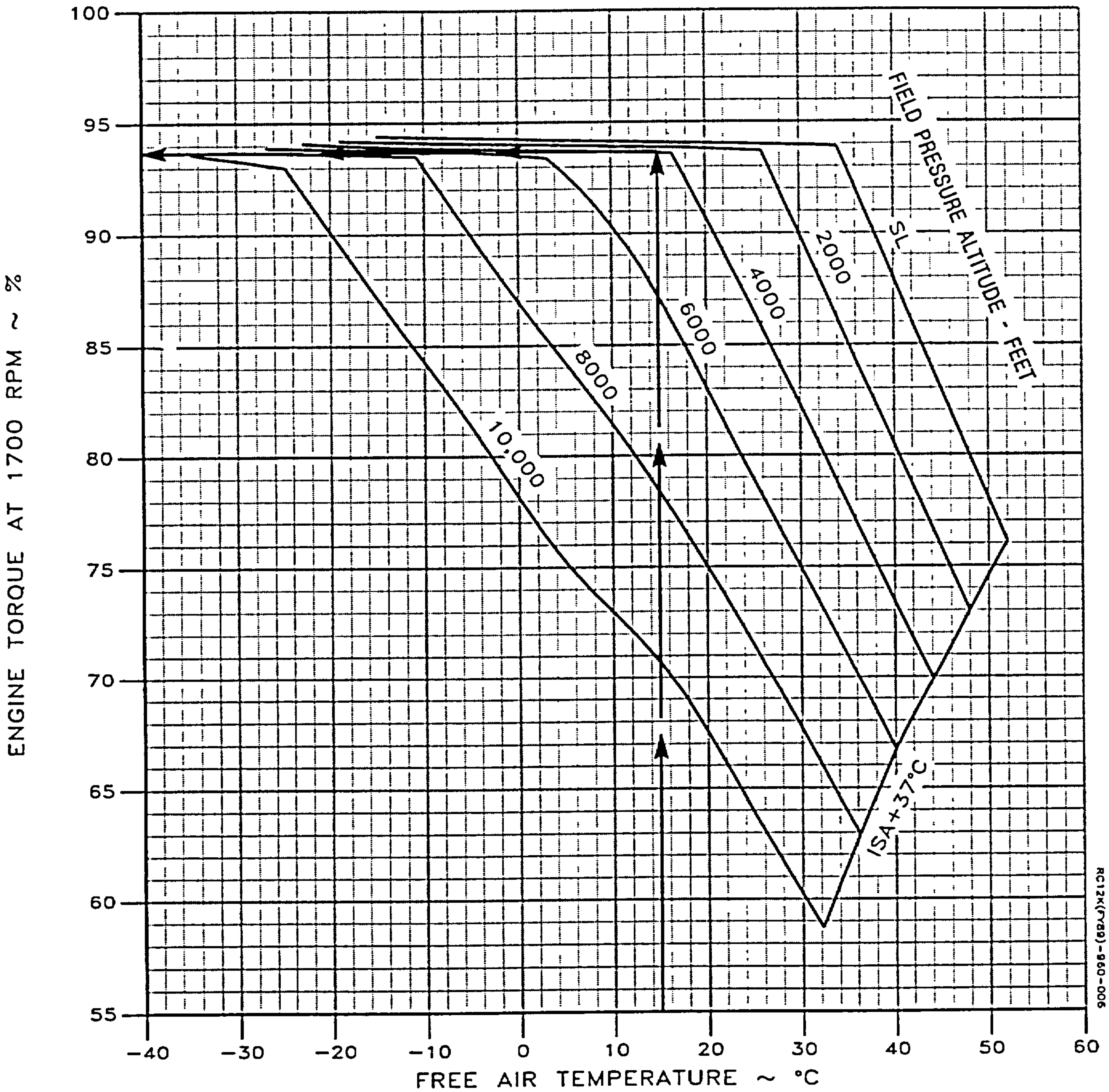


Figure 7-12. Static Take-off Power at 1700 RPM, Ice Vanes Extended IR

STATIC TAKE-OFF POWER AT 1700 RPM WITH ICE VANES EXTENDED

NOTE: TORQUE WILL INCREASE WITH INCREASING AIRSPEED

EXAMPLE:

FAT .... 15°C

FIELD PRESSURE ALTITUDE .... 3499 FT

TAKE-OFF POWER 86.0%

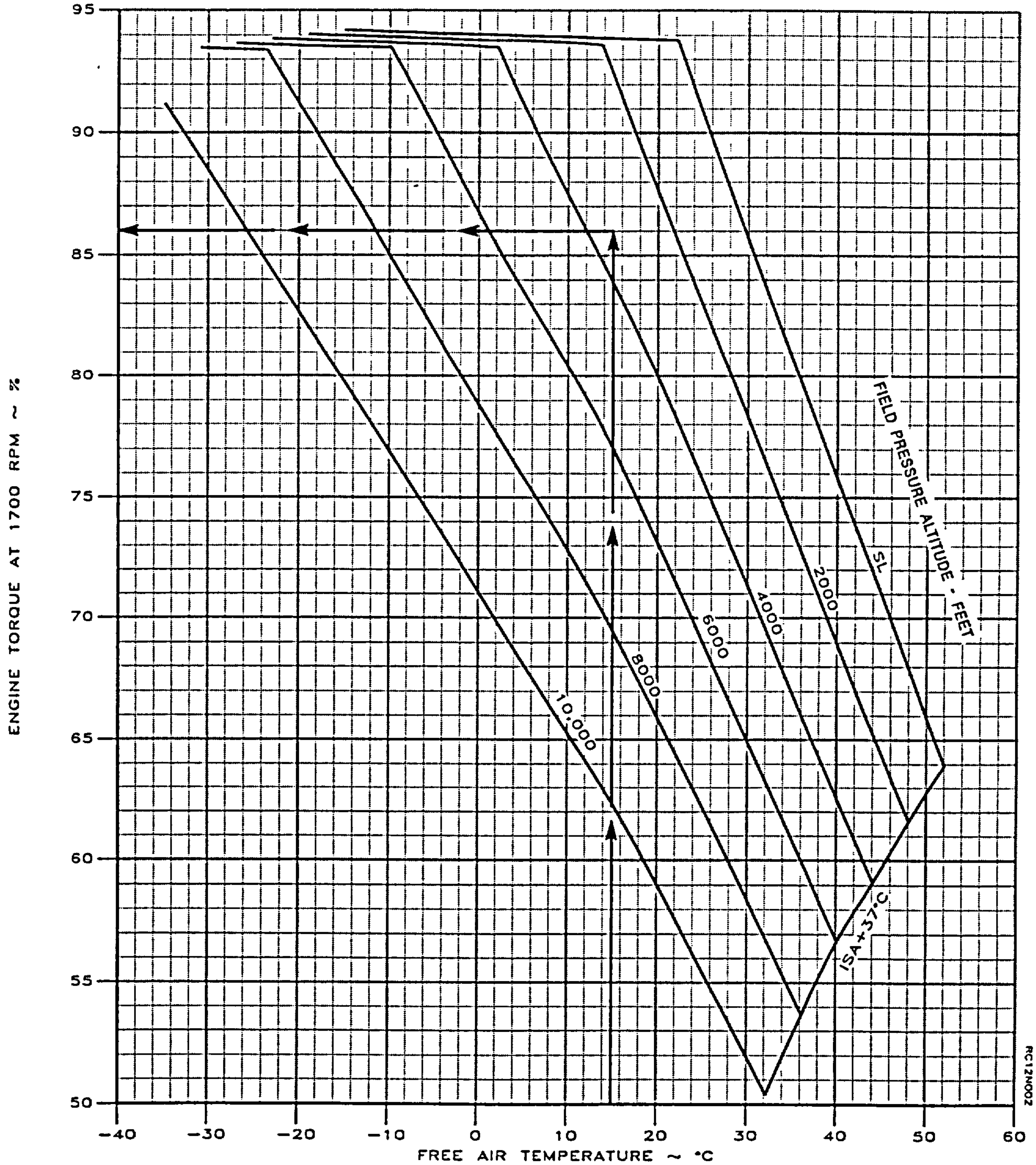


Figure 7-13. Static Take-off Power at 1700 RPM, Ice Vanes Extended CA

WIND COMPONENTS

EXAMPLE:	
WIND SPEED	15 KNOTS
ANGLE BETWEEN WIND DIRECTION AND FLIGHT PATH	50°
HEADWIND COMPONENT	9.6 KNOT
CROSSWIND COMPONENT	11.5 KNO

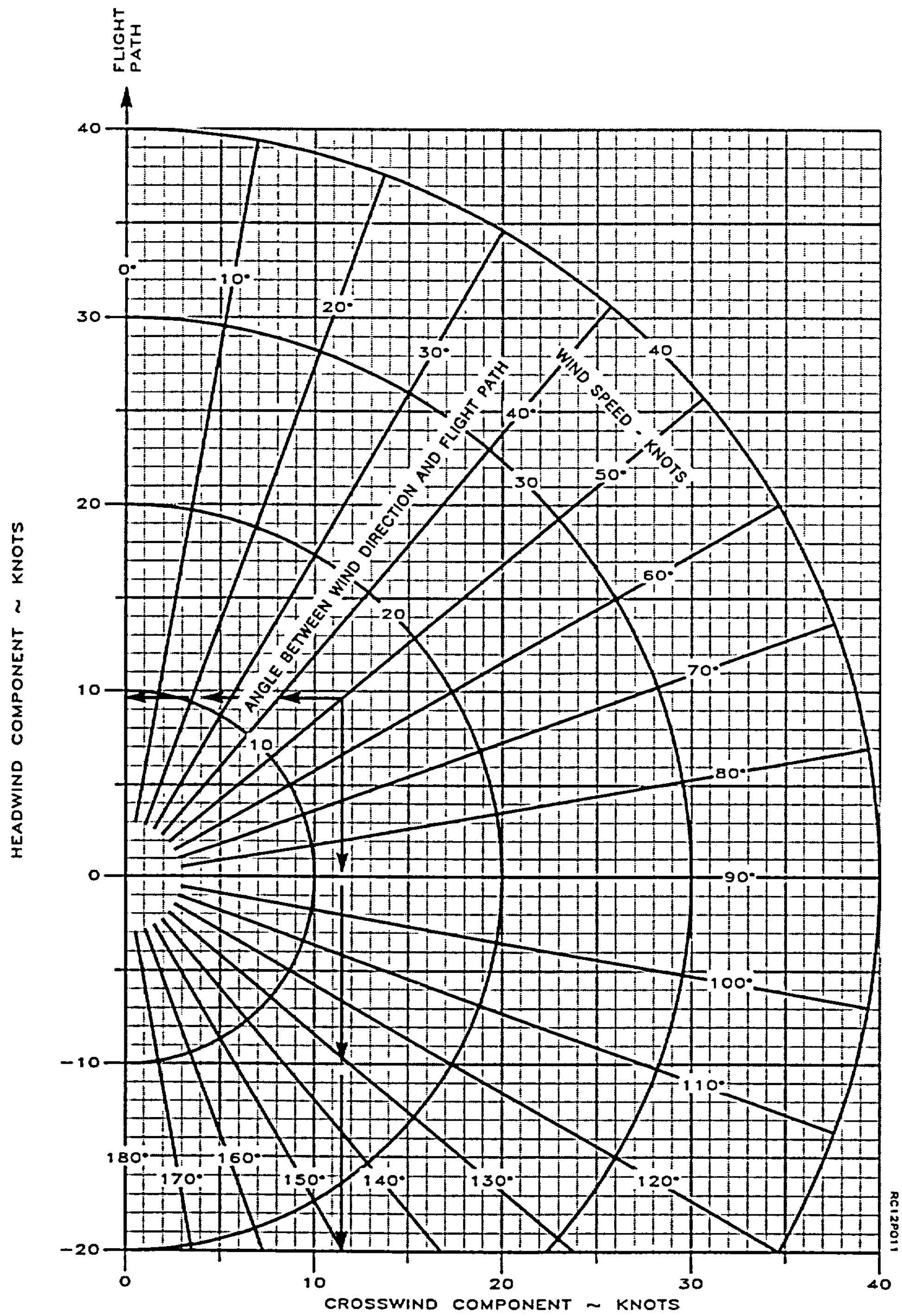


Figure 7-14. Wind Components

MAXIMUM TAKE-OFF WEIGHT
PERMITTED BY ENROUTE CLIMB REQUIREMENTS

ASSOCIATED CONDITIONS:
POWER ....MAXIMUM CONTINUOUS
INOPERATIVE PROPELLER ....FEATHERED
FLAPS ....UP
LANDING GEAR....................................UP

EXAMPLE:
FIELD PRESSURE ALTITUDE ....3499 FT
FAT...15°C
TAKE-OFF WEIGHT ....16200 LBS

NOTES: 1. THIS GRAPH PROVIDES THE ONE-ENGINE-INOPERATIVE CLIMB PERFORMANCE WEIGHT LIMIT (WHICH IS FOR RATE-OF-CLIMB CAPABILITIES AT 5000 FT PRESSURE ALTITUDE) AS A FUNCTION OF FIELD PRESSURE ALTITUDE AND TEMPERATURE. REFER TO THE "CLIMB ONE ENGINE INOPERATIVE" GRAPH FOR ACTUAL CLIMB CAPABILITIES APPLICABLE TO THE PARTICULAR TEMPERATURE AND ALTITUDE BEING CONSIDERED.

2. FOR OPERATION WITH ICE VANES EXTENDED, ADD 5500 FEET TO FIELD PRESSURE ALTITUDE BEFORE ENTERING GRAPH.

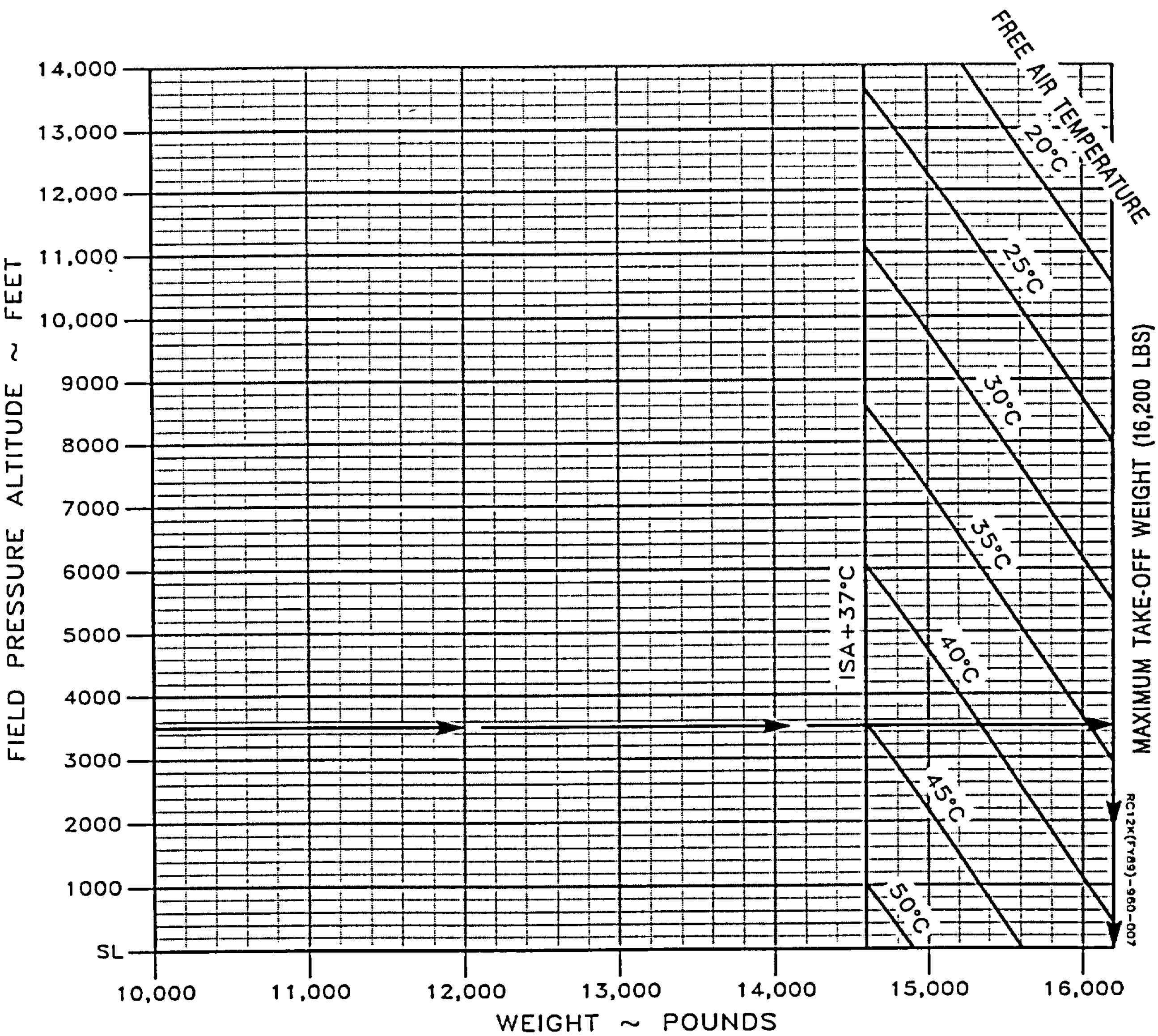


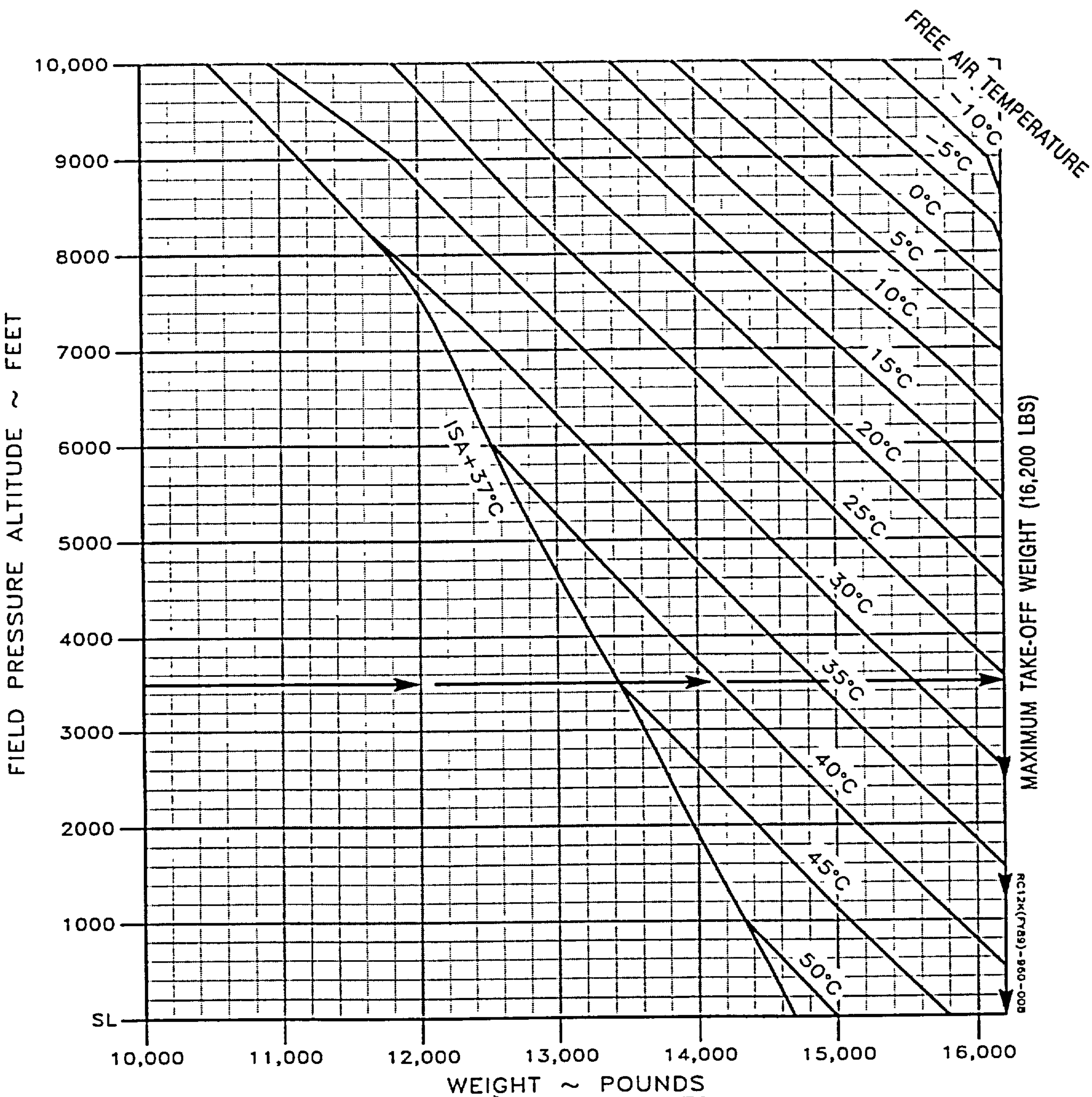
Figure 7-15. Maximum Take-off Weight Permitted by Enroute Climb Requirements IR

MAXIMUM TAKE-OFF WEIGHT - FLAPS UP
TO ACHIEVE POSITIVE ONE-ENGINE-INOPERATIVE CLIMB AT LIFT-OFF

ASSOCIATED CONDITIONS:
POWER ....TAKEOFF
LANDING GEAR ....DOWN
INOPERATIVE PROPELLER ....FEATHERED

EXAMPLE:
FIELD PRESSURE ALTITUDE ....3499 FT
FAT ....15°C
TAKE-OFF WEIGHT ....16,200 LBS

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, ADD 1400 FEET TO FIELD PRESSURE ALTITUDE BEFORE ENTERING GRAPH.



☛ CA Reduce maximum take-off weight by 70 pounds.

Figure 7-16. Maximum Take-off Weight to Achieve Positive One Engine Inoperative Climb at Liftoff- Flaps Up IR

MAXIMUM TAKE-OFF WEIGHT - FLAPS UP AS LIMITED BY TIRE SPEED

EXAMPLE:

FAT	15°C
FIELD PRESSURE ALTITUDE	3499 FT
HEADWIND COMPONENT	10 KTS
WEIGHT	EXCEEDS STRUCTURAL LIMIT OF 16,200 LBS

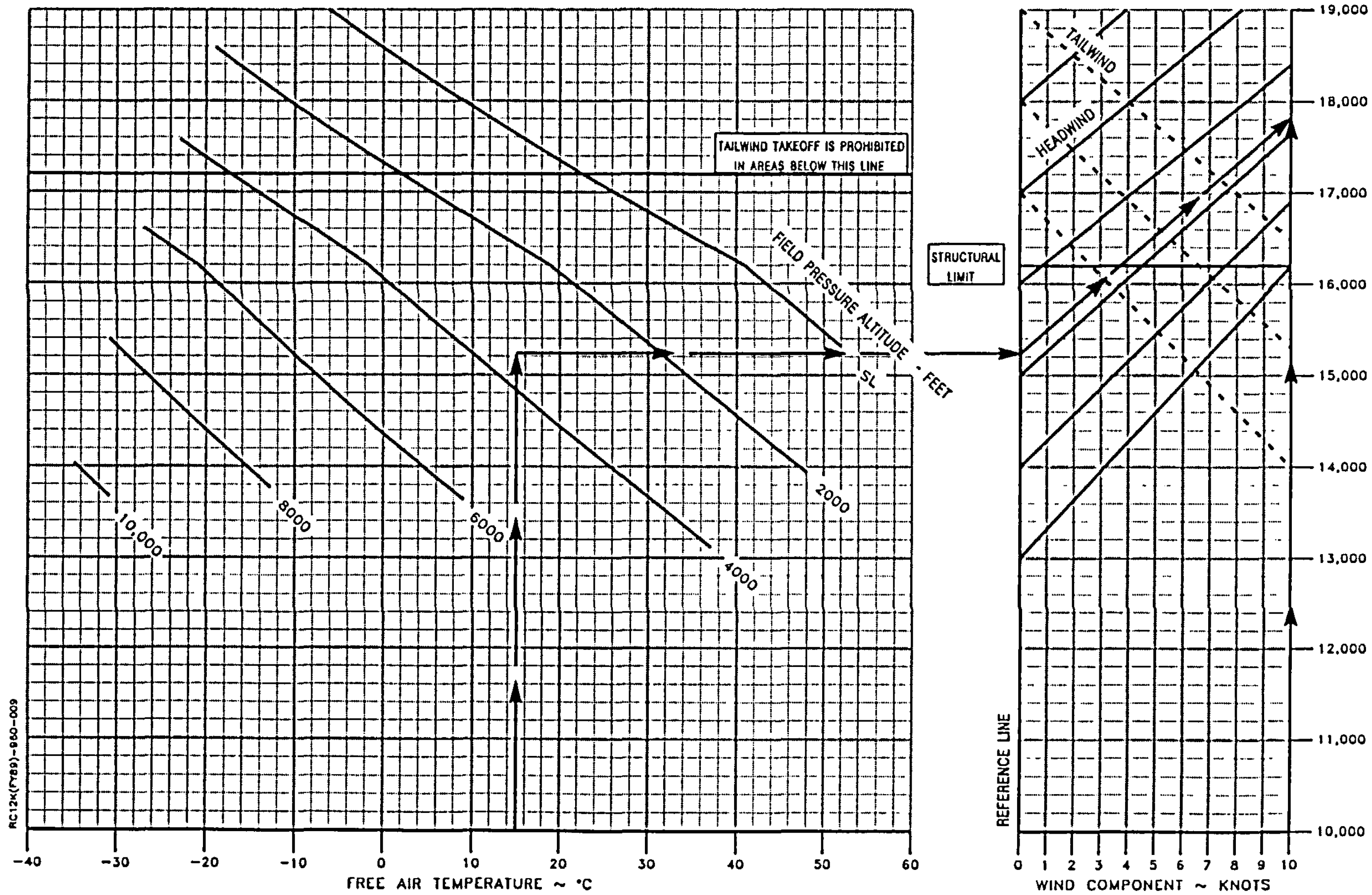


Figure 7-17. Maximum Take-off Weight as Limited by Tire Speed - Flaps Up

TAKE-OFF SPEEDS (KIAS) - FLAPS UP

		FREE AIR TEMPERATURE																											
PRESS. ALT (FT)	T/O WT (LBS)	-30°C				-10°C				0°C				10°C				20°C				40°C				52°C			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
	16,200	116	120	127	143	116	120	127	142	116	121	127	142	116	121	127	141	116	121	127	141	116	122	127	141	116	124	127	139
	15,000	113	115	123	141	113	118	123	140	113	118	123	140	113	118	123	139	113	117	123	139	113	117	123	138	113	119	123	137
	14,000	110	111	121	139	110	112	121	138	110	112	121	138	110	113	121	137	110	113	121	137	110	114	121	137	110	115	121	135
SL	13,000	110	110	121	140	110	110	120	139	110	110	120	138	110	110	119	137	110	110	119	137	110	110	118	135	110	111	118	133
	12,000	110	110	122	142	110	110	121	141	110	110	121	140	110	110	120	139	110	110	120	139	110	110	120	137	110	110	118	134
	11,000	110	110	123	144	110	110	122	143	110	110	122	142	110	110	122	141	110	110	121	140	110	110	121	139	110	110	119	135
	10,000	110	110	125	147	110	110	124	145	110	110	123	144	110	110	123	143	110	110	123	143	110	110	122	141	110	110	120	137
	16,200	116	120	127	142	116	121	127	141	116	121	127	141	116	122	127	141	116	122	121	140	116	123	127	139	116	125	121	138
	15,000	113	118	123	140	113	118	123	139	113	117	123	139	113	117	123	139	113	117	123	138	113	119	123	137	113	120	123	135
	14,000	110	112	121	138	110	113	121	137	110	113	121	137	110	113	121	137	110	114	121	137	110	115	121	135	110	117	121	133
2000	13,000	110	110	120	139	110	110	119	137	110	110	119	137	110	110	119	136	110	110	118	135	110	111	118	133	110	113	118	132
	12,000	110	110	121	141	110	110	120	139	110	110	120	139	110	110	120	138	110	110	119	137	110	110	118	134	110	110	116	131
	11,000	110	110	122	143	110	110	122	141	110	110	121	140	110	110	121	140	110	110	121	139	110	110	119	136	110	110	117	132
	10,000	110	110	124	145	110	110	123	143	110	110	123	143	110	110	122	142	110	110	122	141	110	110	120	138	110	110	118	134
	16,200	116	121	127	141	116	122	127	141	116	122	127	140	116	122	12?	140	116	123	127	140	116	124	12?	138	116	126	127	137
	15,000	113	116	123	139	113	117	123	139	113	117	123	138	113	118	123	138	113	118	123	138	113	120	123	136	113	122	123	134
	14,000	110	113	121	138	110	113	121	137	110	114	121	138	110	114	121	136	110	114	121	136	110	116	121	134	110	118	121	132
4000	13,000	110	110	119	137	110	110	119	138	110	110	118	135	110	110	118	135	110	110	118	134	110	113	118	132	110	114	118	130
	12,000	110	110	121	139	110	110	120	138	110	110	119	137	110	110	119	138	110	110	119	138	110	110	118	131	110	110	115	128
	11,000	110	110	122	141	110	110	121	140	110	110	121	139	110	110	120	138	110	110	120	138	110	110	117	133	110	110	116	129
	10,000	110	110	123	144	110	110	122	142	110	110	122	141	110	110	121	140	110	110	121	140	110	110	119	135	110	110	117	131
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	15,000	113	117	123	139	113	118	123	138	113	118	123	138	113	118	123	137	113	119	123	137	113	121	123	135	113	123	123	133
	14,000	110	113	121	137	110	114	121	138	110	114	121	138	110	114	121	136	110	115	121	135	110	118	121	132	110	119	121	131
6000	13,000	110	110	119	138	110	110	118	135	110	110	118	134	110	111	118	134	110	111	118	133	110	114	118	131	110	115	118	129
	12,000	110	110	120	138	110	110	119	138	110	110	119	138	110	110	118	135	119	119	117	134	119	119	115	128	119	119	114	126
	11,000	110	110	121	140	110	110	120	138	110	110	120	138	110	110	119	137	110	110	119	135	110	110	116	130	110	110	114	127
	10,000	110	110	122	142	110	110	121	140	110	110	121	140	110	110	121	139	110	110	120	137	110	110	117	132	110	110	115	128
	16,200	116	122	127	140	116	123	127	140	116	123	127	139	116	124	127	139	116	125	127	138	116	127	127	136	116	127	127	134
	15,000	113	118	123	138	113	118	123	137	113	119	123	137	113	119	123	138	113	120	123	138	113	122	123	133	113	124	123	132
	14,000	110	114	121	136	110	114	121	136	110	115	121	135	110	116	121	134	110	117	121	133	110	119	121	131	110	120	121	130
8000	13,000	110	110	118	135	110	111	118	134	110	111	118	133	110	112	118	133	110	113	118	132	110	115	118	129	110	117	118	128
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	15,000	113	118	123	137	113	119	123	137	113	120	123	138	113	121	123	135	113	122	123	134	113	124	123	132	113	124	123	130
	14,000	110	114	121	138	110	115	121	135	110	116	121	134	110	117	121	133	110	118	121	132	110	120	121	130	110	121	121	128
10,000	13,000	110	111	118	134	110	112	118	133	110	112	118	132	110	113	118	131	110	114	118	130	110	116	118	128	110	118	118	127
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	10,000	110	110	121	139	110	110	120	137	110	110	119	135	110	110	118	133	110	110	117	131	110	110	114	125	119	119	113	123

BT03684

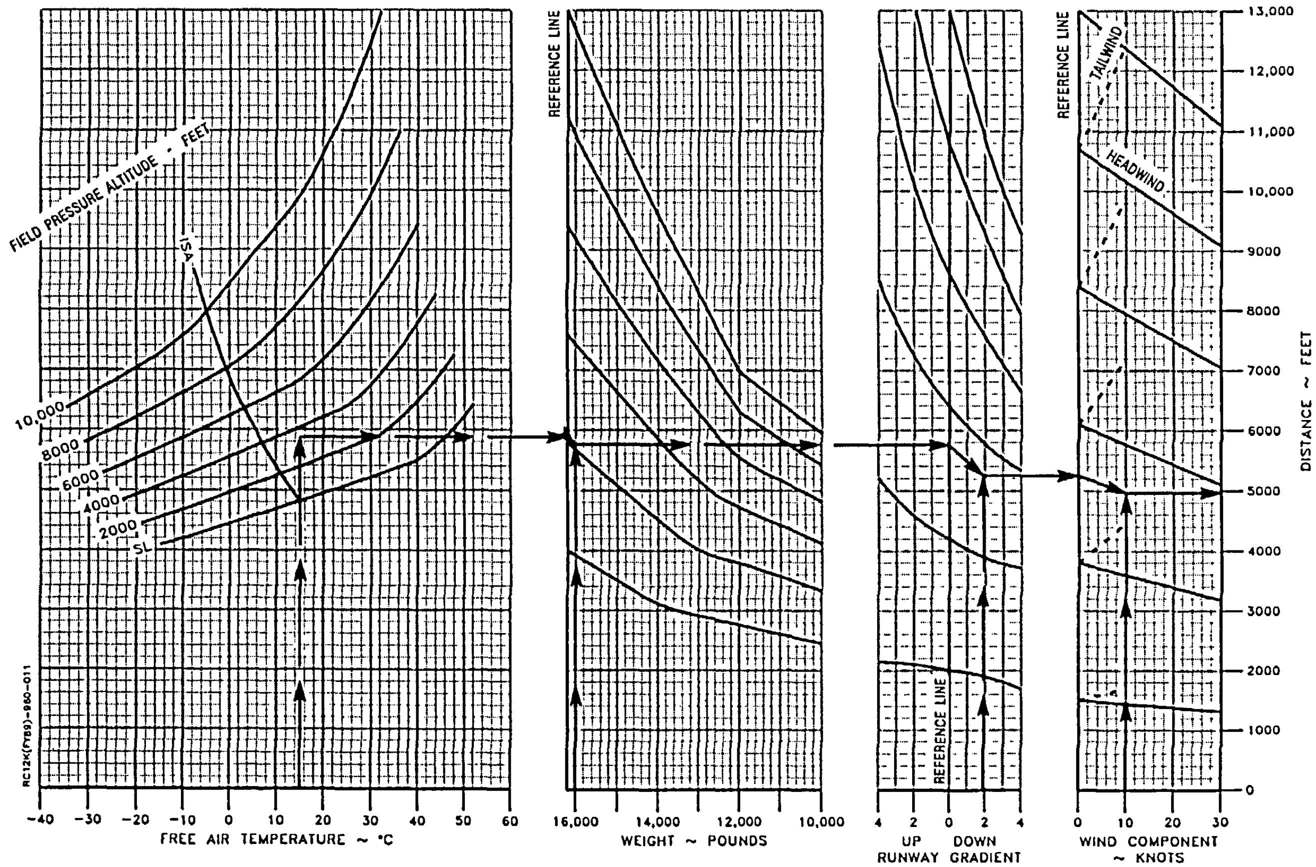
Figure 7-18. Take-off Speeds (KIAS) - Flaps Up

TAKE-OFF DISTANCE - FLAPS UP

ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET
....BEFORE BRAKE RELEASE.
V_R. V_{50} ....AS SCHEDULED IN TABLE
....OF TAKE-OFF SPEEDS.
LANDING GEAR ....RETRACTED AFTER LIFT-OFF
RUNWAY ....PAVED, DRY SURFACE

NOTES: 1. FOR OPERATION WITH ICE VANES EXTENDED, INCREASE TOTAL DISTANCE BY 12%
2. CONSULT "MAXIMUM TAKE-OFF WEIGHT FLAPS UP AS LIMITED BY TIRE SPEED" GRAPH FOR POSSIBLE TAILWIND PROHIBITIONS.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16.000 LBS
RUNWAY GRADIENT ....1.9% DN
HEADWIND COMPONENT.....................10 KTS
TOTAL DISTANCE OVER
50-T OBSTACLE ....4967 FT



☛ CA Increase total distance by 5%.

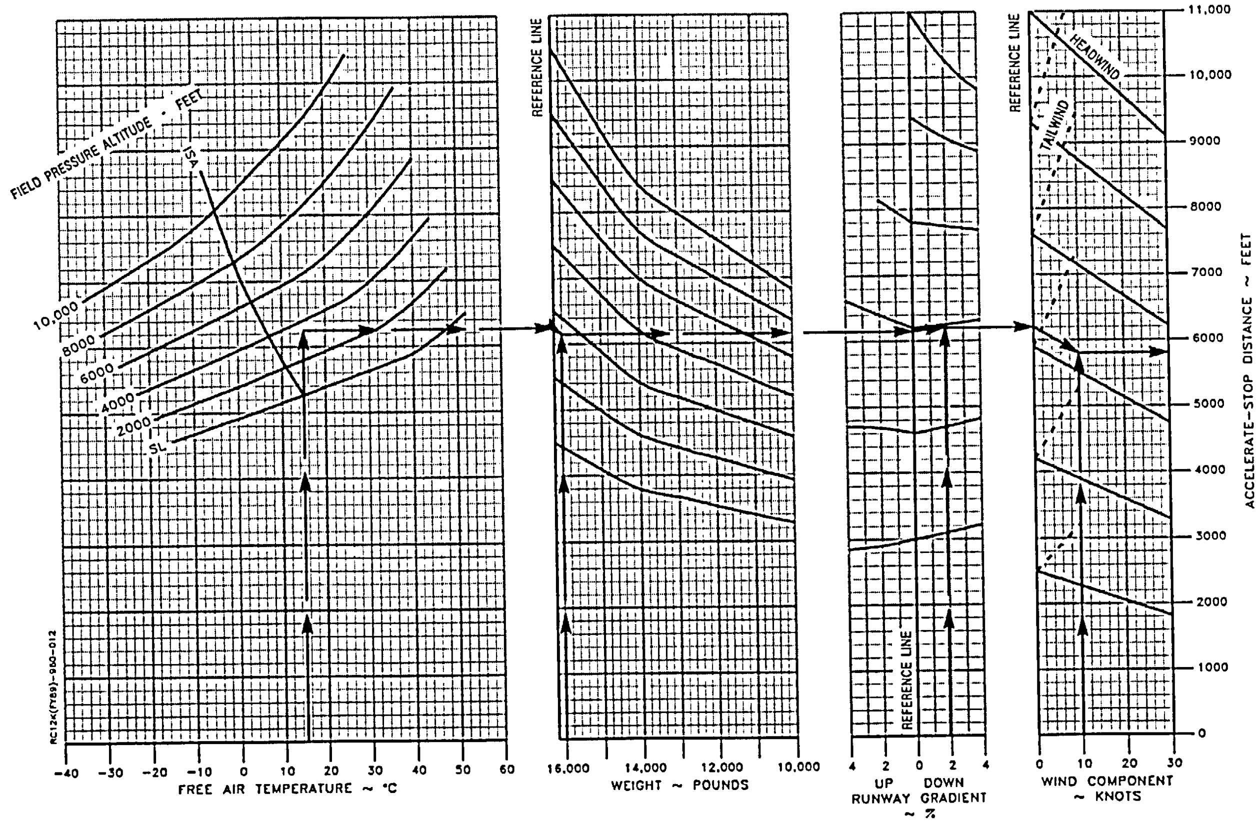
Figure 7-19. Take-off Distance Over 50 Foot Obstacle - Flaps Up IR

ACCELERATE-STOP - FLAPS UP

ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET
...............................BEFORE BRAKE RELEASE
AUTOFEATHER .....ARMED
V_1 ....AS SCHEDULED IN TABLE
...............................OF TAKE-OFF SPEEDS.
POWER LEVERS ...GROUND FINE AT V_1
BRAKING................MAXIMUM WITHOUT SLIDING TIRES
RUNWAY ....PAVED. DRY SURFACE

NOTES 1. FOR OPERATION WITH ICE VANES EXTENDED, INCREASE DISTANCE BY 5%
2. CONSULT "MAXIMUM TAKE-OFF WEIGHT FLAPS UP AS LIMITED BY TIRE SPEED" GRAPH FOR POSSIBLE TAILWIND PROHIBITIONS.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT..16,000 LBS
RUNWAY GRADIENT ....1.9% DN
HEADWIND COMPONENT.................10 KTS
ACCELERATE-STOP DISTANCE .....5802 FT



☛ CA Increase distance by 3%.

Figure 7-20. Accelerate Stop - Flaps Up IR

ACCELERATE-GO - FLAPS UP
OVER 50-FOOT OBSTACLE

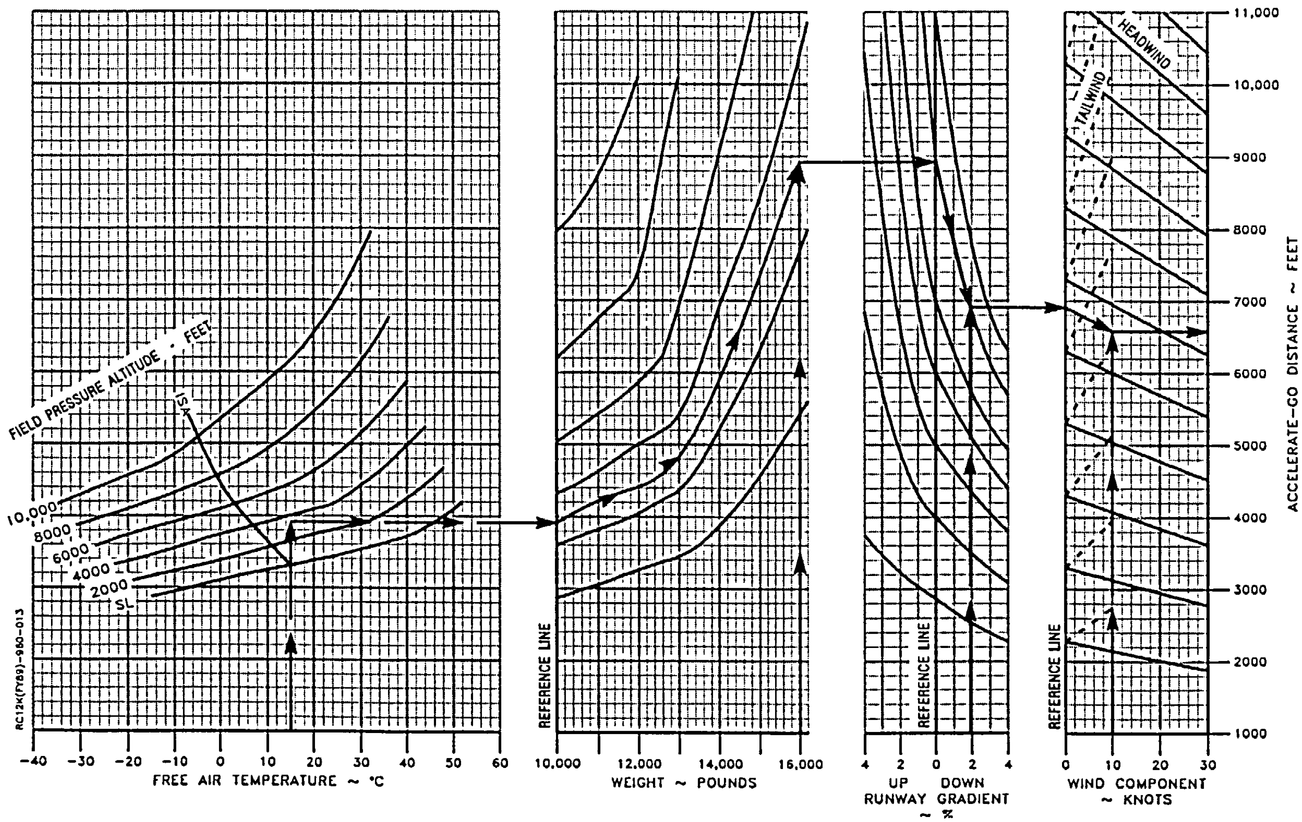
ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE.
AUTOFEATHER ....ARMED
V_1 AND V_2 ....AS SCHEDULED IN TABLE OF TAKE-OFF SPEEDS.
LANDING GEAR ....RETRACTED AFTER LIFT-OFF
RUNWAY ....PAVED, DRY SURFACE

NOTES:

1. **FOR OPERATION WITH ICE VANES EXTENDED, INCREASE DISTANCE BY 25%.**
2. **CONSULT "MAXIMUM TAKE-OFF WEIGHT - FLAPS UP - AS LIMITED BY TIRE SPEED" GRAPH FOR POSSIBLE TAILWIND PROHIBITIONS.**

EXAMPLE:

FAT	15°C
FIELD PRESSURE ALTITUDE	3499 FT
WEIGHT	16,000 LBS
RUNWAY GRADIENT	1.9% DN
HEADWIND COMPONENT	10 KTS
ACCELERATE-GO DISTANCE	6583 FT



CA Increase distance by 7%.

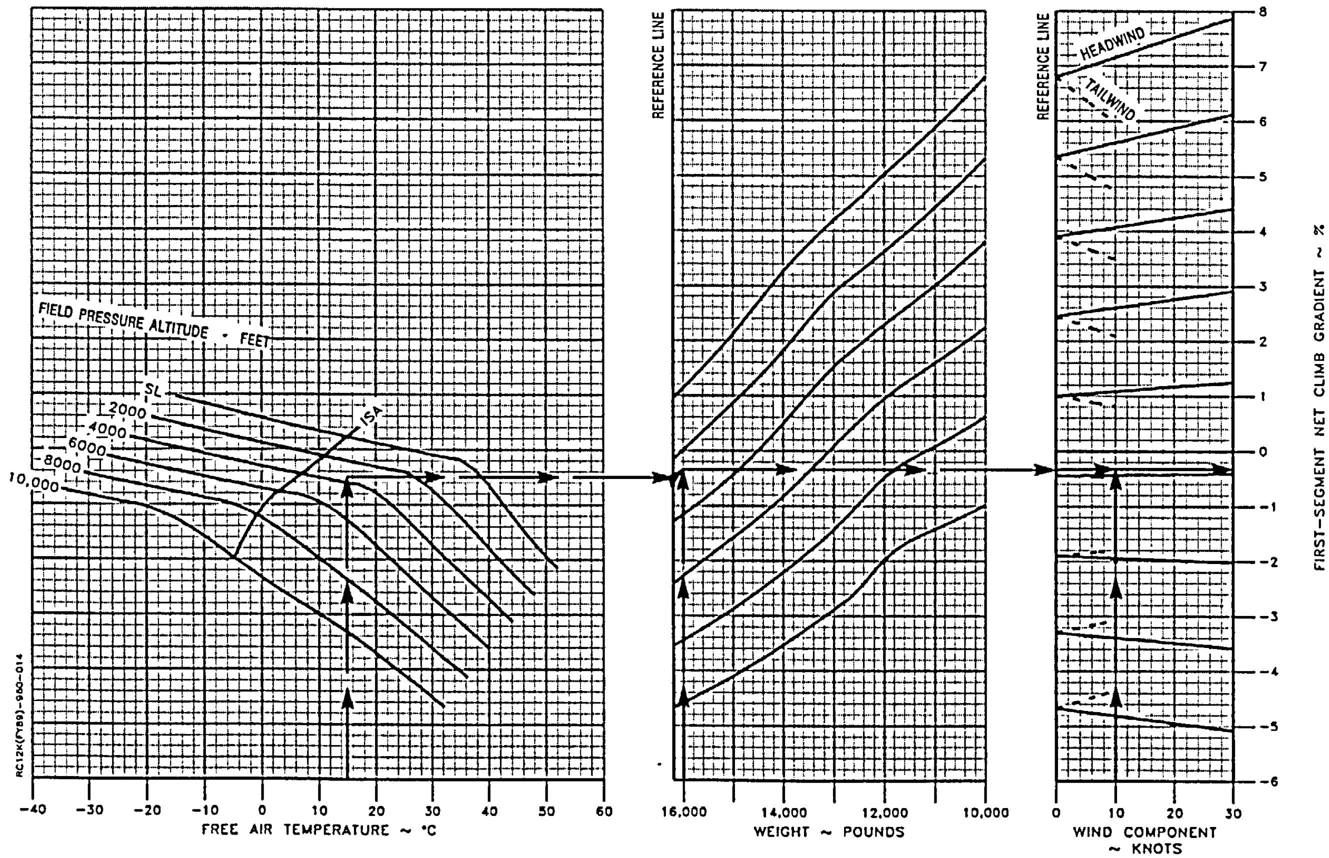
Figure 7-21. Accelerate-Go Distance Over 50 Foot Obstacle - Flaps Up IR

NET TAKE-OFF FLIGHT PATH - FIRST SEGMENT - FLAPS UP
ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:
POWER .... STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE
INOPERATIVE PROPELLER ..... FEATHERED
LANDING GEAR .... DOWN
CLIMB SPEED .... V_2

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, DECREASE NET CLIMB GRADIENT BY 1.0 PERCENTAGE POINT.

EXAMPLE:
FAT .... 15°C
FIELD PRESSURE ALTITUDE .... 3499 FT
WEIGHT .... 16,000 LBS
HEADWIND COMPONENT .... 10 KTS
NET CLIMB GRADIENT .... -0.32 %



☛ CA Decrease net climb gradient by 0.1 percentage points.

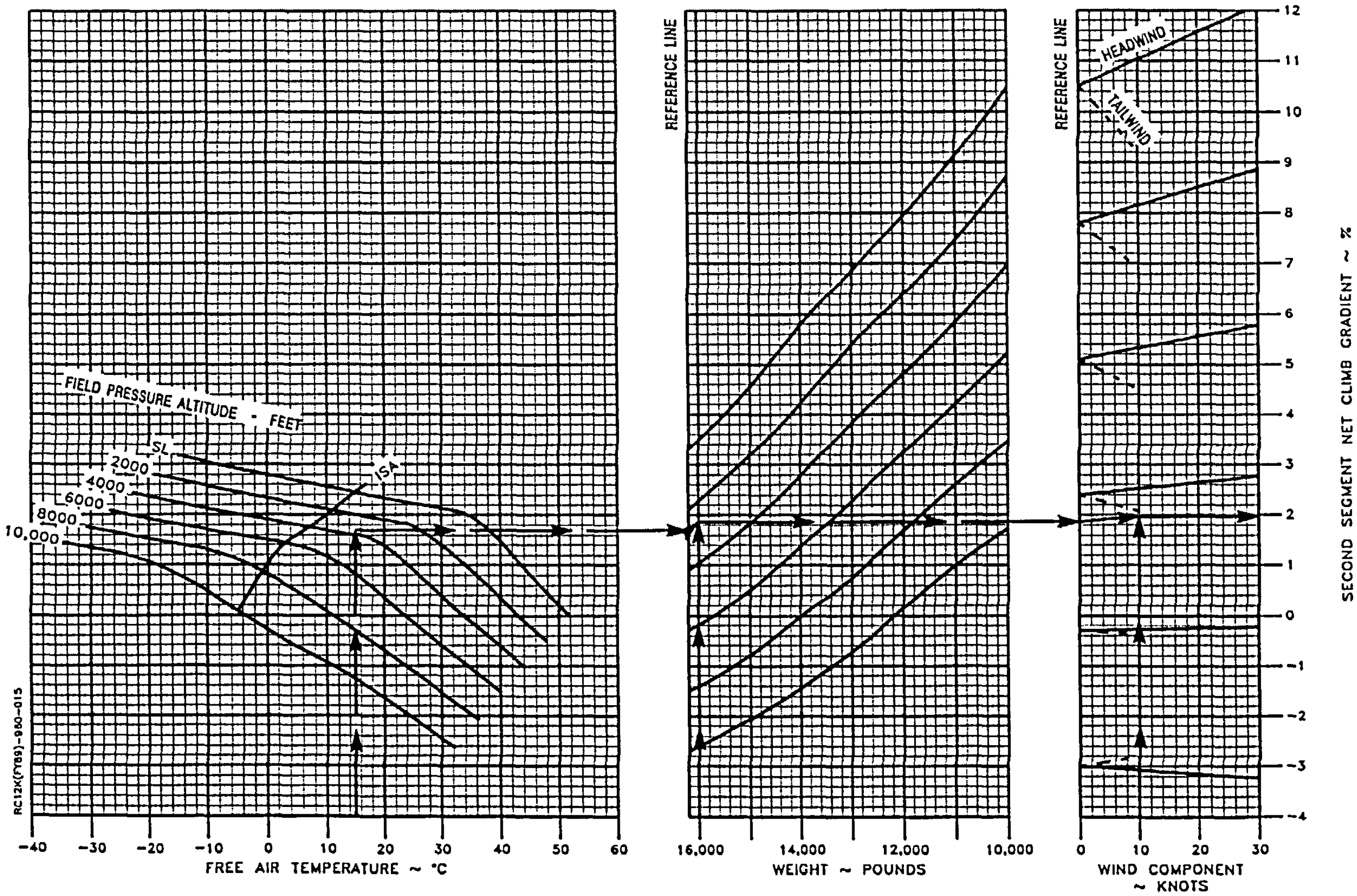
Figure 7-22. Net Take-off Flight Path - First Segment - Flaps Up IR

NET TAKE-OFF FLIGHT PATH - SECOND SEGMENT - FLAPS UP
ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE
INOPERATIVE PROPELLER .....FEATHERED
LANDING GEAR ....UP
CLIMB SPEED V2

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, DECREASE NET CLIMB GRADIENT BY 1.1 PERCENTAGE POINTS.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
HEADWIND COMPONENT ....10 KTS
NET CLIMB GRADIENT 1.97%



☛ CA Decrease net climb gradient by 0.1 percentage points.

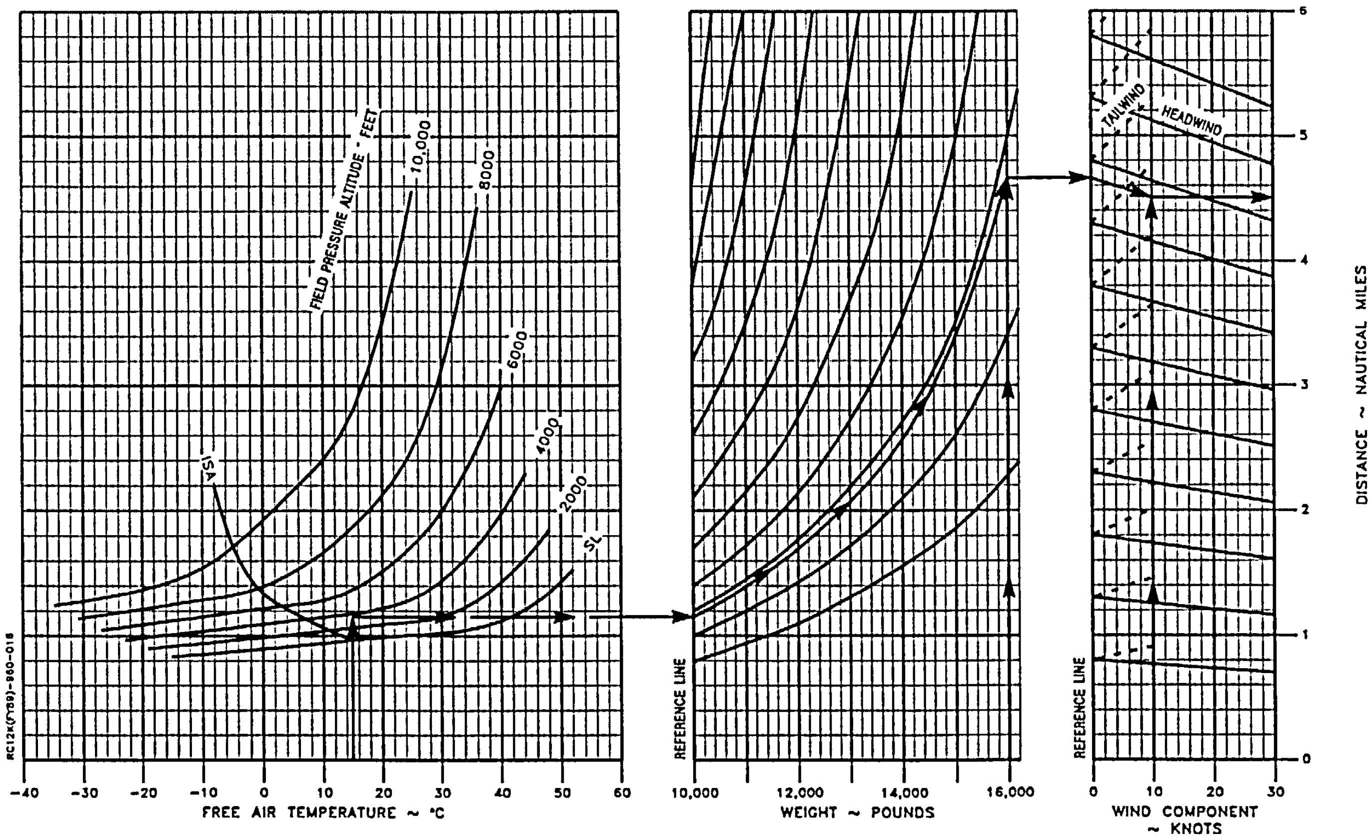
Figure 7-23. Net Take-off Flight Path - Second Segment - Flaps Up IR

HORIZONTAL DISTANCE FROM REFERENCE ZERO TO THIRD SEGMENT CLIMB - FLAPS UP

ASSOCIATED CONDITIONS:
POWER:
TO 500 FT AGL ....STATIC TAKE-OFF POWER SET
...................................BEFORE BRAKE RELEASE.
AT 500 FT AGL ....TAKEOFF
AIRSPEED:
TO 500 FT AGL ....V_2
AT 500 FT AGL ....ACCELERATE TO V_{ENR}
INOPERATIVE PROPELLER .....FEATHERED
LANDING GEAR . ...RETRACTED AFTER LIFT-OFF

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, ADD 1.9 NM TO DISTANCE OBTAINED FROM THIS GRAPH.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
HEADWIND COMPONENT.....................10 KTS
DISTANCE ....4.50 NM



☛ CA Add 0.1 NM to distance obtained from this graph.

Figure 7-24. Horizontal Distance from Reference Zero to Third Segment Climb - Flaps Up IR

MAXIMUM TAKE-OFF WEIGHT - FLAPS APPROACH TO ACHIEVE POSITIVE ONE-ENGINE-INOPERATIVE CLIMB AT LIFT-OFF

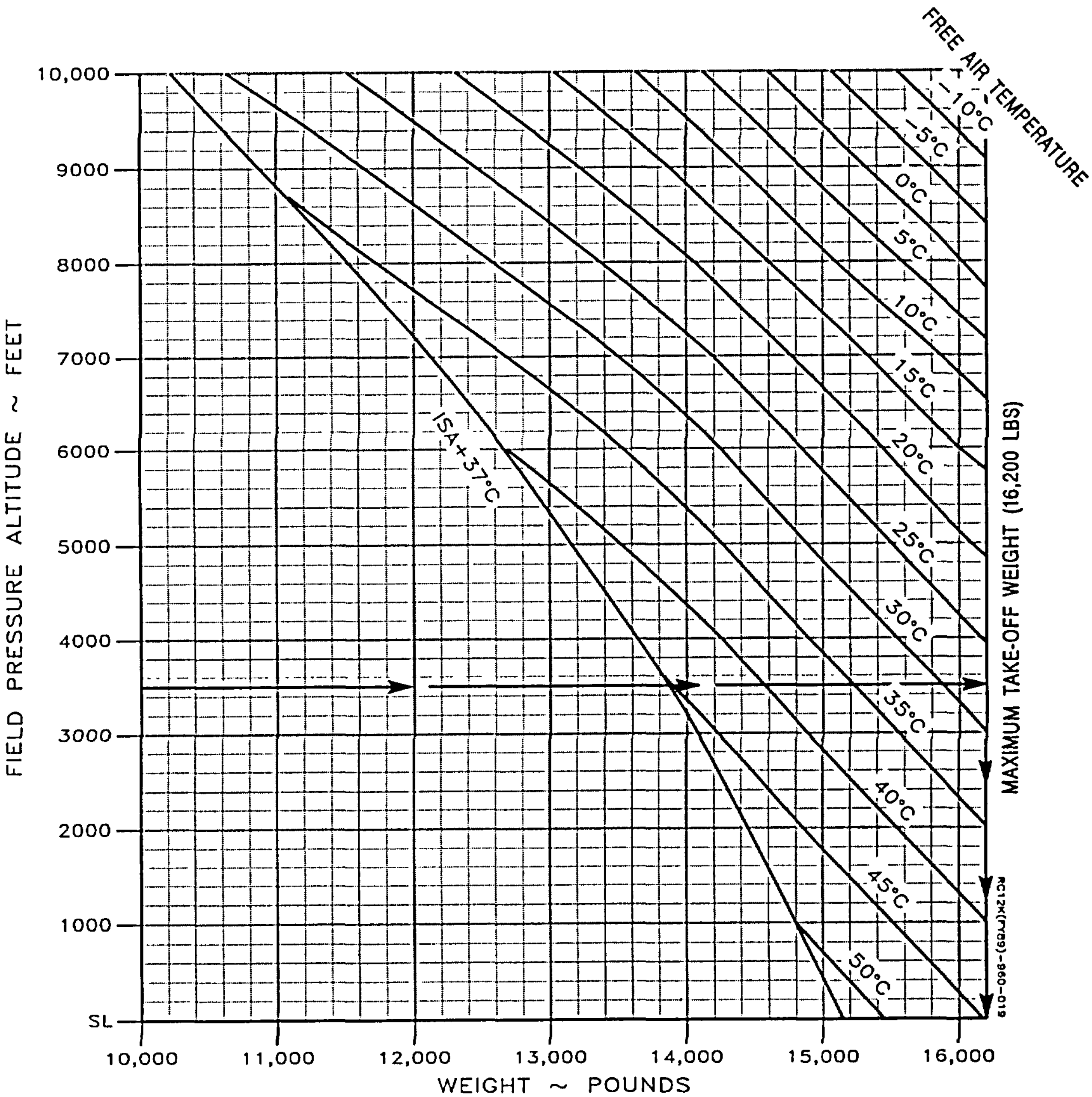
ASSOCIATED CONDITIONS:

POWER ....TAKEOFF
LANDING GEAR ....DOWN
INOPERATIVE PROPELLER ....FEATHERED

EXAMPLE:

FIELD PRESSURE ALTITUDE ....3499 FT
FAT ....15°C
TAKE-OFF WEIGHT ....16,200 LBS

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, ADD 1200 FEET TO FIELD PRESSURE ALTITUDE BEFORE ENTERING GRAPH.



☛ CA Reduce maximum take-off weight by 110 pounds.

Figure 7-25. Maximum Take-off Weight to Achieve Positive One Engine Inoperative Climb at Liftoff - Flaps Approach

MAXIMUM TAKE-OFF WEIGHT - FLAPS APPROACH AS LIMITED BY TIRE SPEED

EXAMPLE:

FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
HEADWIND COMPONENT ....10 KTS
WEIGHT ....EXCEEDS STRUCTURAL LIMIT OF 16,200 LBS

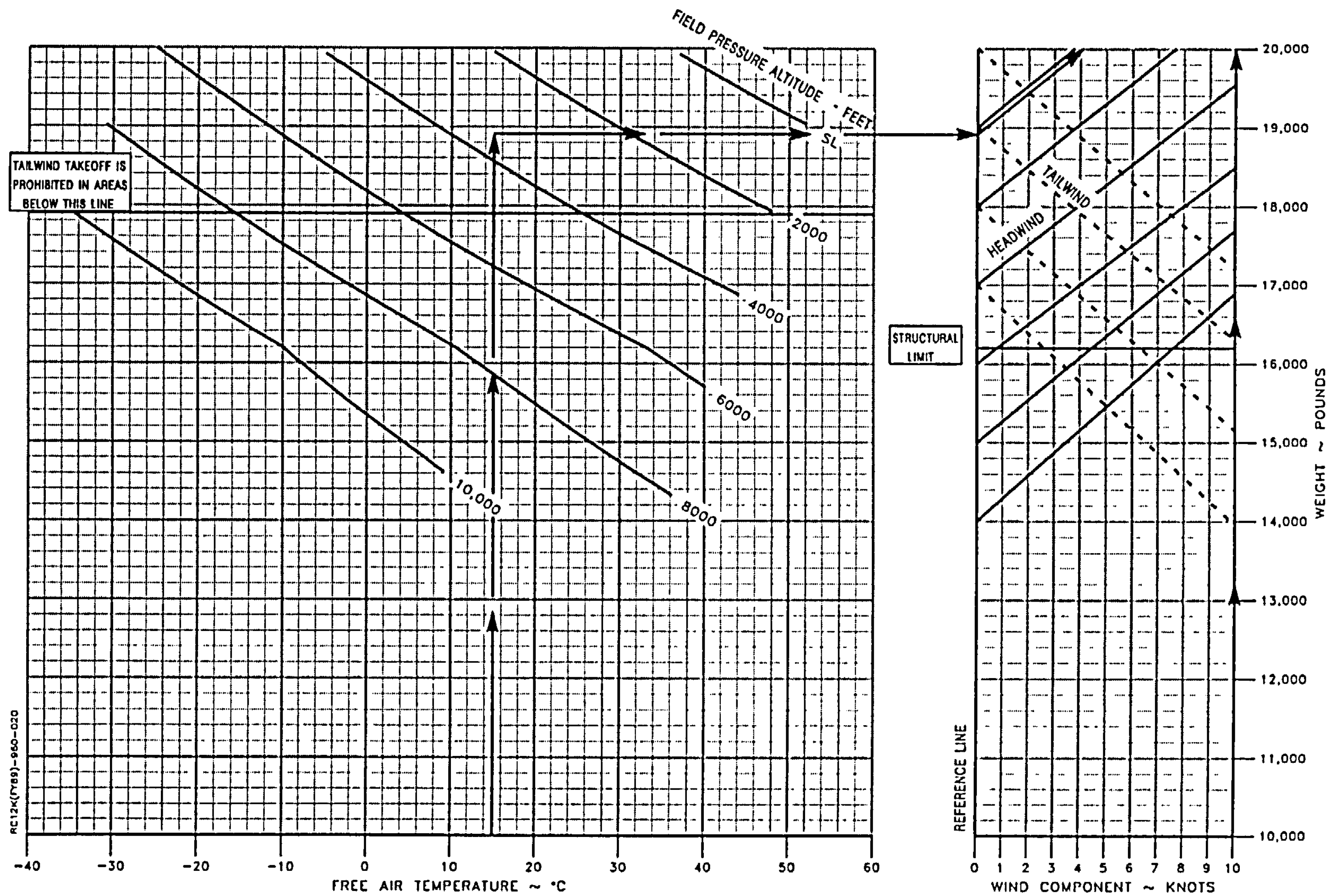


Figure 7-26. Maximum Take-off Weight as Limited by Tire Speed - Flaps Approach

TAKE-OFF SPEEDS (KIAS) - FLAPS UP

		FREE AIR TEMPERATURE																											
PRESS-ALT (FT)	T/O WT (LBS)	-30°C				-10°C				0°C				10°C				20°C				40°C				52°C			
		V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}	V_1	V_R	V_2	V_{50}
SL	16,200	116	120	127	143	116	120	127	142	116	121	127	142	116	121	127	141	116	121	127	141	116	122	127	141	116	124	127	139
	16,200	107	111	116	131	107	111	118	130	107	112	116	130	107	112	118	130	107	112	116	129	107	112	116	129	107	113	116	127
	15,000	107	107	113	129	107	107	113	128	107	108	113	128	107	108	113	128	107	108	113	127	107	108	113	127	107	109	113	125
	14,000	107	107	114	131	107	107	113	130	107	107	113	129	107	107	113	128	107	107	112	128	107	107	112	127	107	107	111	124
	13,000	107	107	116	133	107	107	114	131	107	107	114	131	107	107	113	130	107	107	113	129	107	107	113	128	107	107	111	125
	12,000	107	107	116	135	107	107	115	133	107	107	115	133	107	107	114	132	107	107	114	131	107	107	113	130	107	107	112	122
	11,000	107	107	117	137	107	107	116	135	107	107	118	135	107	107	115	134	107	107	115	133	107	107	115	132	107	107	113	129
	10,000	107	107	119	139	107	107	118	138	107	107	117	137	107	107	117	138	107	107	116	135	107	107	118	134	107	107	114	130
2000	16,200	107	111	116	130	107	112	118	130	107	112	118	129	107	112	116	129	107	112	116	128	107	113	116	127	107	114	116	125
	15,000	107	107	113	129	107	108	113	128	107	108	113	127	107	108	113	127	107	108	113	127	107	109	113	125	107	110	113	123
	14,000	107	107	113	130	107	107	113	128	107	107	112	128	107	107	112	127	107	107	112	126	107	107	111	127	107	107	110	121
	13,000	107	107	114	132	107	107	113	130	107	107	113	129	107	107	113	129	107	107	113	128	107	107	112	126	107	107	111	123
	12,000	107	101	115	133	107	107	114	132	107	107	114	131	107	107	114	131	107	107	113	130	107	107	112	127	107	107	111	124
	11,000	107	107	116	135	107	107	116	134	107	107	115	133	107	107	115	132	107	107	114	132	107	107	113	129	107	107	112	126
	10,000	107	107	118	136	107	107	117	136	107	107	116	135	107	107	118	135	107	107	118	134	107	107	114	131	107	107	112	128
4000	16,200	107	112	118	130	107	112	116	129	107	112	116	128	107	112	116	128	107	113	116	128	107	114	116	125	107	115	116	124
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	11,000	107	107	118	134	107	107	115	133	107	107	114	132	107	107	114	131	107	107	114	131	107	107	112	126	107	107	111	123
	10,000	107	107	117	136	107	107	118	135	107	107	116	134	107	107	115	133	107	107	115	133	107	107	113	128	107	107	111	125
6000	16,200	107	112	116	129	107	112	116	128	107	113	116	128	107	113	118	127	107	113	116	127	107	115	116	124	107	115	116	123
	15,000	107	108	113	127	107	109	113	126	107	109	113	126	107	109	113	125	107	109	113	125	107	111	113	122	107	112	113	120
	14,000	107	107	112	127	107	107	11	126	107	107	111	125	107	107	111	125	107	107	110	123	107	109	110	120	107	109	110	118
	13,000	107	107	113	129	107	107	112	128	107	107	112	127	107	107	112	126	107	107	111	125	107	107	110	121	107	108	110	119
	12,000	107	107	114	131	107	107	113	129	107	107	113	129	107	107	113	128	107	107	112	127	107	107	110	122	107	107	110	120
	11,000	107	107	115	133	107	107	114	131	107	107	114	131	107	107	113	130	107	107	113	128	107	107	111	124	107	107	110	121
	10,000	107	107	116	135	107	107	115	133	107	107	115	133	107	107	115	132	107	107	114	130	107	107	112	125	107	107	111	122
8000	16,200	107	112	116	128	107	113	116	127	107	113	116	127	107	113	116	126	107	114	118	125	107	115	116	123	107	116	116	122
	15,000	107	109	113	126	107	109	113	125	107	109	113	125	107	110	113	124	107	110	113	123	107	112	113	121	107	112	113	119
	14,000	107	107	112	126	107	107	111	125	107	107	111	124	107	107	111	123	107	107	110	121	107	109	110	119	107	109	110	117
	13,000	107	107	112	128	107	107	112	126	107	107	112	128	107	107	111	124	107	107	110	122	107	108	110	119	107	109	110	117
	12,000	107	107	113	130	107	107	113	128	107	107	112	127	107	107	112	126	107	107	111	124	107	107	110	120	107	108	110	113
	11,000	107	107	114	131	1078	107	113	130	107	107	113	129	107	107	112	127	107	107	112	128	107	107	110	121	107	108	110	119
	10,000	107	107	115	133	107	107	115	132	107	107	114	131	107	107	113	129	107	107	112	127	107	107	111	123	107	107	110	120
10,000	16,200	107	113	116	127	107	113	116	127	107	114	116	128	107	114	116	125	107	115	116	124	107	116	116	122	107	117	116	121
	15,000	107	109	113	128	107	110	113	124	107	110	113	123	107	111	113	123	107	111	113	122	107	112	113	119	107	113	113	119
	13,000	107	107	112	127	107	107	111	125	107	120	111	123	107	107	110	122	107	107	110	120	107	108	110	118	107	109	110	116
	12,000	107	107	113	128	107	107	112	126	107	107	111	125	107	107	111	123	107	107	110	121	107	108	110	118	107	109	110	117
	11,000	107	107	114	130	107	107	113	128	107	107	112	126	107	107	111	125	107	107	111	123	107	108	110	119	107	108	110	117
	10,000	107	107	115	132	107	107	114	130	107	107	113	128	107	107	112	128	107	107	111	124	107	107	110	120	107	108	110	118

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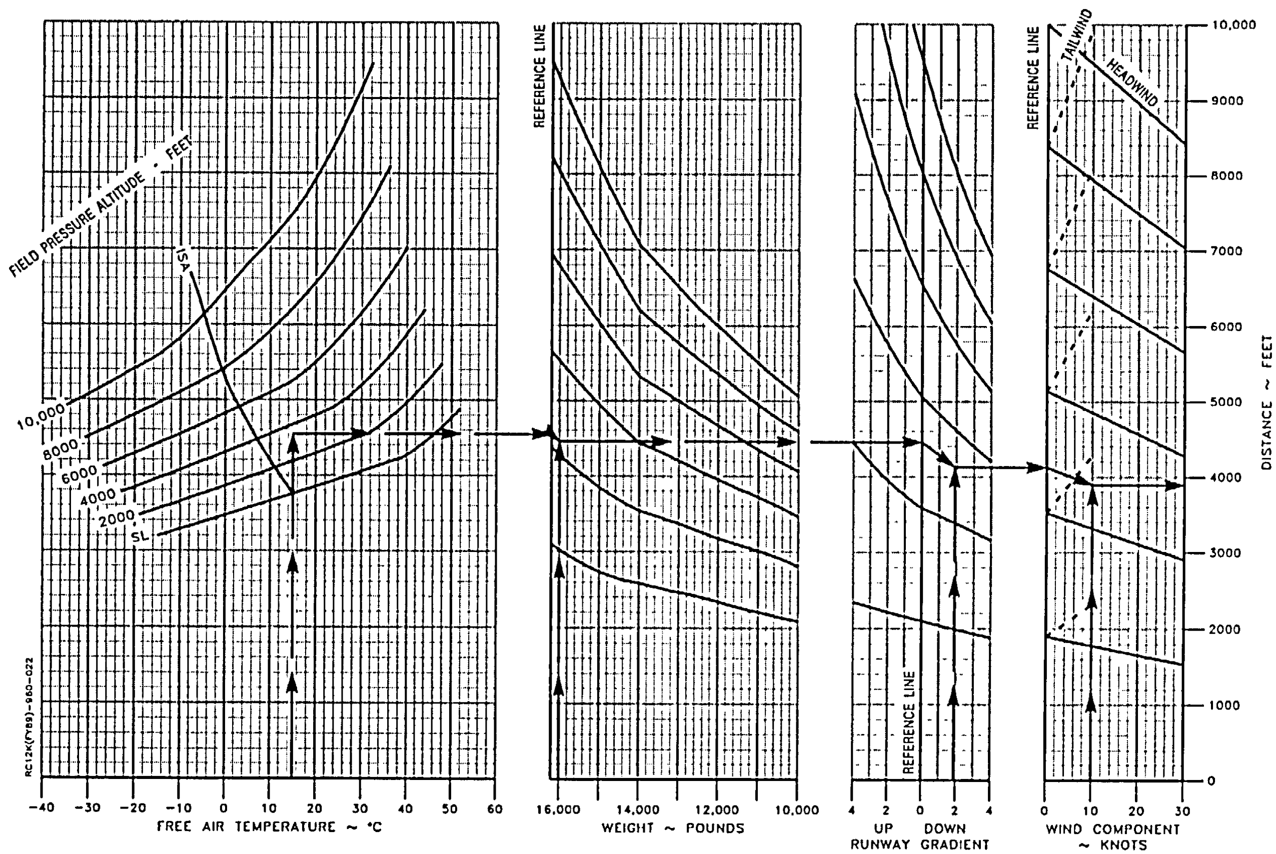
Figure 7-27. Take-off Speeds - Flaps Approach

TAKE-OFF DISTANCE - FLAPS APPROACH

ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET
....BEFORE BRAKE RELEASE.
V_R, V_{50} ....AS SCHEDULED IN TABLE
....OF TAKE-OFF SPEEDS.
LANDING GEAR ....RETRACTED AFTER LIFT-OFF
RUNWAY ....PAVED. DRY SURFACE

NOTES:
1. **FOR OPERATION WITH ICE VANES EXTENDED, INCREASE TOTAL DISTANCE BY 9%.**
2. **CONSULT "MAXIMUM TAKE-OFF WEIGHT - FLAPS APPROACH - AS LIMITED BY TIRE SPEED" GRAPH FOR POSSIBLE TAILWIND PROHIBITIONS.**

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
RUNWAY GRADIENT ....1.9% DN
HEADWIND COMPONENT............................10 KTS
TOTAL DISTANCE OVER
50-FT OBSTACLE 3892FT



☛ CA Increase total distance by 5%.

Figure 7-28. Take-off Distance Over 50 Foot Obstacle - Flaps Approach IR

ACCELERATE-STOP - FLAPS APPROACH

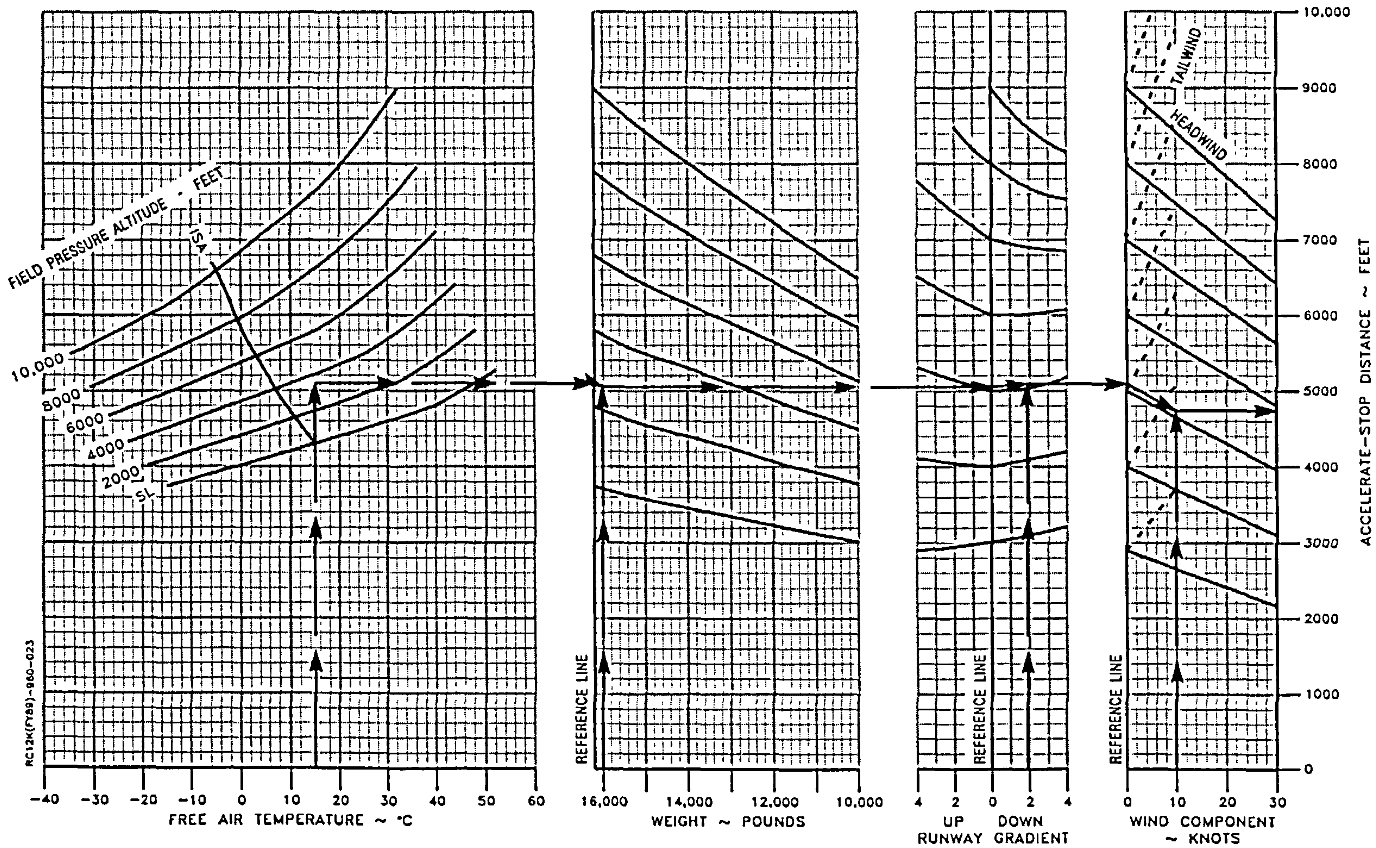
ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE.
AUTOFEATHER .....ARMED
V_1...........................AS SCHEDULED IN TABLE OF TAKE-OFF SPEEDS.
POWER LEVERS ...GROUND FINE AT V_1
BRAKING ....MAXIMUM WITHOUT SLIDING TIRES
RUNWAY ....PAVED, DRY SURFACE

NOTES:

1. FOR OPERATION WITH ICE VANES EXTENDED, INCREASE DISTANCE BY 5%,.

2. CONSULT "MAXIMUM TAKE-OFF WEIGHT - FLAPS APPROACH - AS LIMITED BY TIRE SPEED" GRAPH FOR POSSIBLE TAILWIND PROHIBITIONS.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
RUNWAY GRADIENT ....1.97% DN
HEADWIND COMPONENT ....10 KTS
ACCELERATE-STOP DISTANCE ....4739 FT



☛ CA Increase distance by 3%.

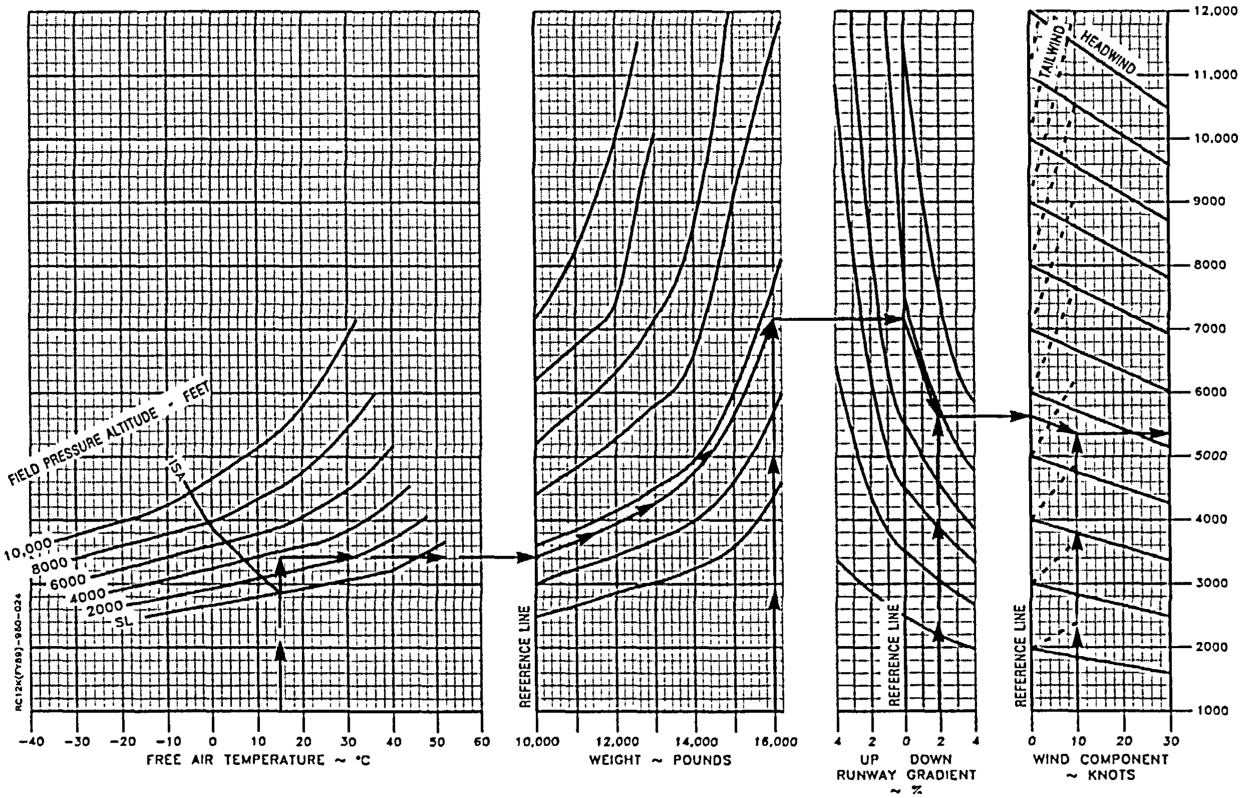
Figure 7-29. Accelerate Stop - Flaps Approach IR

ACCELERATE-GO - FLAPS APPROACH
OVER 50-FOOT OBSTACLE

ASSOCIATED CONDITIONS:
POWER .... STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE.
AUTOFEATHER .... ARMED
V_1 AND V_2 .... AS SCHEDULED OF TAKE-OFF SPEEDS.
LANDING GEAR .... RETRACTED AFTER LIFT-OFF
RUNWAY .... PAVED, DRY SURFACE

NOTES: 1. FOR OPERATION WITH ICE VANES EXTENDED, AS SCHEDULED IN TABLE INCREASE DISTANCE BY 20%.
2. CONSULT "MAXIMUM TAKE-OFF WEIGHT - FLAPS APPROACH - AS LIMITED BY TIRE SPEED" GRAPH FOR POSSIBLE TAILWIND PROHIBITIONS.

EXAMPLE:	
FAT	15°C
FIELD PRESSURE ALTITUDE	3499 FT
WEIGHT	16,000 LBS
RUNWAY GRADIENT	1.9% DN
HEADWIND COMPONENT	10 KTS
ACCELERATE-GO DISTANCE	357 FT



☛ CA Increase distance by 7%.

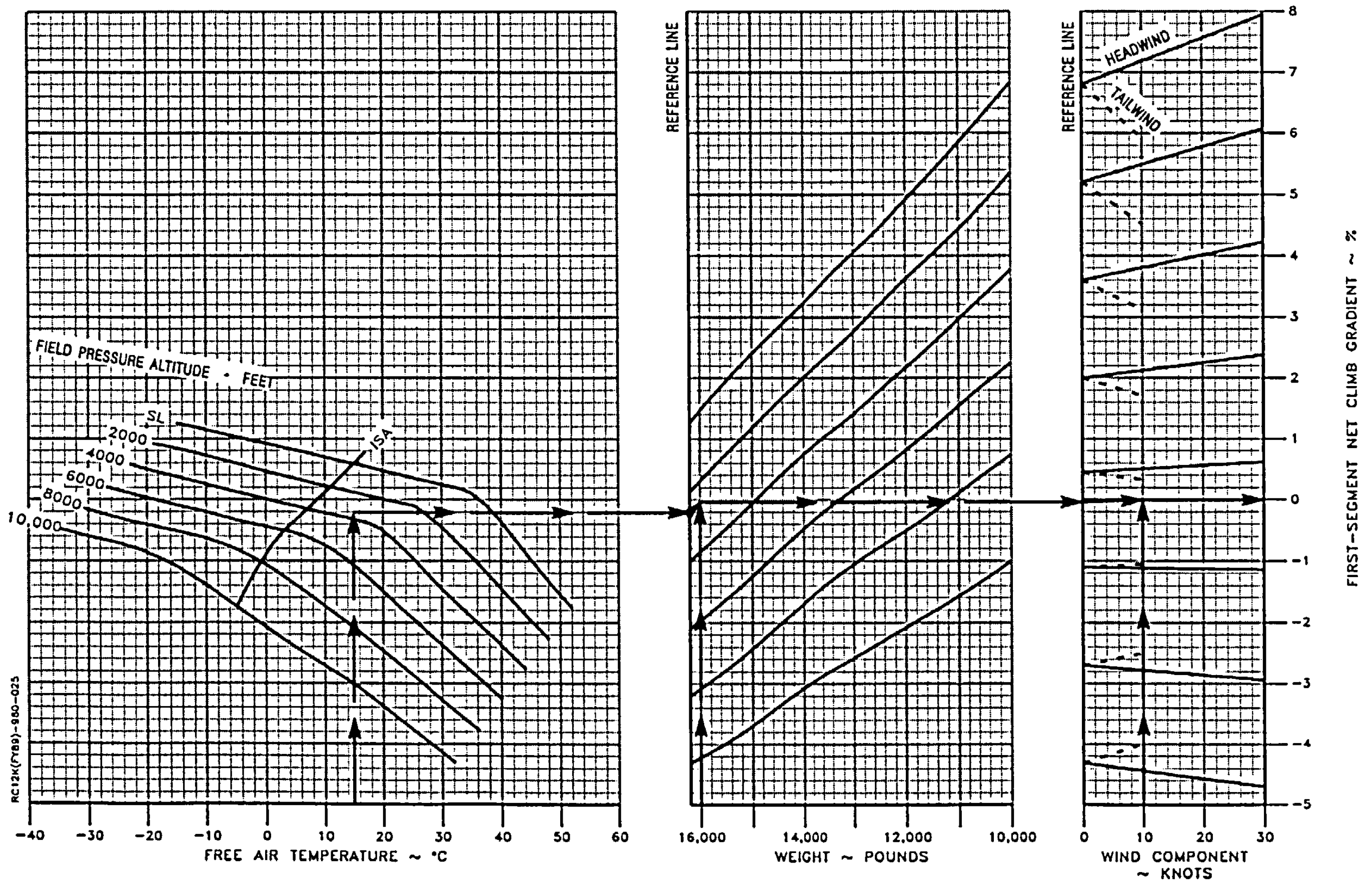
Figure 7-30. Accelerate-Go Distance Over 50 Foot Obstacle - Flaps Approach IR

NET TAKE-OFF FLIGHT PATH - FIRST SEGMENT - FLAPS APPROACH
ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE
INOPERATIVE PROPELLER ....FEATHERED
LANDING GEAR ....DOWN
CLIMB SPEED..................................V_2

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, DECREASE NET CLIMB GRADIENT BY 1.0 PERCENTAGE POINT.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
HEADWIND COMPONENT ....10 KTS
NET CUMB GRADIENT ....0.00 %



☛ CA Decrease net climb gradient by 0.1 percentage points.

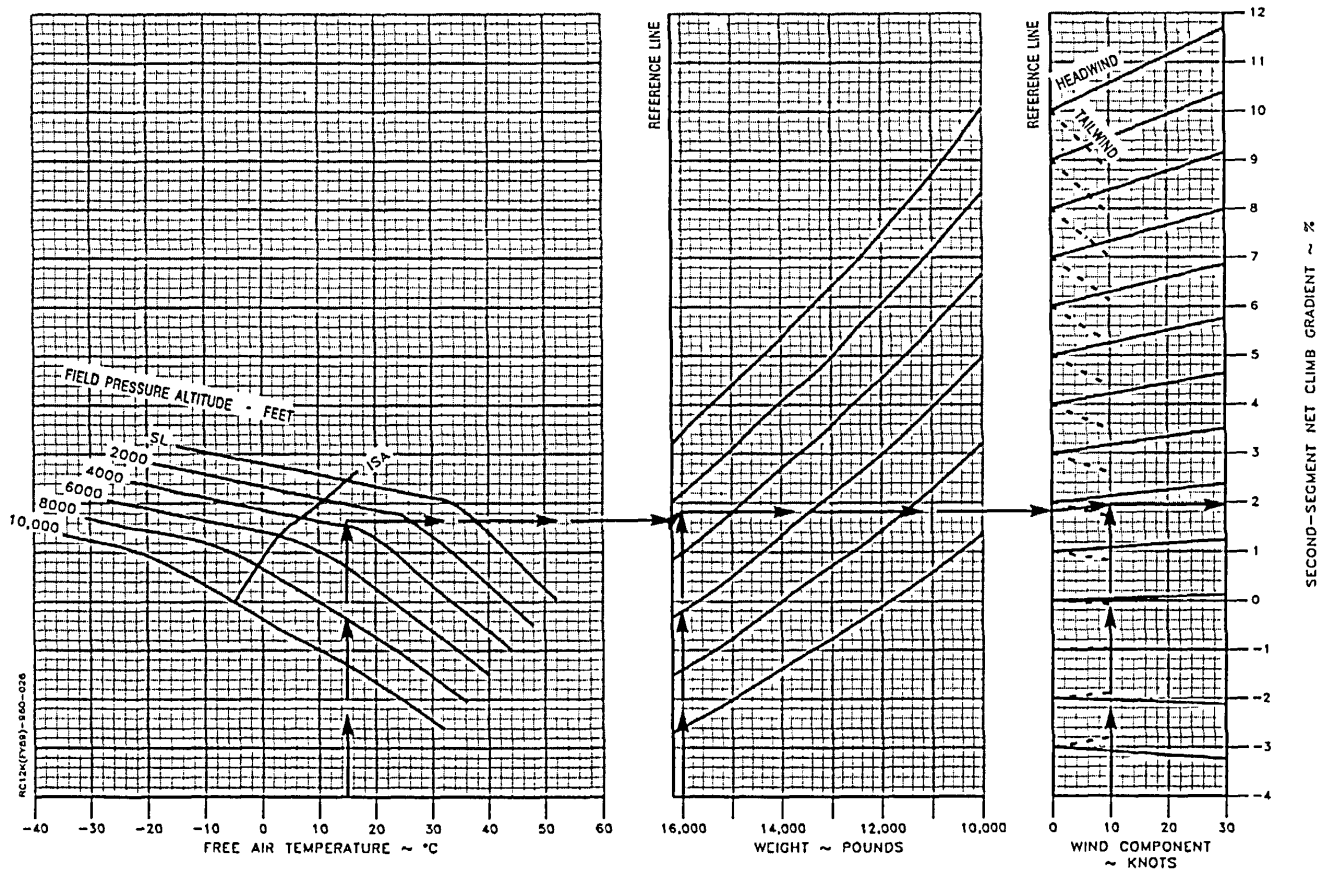
Figure 7-31. Net Take-off Flight Path - First Segment - Flaps Approach IR

NET TAKE-OFF FLIGHT PATH - SECOND SEGMENT - FLAPS APPROACH
ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:
POWER ....STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE
INOPERATIVE PROPELLER ....FEATHERED
LANDING GEAR............................UP
CUMB SPEED ....V_2

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, DECREASE NET CLIMB GRADIENT BY 0.9 PERCENTAGE POINT.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
HEADWIND COMPONENT ....10 KTS
NET CLIMB GRADIENT 1.94%



☛ CA Decrease net climb gradient by 0.1 percentage points.

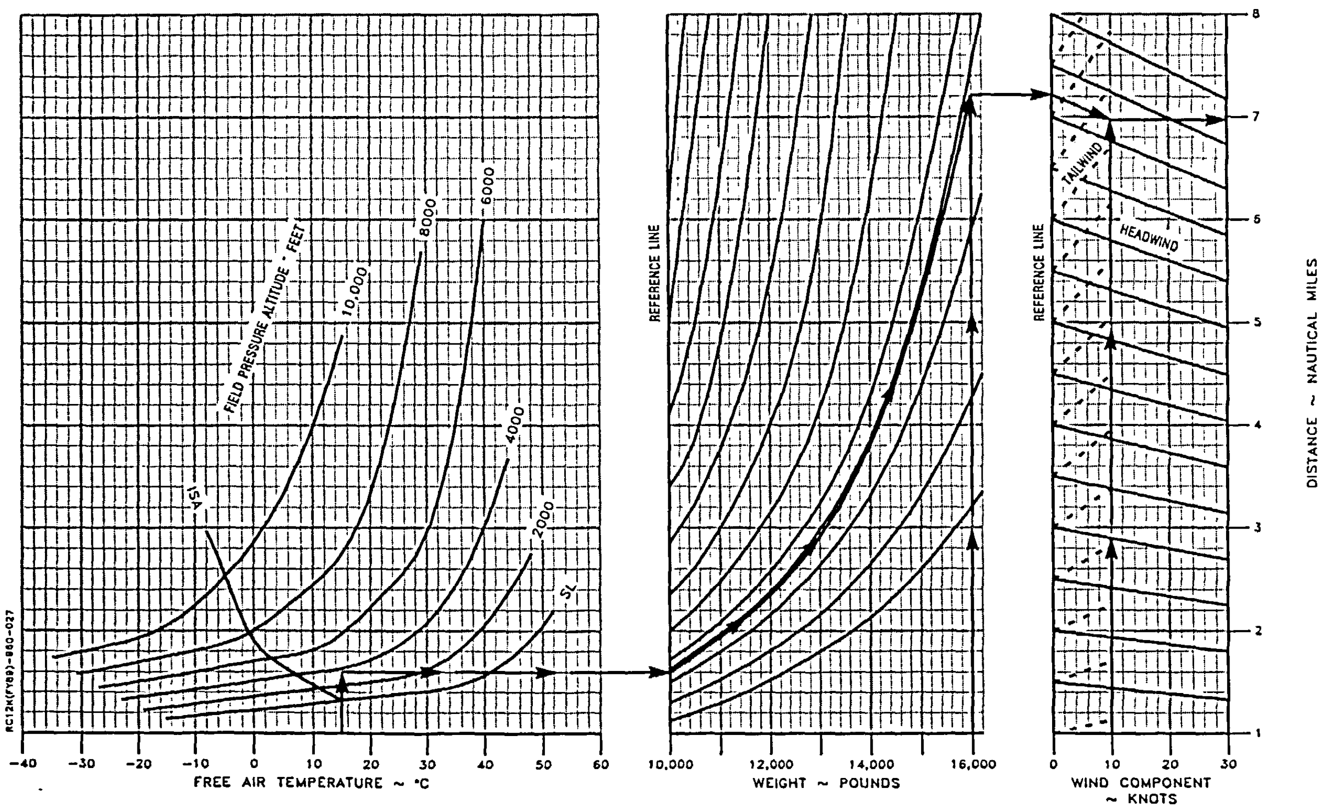
Figure 7-32. Net Take-off Flight Path - Second Segment - Flaps Approach IR

HORIZONTAL DISTANCE FROM REFERENCE ZERO TO THIRD SEGMENT CLIMB - FLAPS APPROACH

ASSOCIATED CONDITIONS:
POWER:
TO 500 FT AGL ....STATIC TAKE-OFF POWER SET BEFORE BRAKE RELEASE
AT 500 FT AGL ....TAKEOFF
AIRSPEED:
TO 500 FT AGL ....V_2
AT 500 FT AGL ....ACCELERATE TO V_{ENR}
INOPERATIVE PROPELLER..........FEATHERED
FLAPS ....RETRACTED AT V_{ENR}
LANDING GEAR ....RETRACTED AFTER LIFT-OFF

NOTE. FOR OPERATION WITH ICE VANES EXTENDED, ADD 2 8 NM TO DISTANCE OBTAINED FROM THIS GRAPH.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16,000 LBS
HEADWIND COMPONENT.........................10 KTS
DISTANCE ....6.97 NM



☛ CA Add 0.1 NM to distance obtained from this graph.

Figure 7-33. Horizontal Distance from Reference Zero to Third Segment Climb - Flaps Approach IR

CLOSE-IN TAKE-OFF FLIGHT PATH

NOTE: TOTAL HEIGHT REQUIRED IS EQUAL TO OBSTACLE HEIGHT PLUS DESIRED MARGIN OF CLEARANCE.

EXAMPLE:

TOTAL HEIGHT REQUIRED ....70 FT
OBSTACLE DISTANCE FROM
REFERENCE ZERO ....920 FT
NET CLIMB GRADIENT REQUIRED 2.2%

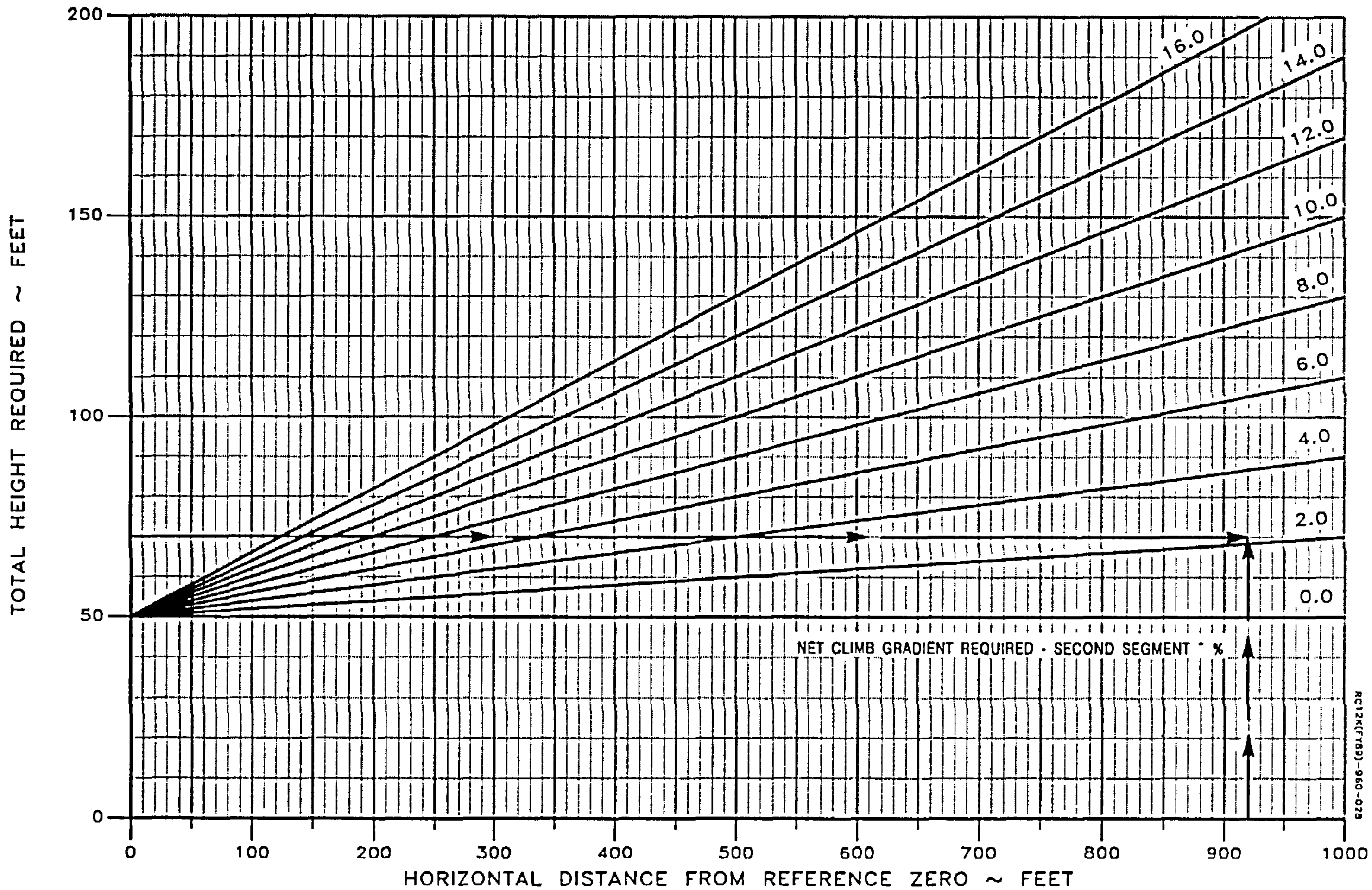


Figure 7-34. Close-in Take-off Flight Path - Flaps Approach

DISTANT TAKE-OFF FLIGHT PATH

NOTE: TOTAL HEIGHT REQUIRED IS EOUAL TO TOTAL HEIGHT REQUIRED TO CLEAR OBSTACLE PLUS DESIRED MIARGIN O CLEARANCE

EXAMPLE:
TOTAL HEIGHT REQUIRED....................190 FT
OBSTACLE DISTANCE FROM
REFERENCE ZERO ....1.8 NM
NET CLIMB GRADIENT REQUIRED 1.28%

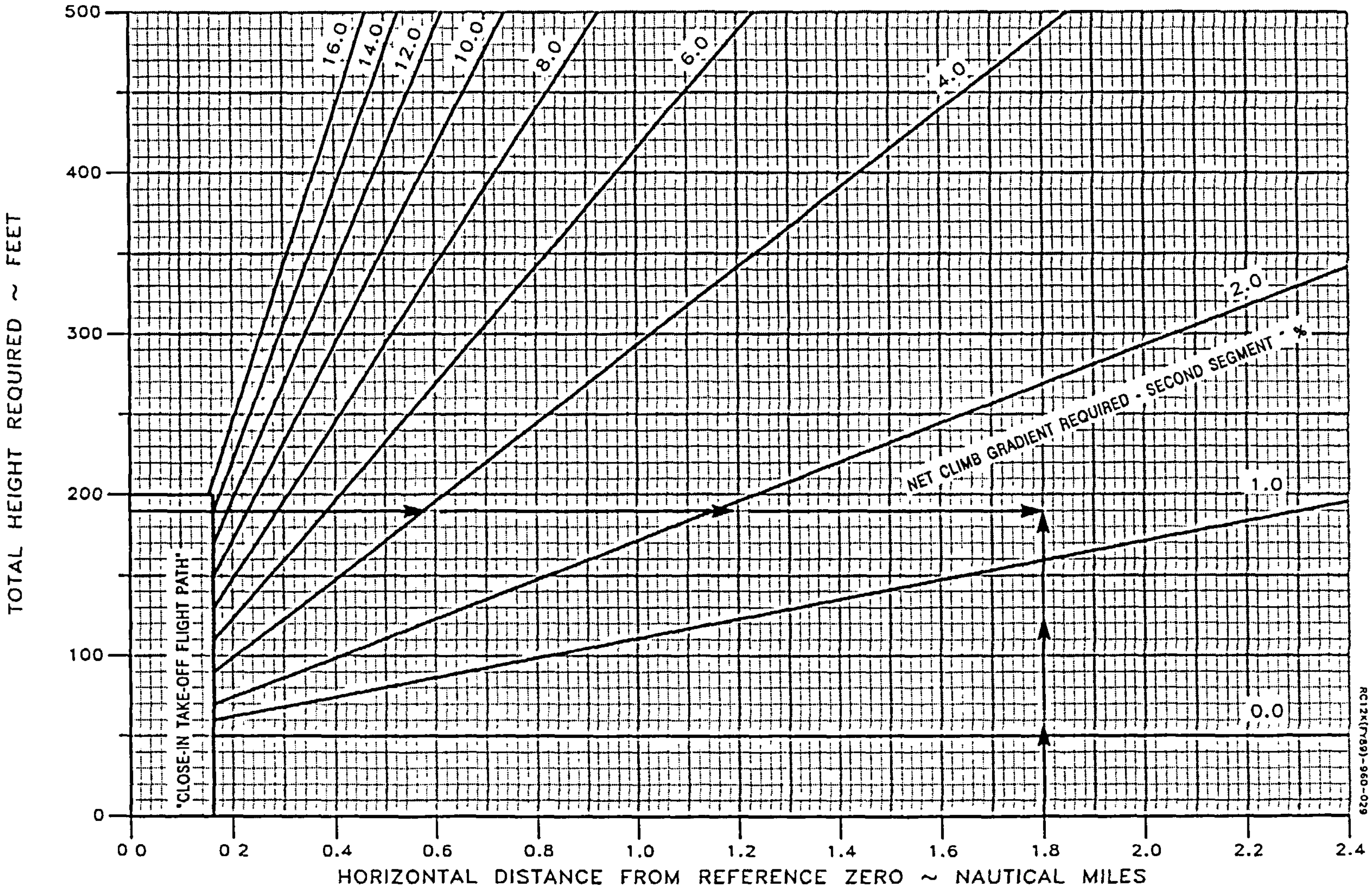


Figure 7-35. Distant Take-off Flight Path - Flaps Approach

NET TAKE-OFF FLIGHT PATH - THIRD SEGMENT
ONE ENGINE INOPERATIVE

V_{ENR} = 130 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:
POWER ....MAXIMUM CONTINUOUS
INOPERATIVE PROPELLER .....FEATHERED
LANDING GEAR ....UP
FLAPS ....UP
CLIMB SPEED ....V_{ENR}

NOTE: FOR OPERATION WITH ICE VANES EXTENDED. DECREASE NET CLIMB GRADIENT BY 1.3 PERCENTAGE POINTS.

EXAMPLE:
FAT ....15°C
FIELD PRESSURE ALTITUDE ....3499 FT
WEIGHT ....16.000 LBS
HEADWIND COMPONENT ....10 KTS
NET CLIMB GRADIENT..........................1.47%

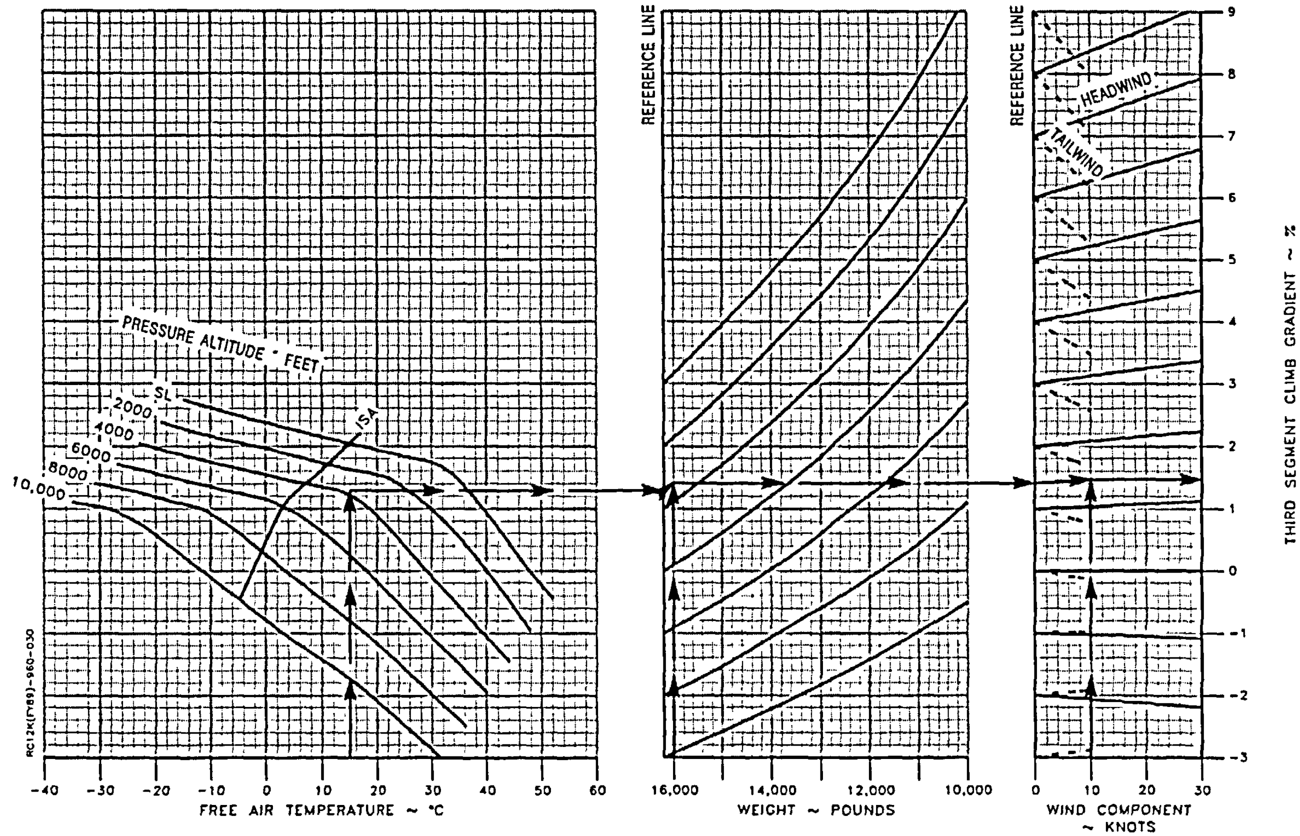


Figure 7-36. Net Take-off Flight Path - Third Segment

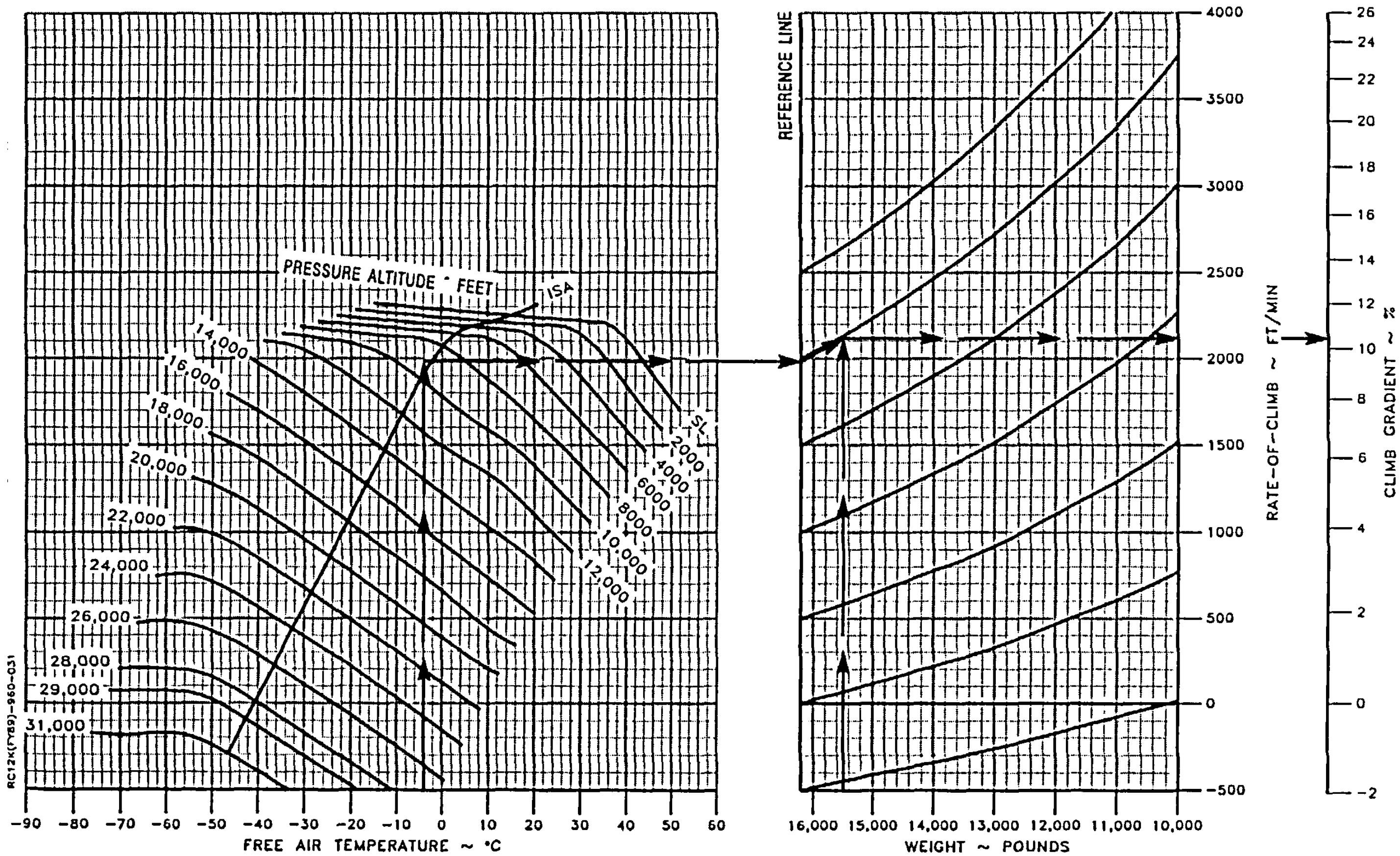
CLIMB - TWO ENGINES - FLAPS UP

CLIMB SPEED = 135 KNOTS (ALL WEIGHTS)

ASSOCIATED CONDITIONS:
POWER ....MAXIMUM CONTINUOUS
LANDING GEAR ....UP

NOTE: DURING OPERATION WITH ICE VANES EXTENDED, RATE-OF-CLIMB WILL BE REDUCED APPROXIMATELY 450 FEET PER MINUTE.

EXAMPLE:
FAT ....-4°C
PRESSURE ALTITUDE ....9000 FT
WEIGHT ....15,500 LBS
RATE-OF-CLIMB ....2119 FT/MIN
CLIMB GRADIENT 10.5%



☛ CA Rate of climb will be reduced by approximately 125 feet per minute.

Figure 7-37. Climb - Two Engines - Flaps Up

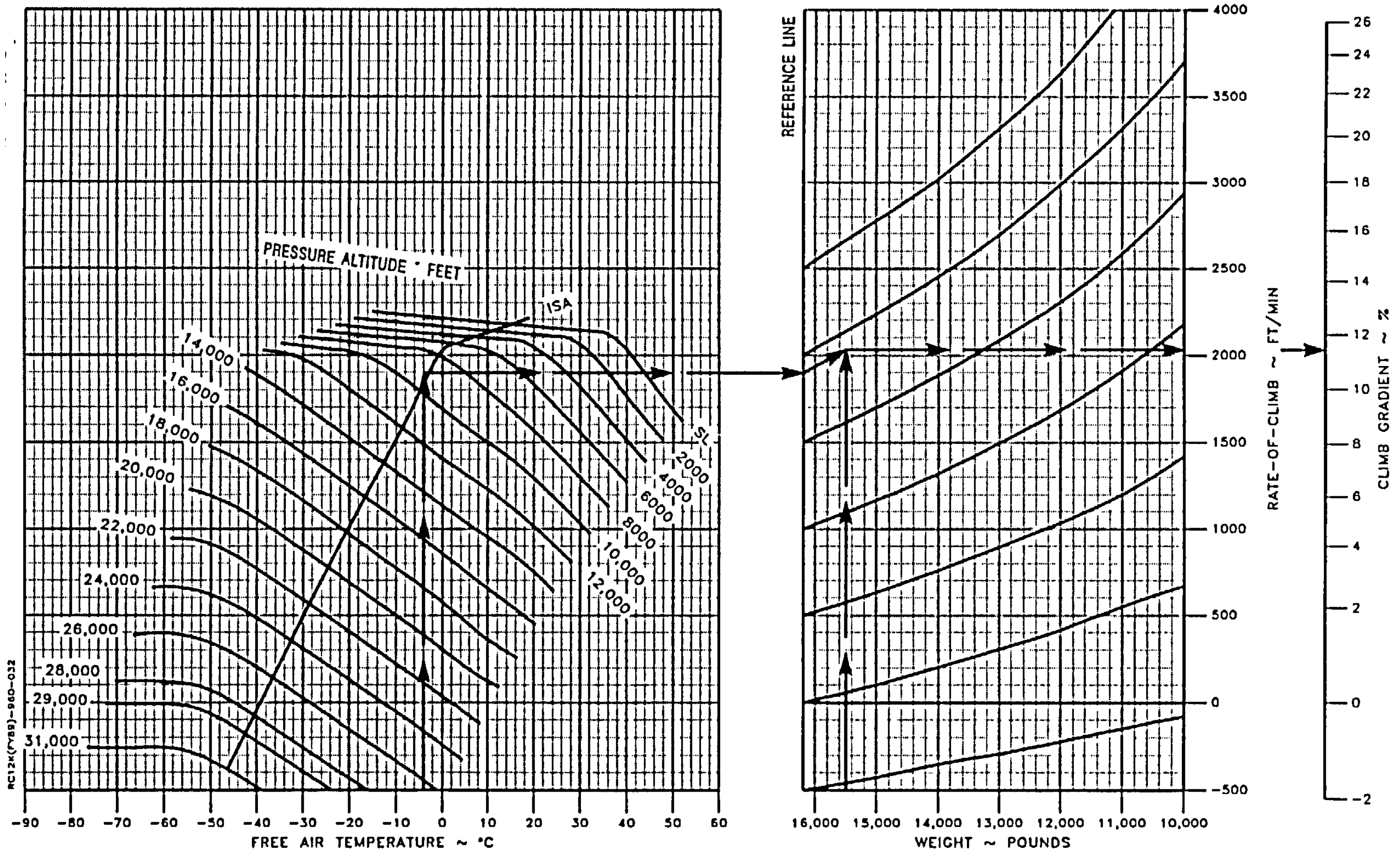
CLIMB - TWO ENGINES - FLAPS APPROACH

ASSOCIATED CONDITIONS:
POWER ....MAXIMUM CONTINUOUS
LANDING GEAR ....UP

CLIMB SPEED = 135 KNOTS (ALL WEIGHTS)

NOTE: DURING OPERATION WITH ICE VANES EXTENDED, RATE-OF-CLIMB WILL BE REDUCED APPROXIMATELY 450 FEET PER MINUTE.

EXAMPLE:
FAT ....-4°C
PRESSURE ALTITUDE ....9000 FT
WEIGHT...15,500 LBS
RATE-OF-CLIMB ....2031 FT/MIN
CLIMB GRADIENT 11.4%



☛ CA Rate of climb will be reduced by approximately 125 feet per minute.

Figure 7-38. Climb - Two Engines - Flaps Approach IR

CLIMB - ONE ENGINE INOPERATIVE

<u>ASSOCIATED CONDITIONS:</u>
POWER ....MAXIMUM CONTINUOUS
FLAPS ....UP
LANDING GEAR ....UP
INOPERATIVE PROPELLER .....FEATHERED

CLIMB SPEED = 130 KNOTS (ALL WEIGHTS)

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, RATE-OF-CLIMB WILL BE REDUCED APPROXIMATELY 200 FT/MIN

<u>EXAMPLE:</u>
FAT ....-4°C
PRESSURE ALTITUDE ....9000 FT
WEIGHT ....15,500 LBS
RATE-OF-CLIMB ....264 FT/MIN
CLIMB GRADIENT 1.4%

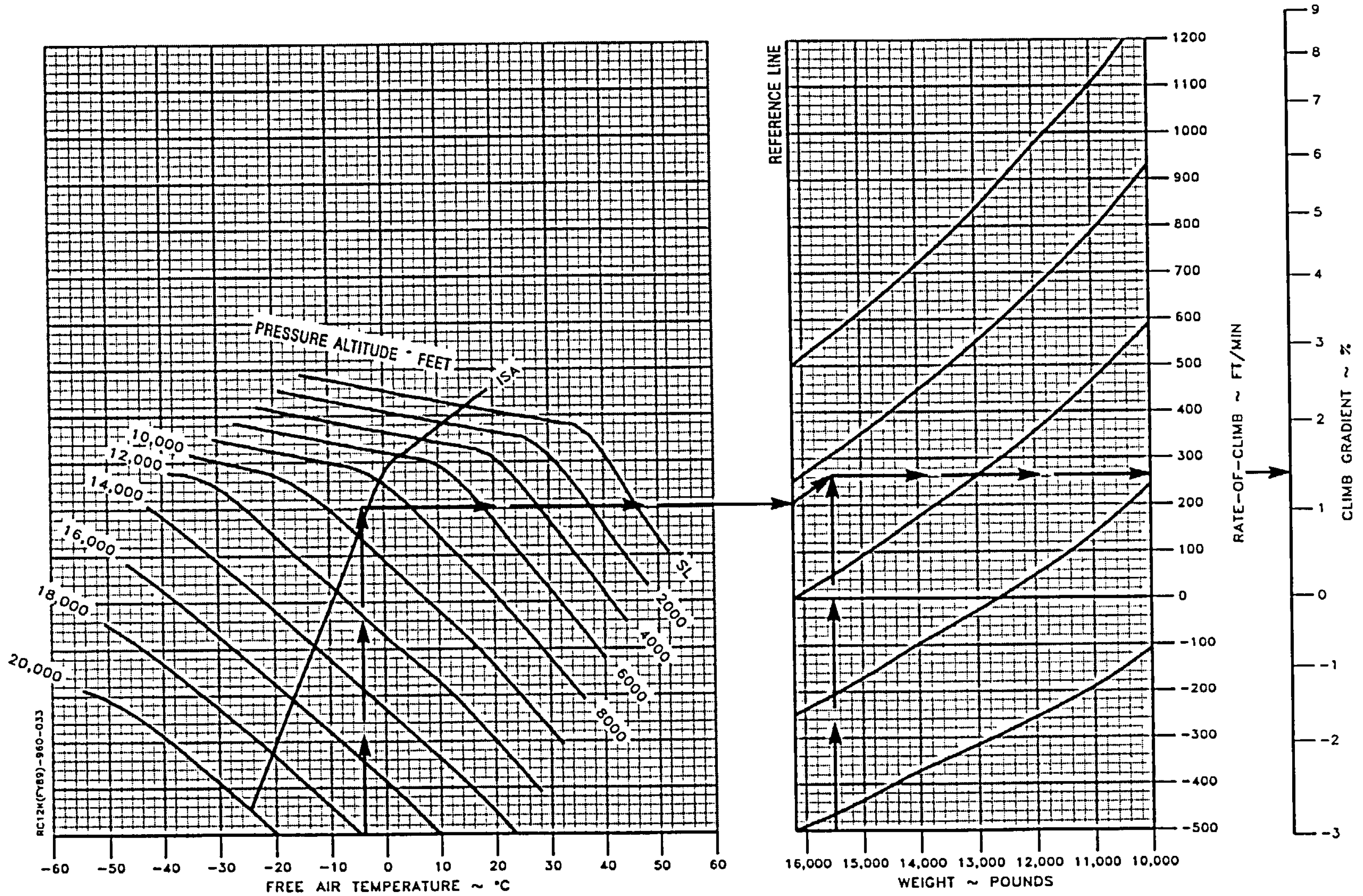


Figure 7-39. Climb - One Engine Inoperative

SERVICE CEILING - ONE ENGINE INOPERATIVE

ASSOCIATED CONDITIONS:
POWER ....MAXIMUM CONTINUOUS
FLAPS ....UP
INOPERATIVE PROPELLER ....FEATHERED
LANDING GEAR ....UP

EXAMPLE:
FAT ....0°C
WEIGHT ....15,659 LBS
SERVICE CEILING ....11,021 FT

NOTES:
1. **SERVICE CEILING IS THE MAXIMUM PRESSURE ALTITUDE AT WHICH THE AIRPLANE IS CAPABLE OF CLIMBING 50 FT/MIN WITH ONE PROPELLER FEATHERED.**
2. **DURING OPERATION WITH ICE VANES EXTENDED, THE SERVICE CEILING WILL BE LOWERED APPROXIMATELY 2000 FEET.**

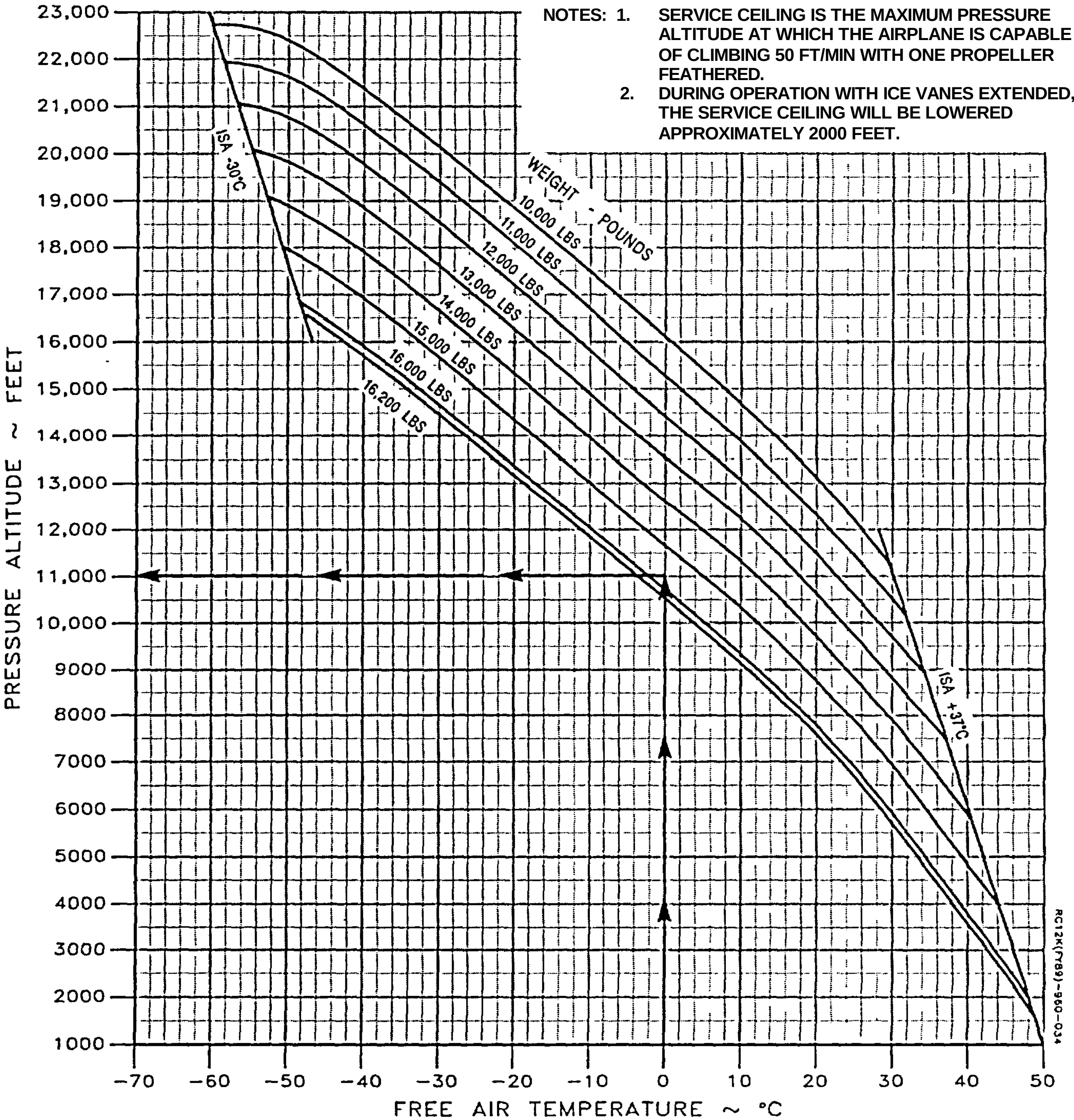


Figure 7-40. Service Ceiling - One Engine Inoperative

TIME, FUEL, AND DISTANCE TO CRUISE CLIMB

ASSOCIATED CONDITIONS:
PROPELLER SPEED ....1700 RPM
POWER ....NORMAL CUMB

NOTES:
1. **ADD 120 LBS FUEL FOR START, TAXI, AND TAKEOFF.**
2. **FOR OPERATION WITH ICE VANES EXTENDED, ADD 15°C TO THE ACTUAL FAT BEFORE ENTERING THE GRAPH.**

ALTITUDE~FEET	CLIMB SPEED~KNOTS
SL TO 10,000	135
10,000 TO 20,000	130
20,000 TO 25,000	125
25,000 TO 35,000	120

EXAMPLE:
FAT AT TAKEOFF.................................15°C
FAT AT CRUISE ....-40°C
AIRPORT PRESSURE ALTITUDE ....3499 FT
CRUISE ALTITUDE ....25,000 FT
INITIAL CLIMB WEIGHT ....16,000 LBS

TIME TO CLIMB (24-2) ....22 MIN
FUEL TO CLIMB (389-48) ....341 LBS
DISIANCE TO CLIMB (63-6) ....57 NM

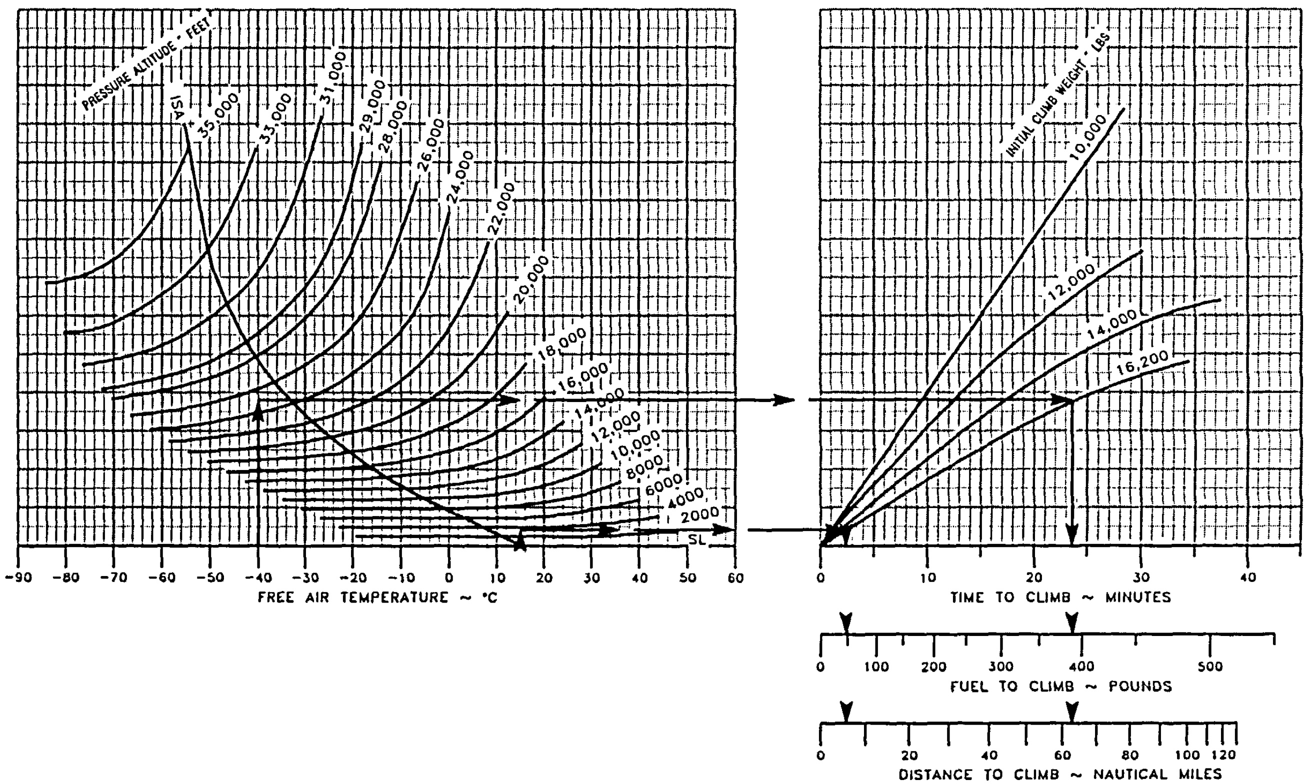


Figure 7-41. Time, Fuel, and Distance to Cruise Climb IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	83	612	1224	212	203	83	611	1222	214	204
2000	-15	-19	83	593	1186	212	208	83	592	1184	213	209
4000	-19	-23	83	575	1150	211	213	83	575	1150	212	215
6000	-23	-27	83	560	1120	209	217	83	559	1118	210	219
8000	-26	-31	83	547	1094	208	222	83	547	1094	209	224
10,000	-30	-35	83	539	1078	205	226	83	538	1076	207	228
12,000	-34	-39	83	531	1062	203	231	83	530	1060	205	233
14,000	-38	-43	83	524	1048	201	236	83	523	1046	203	238
16,000	-41	-47	83	518	1036	199	240	83	518	1036	201	243
18,000	-45	-51	83	514	1028	197	245	83	513	1026	199	248
20,000	-49	-55	83	510	1020	195	250	83	509	1018	197	253
22,000	-53	-59	83	506	1012	193	255	83	505	1010	195	258
24,000	-57	-63	79	479	958	186	255	79	480	960	189	259
26,000	-61	-67	72	442	884	177	251	73	444	888	180	255
28,000	-65	-70	64	400	800	165	243	65	401	802	169	249
29,000	-67	-72	61	379	758	159	239	61	381	762	164	246
31,000	-72	-76	54	341	682	146	228	55	344	688	153	238
33,000	-76	-80	47	305	610	131	213	48	309	618	141	228
35,000	-80	-84	---	---	---	---	---	41	273	546	125	212

BT03277

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G..64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-42. Maximum Cruise Power at 1700 RPM - ISA -300C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	83	611	1222	215	206	83	611	1122	216	206
2000	-15	-19	83	592	1184	214	210	83	592	1184	215	211
4000	-19	-23	83	574	1148	214	216	83	574	1148	215	217
6000	-22	-27	83	559	1118	212	220	83	559	1118	213	221
8000	-26	-31	83	546	1092	211	225	83	546	1092	212	227
10,000	-30	-35	83	538	1076	209	230	83	538	1076	210	231
12,000	-34	-39	83	530	1060	207	235	83	530	1060	208	236
14,000	-37	-43	83	523	1046	205	239	83	523	1046	206	241
16,000	-41	-47	83	517	1034	203	245	83	517	1034	204	246
18,000	-45	-51	83	513	1026	201	250	83	512	1024	202	251
20,000	-49	-55	83	509	1018	199	255	83	508	1016	200	257
22,000	-52	-59	83	505	1010	197	261	83	504	1008	198	263
24,000	-56	-63	79	481	962	191	262	80	482	964	193	264
26,000	-60	-67	73	446	892	183	259	73	447	894	185	262
28,000	-65	-70	66	404	808	173	254	66	405	810	176	258
29,000	-67	-72	62	383	766	168	251	62	385	770	171	255
31,000	-71	-76	55	346	692	157	244	55	347	694	161	249
33,000	-75	-80	49	311	622	147	237	49	313	626	151	244
35,000	-80	-84	42	277	554	134	226	43	279	558	140	235

BT03278

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-42. Maximum Cruise Power at 1700 RPM - ISA -30°C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	83	632	1264	220	210	83	631	1262	221	211
2000	-15	-19	83	613	1226	219	215	83	612	1224	220	216
4000	-18	-23	83	595	1190	218	220	83	594	1188	220	222
6000	-22	-27	83	579	1158	217	226	83	578	1156	219	227
8000	-26	-31	83	568	1136	215	230	83	567	1134	217	232
10,000	-30	-35	83	558	1116	213	234	83	557	1114	215	236
12,000	-34	-39	83	547	1094	211	239	83	547	1094	212	241
14,000	-37	-43	83	538	1076	209	244	83	538	1076	210	246
16,000	-41	-47	83	531	1062	206	249	83	530	1060	208	251
18,000	-45	-51	83	525	1050	204	254	83	524	1048	206	256
20,000	-48	-55	83	519	1038	202	259	83	519	1038	205	262
22,000	-52	-59	83	511	1022	199	264	83	512	1024	202	267
24,000	-56	-63	78	482	964	192	263	78	483	966	195	267
26,000	-60	-67	72	446	892	183	259	72	448	896	187	264
28,000	-65	-70	64	403	806	171	252	65	406	812	176	258
29,000	-67	-72	60	382	764	165	247	61	385	770	170	254
31,000	-71	-76	54	344	688	152	237	54	346	692	159	246
33,000	-76	-80	47	308	616	137	222	48	311	622	146	236
35,000	-81	-84	40	268	536	111	190	41	275	550	131	221

BT05593

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-43. Maximum Cruise Power at 1700 RPM - ISA -300C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA -30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	83	631	1262	222	212	83	631	1262	223	213
2000	-15	-19	83	612	1224	221	217	83	612	1224	222	218
4000	-18	-23	83	594	1188	221	223	83	594	1188	222	224
6000	-22	-27	83	578	1156	219	228	83	578	1156	220	229
8000	-26	-31	83	567	1134	218	233	83	566	1132	219	234
10,000	-30	-35	83	557	1114	216	238	83	557	1114	217	239
12,000	-33	-39	83	546	1092	214	242	83	546	1092	215	244
14,000	-37	-43	83	537	1074	212	247	83	537	1074	213	249
16,000	-41	-47	83	530	1060	210	253	83	530	1060	211	254
18,000	-45	-51	83	524	1048	208	258	83	523	1046	210	260
20,000	-48	-55	83	518	1036	206	264	83	518	1036	208	266
22,000	-52	-59	83	512	1024	204	269	83	513	1026	206	271
24,000	-56	-63	79	484	968	197	270	79	484	968	199	272
26,000	-60	-67	73	449	898	189	268	73	450	900	192	271
28,000	-64	-70	65	408	816	179	263	66	410	820	182	266
29,000	-66	-72	62	387	774	174	260	62	389	778	177	264
31,000	-70	-76	55	349	698	163	253	55	351	702	167	258
33,000	-75	-80	48	314	628	152	245	49	316	632	157	252
35,000	-79	-84	42	279	558	140	234	43	281	562	145	243

BT055932

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-43. Maximum Cruise Power at 1700 RPM - ISA -300C (Sheet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA -20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	83	614	1228	211	206	83	613	1226	213	207
2000	-6	-9	83	594	1188	211	211	83	593	1186	212	213
4000	-9	-13	83	576	1152	209	215	83	575	1150	211	217
6000	-12	-17	83	561	1122	208	220	83	561	1122	209	222
8000	-16	-21	83	551	1102	206	225	83	550	1100	207	226
10,000	-20	-25	83	542	1084	203	229	83	541	1082	205	231
12,000	-24	-29	83	533	1066	201	234	83	533	1066	203	236
14,000	-27	-33	83	526	1052	199	238	83	525	1050	201	241
16,000	-31	-37	83	519	1038	197	243	83	519	1038	199	246
18,000	-35	-41	83	514	1028	195	248	83	514	1028	197	251
20,000	-39	-45	83	512	1024	193	253	83	511	1022	195	256
22,000	-43	-49	79	970	186	253	257	79	486	972	189	256
24,000	-47	-53	74	455	910	178	251	74	455	910	182	255
26,000	-51	-57	68	423	846	170	248	69	424	848	174	253
28,000	-55	-60	63	391	782	161	243	63	393	786	165	249
29,000	-59	-64	57	359	718	150	236	60	377	754	161	247
31,000	-62	-66	54	341	682	143	230	54	344	638	150	240
33,000	-66	-70	47	305	610	127	213	48	309	618	138	229
35,000	-70	-74-	---	---	---	---	---	41	273	546	122	212

BT03279

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-44. Maximum Cruise Power at 1700 RPM - ISA -20°C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	83	613	1226	214	209	83	613	1226	215	210
2000	-5	-9	83	593	1186	213	214	83	593	1186	215	215
4000	-9	-13	83	575	1150	212	218	83	575	1150	213	220
6000	-12	-17	83	561	1122	211	224	83	560	1120	212	225
8000	-16	-21	83	550	1100	209	228	83	550	1100	210	229
10,000	-20	-25	83	541	1082	207	233	83	541	1082	208	234
12,000	-24	-29	83	532	1064	205	237	83	532	1064	206	239
14,000	-27	-33	83	525	1050	203	242	83	525	1050	204	244
16,000	-31	-37	83	519	1038	201	248	83	518	1036	202	249
18,000	-35	-41	83	513	1026	199	253	83	513	1026	200	254
20,000	-38	-45	83	511	1022	197	258	83	510	1020	198	260
22,000	-42	-49	79	486	972	191	259	80	487	974	193	262
24,000	-46	-53	74	456	912	184	259	75	457	914	186	261
26,000	-50	-57	69	425	850	177	257	69	426	852	179	260
28,000	-54	-60	63	394	788	169	254	64	395	790	172	258
29,000	-57	-62	61	379	758	165	252	61	380	760	168	257
31,000	-61	-66	55	346	692	155	247	55	347	694	159	253
33,000	-65	-70	48	312	624	145	240	49	313	626	149	246
35,000	-70	-74	42	277	554	132	228	43	279	558	138	238

BT03280

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-44. Maximum Cruise Power at 1700 RPM - ISA -20° C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	83	633	1266	219	213	83	633	1266	220	214
2000	-5	-9	83	613	1226	218	218	83	613	1226	219	220
4000	-8	-13	83	596	1192	217	224	83	596	1192	219	225
6000	-12	-17	83	583	1166	215	228	83	583	1166	217	230
8000	-16	-21	83	571	1142	213	232	83	571	1142	215	234
10,000	-20	-25	83	561	1122	211	237	83	560	1120	212	239
12,000	-23	-29	83	550	1100	209	242	83	549	1098	210	244
14,000	-27	-33	83	540	1080	207	247	83	540	1080	208	249
16,000	-31	-37	83	532	1064	205	252	83	531	1062	206	254
18,000	-35	-41	83	525	1050	202	257	83	525	1050	204	260
20,000	-38	-45	82	516	1032	199	261	83	517	1034	201	264
22,000	-42	-49	78	486	972	192	260	78	487	974	195	264
24,000	-46	-53	73	456	912	184	259	73	457	914	188	263
26,000	-50	-57	68	425	850	176	256	68	426	852	180	261
28,000	-55	-60	62	393	786	166	251	63	395	790	171	257
29,000	-57	-62	59	377	754	161	248	60	379	758	166	255
31,000	-61	-66	53	344	688	149	239	54	346	692	156	248
33,000	-66	-70	47	307	614	134	223	48	311	622	144	238
35,000	-70	-74-	---	---	---	---	---	41	275	550	128	221

BT055933

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-45. Maximum Cruise Power at 1700 RPM - ISA -20°C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA -20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	83	633	1266	221	215	83	632	1264	222	216
2000	-4	-9	83	612	1224	221	221	83	612	1224	222	222
4000	-8	-13	83	596	1192	220	227	83	595	1190	221	228
6000	-12	-17	83	582	1164	218	231	83	582	1164	219	232
8000	-16	-21	83	570	1140	216	236	83	570	1140	217	237
10,000	-19	-25	83	560	1120	214	240	83	560	1120	215	242
12,000	-23	-29	83	549	1098	212	245	83	549	1098	213	247
14,000	-27	-33	83	539	1078	210	251	83	539	1078	211	252
16,000	-31	-37	83	531	1062	208	256	83	531	1062	210	258
18,000	-34	-41	83	524	1048	206	262	83	524	1048	208	263
20,000	-38	-45	83	517	1034	203	266	83	517	1034	205	268
22,000	-42	-49	78	487	974	197	267	78	488	976	199	269
24,000	-46	-53	73	458	916	190	266	74	458	916	192	269
26,000	-50	-57	68	427	854	183	265	69	428	856	185	268
28,000	-54	-60	63	396	792	175	262	63	397	794	177	266
29,000	-56	-62	60	381	762	170	261	61	382	764	173	265
31,000	-60	-66	55	348	696	161	256	55	350	700	165	261
33,000	-65	-70	48	314	628	150	248	49	316	632	155	255
35,000	-69	-74	42	279	558	137	237	42	281	562	143	246

BT055934

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-45. Maximum Cruise Power at 1700 RPM - ISA -20°C (Sheet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA -10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	83	615	1230	211	209	83	615	1230	212	210
2000	5	1	83	595	1190	210	215	83	595	1190	212	216
4000	1	-3	83	579	1158	208	219	83	579	1158	210	220
6000	-2	-7	83	565	1130	206	223	83	565	1130	208	224
8000	-6	-11	83	553	1106	204	277	83	553	1106	206	229
10,000	-10	-15	83	543	1086	202	231	83	543	1086	203	234
12,000	-14	-19	83	534	1068	200	236	83	534	1068	201	238
14,000	-17	-23	83	527	1054	197	241	83	527	1054	199	243
16,000	-21	-27	83	521	1042	195	246	83	520	1040	197	249
18,000	-25	-31	83	513	1026	193	250	83	514	1028	195	253
20,000	-29	-35	79	489	978	186	250	79	489	978	189	254
22,000	-33	-39	74	460	920	179	249	74	461	922	182	253
24,000	-37	-43	69	431	862	171	246	69	432	864	174	251
26,000	-41	-47	64	401	802	162	242	64	402	804	166	248
28,000	-45	-50	58	371	742	153	237	59	373	746	158	244
29,000	-47	-52	56	357	714	148	233	54	344	688	149	239
31,000	-52	-56	51	329	658	136	224	51	330	660	144	236
33,000	-36	-40	---	---	---	---	---	46	303	606	133	227
35,000	-60	-64-	---	---	---	---	---	41	273	546	119	212

BT03281

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-46. Maximum Cruise Power at 1700 RPM - ISA -10°C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	83	614	1228	213	212	83	614	1228	214	213
2000	5	1	83	594	1188	213	218	83	594	1188	214	219
4000	2	-3	83	578	1156	211	222	83	578	1156	212	223
6000	-2	-7	83	564	1128	209	226	83	564	1128	210	227
8000	-6	-11	83	553	1106	207	231	83	552	1104	208	232
10,000	-10	-15	83	542	1084	205	235	83	542	1084	206	237
12,000	-13	-19	83	534	1068	203	240	83	533	1066	204	242
14,000	-17	-23	83	526	1052	201	245	83	526	1052	202	247
16,000	-21	-27	83	520	1040	199	251	83	520	1040	201	252
18,000	-25	-31	83	514	1028	197	256	83	514	1028	198	258
20,000	-29	-35	79	490	980	191	256	79	490	980	193	259
22,000	-33	-39	74	461	922	184	256	74	461	922	186	259
24,000	-37	-43	69	432	864	177	255	70	433	866	180	258
26,000	-41	-47	64	403	806	170	253	64	403	806	172	257
28,000	-45	-50	59	373	746	162	250	59	374	748	165	254
29,000	-47	-52	57	359	718	158	248	57	360	720	161	253
31,000	-51	-56	52	332	664	149	244	52	332	664	153	250
33,000	-55	-60	47	305	610	140	239	47	306	612	145	246
35,000	-59	-64	42	277	554	130	230	42	279	558	136	241

BT03282

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-46. Maximum Cruise Power at 1700 RPM - ISA -10°C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA -10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	83	637	1274	219	217	83	636	1272	220	218
2000	6	1	83	618	1236	218	222	83	617	1234	219	224
4000	2	-3	83	601	1202	215	226	83	601	1202	217	228
6000	-2	-7	83	586	1172	213	230	83	585	1170	215	232
8000	-6	-11	83	573	1146	211	235	83	572	1144	213	237
10,000	-10	-15	83	562	1124	209	239	83	561	1122	211	241
12,000	-13	-19	83	551	1102	207	244	83	550	1100	208	246
14,000	-17	-23	83	541	1082	205	249	83	541	1082	207	252
16,000	-21	-27	83	533	1066	203	255	83	533	1066	205	257
18,000	-25	-31	81	514	1028	198	257	81	514	1028	200	260
20,000	-29	-35	77	490	980	192	257	77	490	980	194	261
22,000	-33	-39	73	461	922	184	256	73	461	922	187	260
24,000	-37	-43	68	432	864	176	254	68	433	866	180	258
26,000	-41	-47	63	402	804	168	250	63	403	806	172	256
28,000	-45	-50	58	373	746	158	245	58	374	748	163	252
29,000	-47	-52	55	358	716	153	242	56	359	718	159	250
31,000	-51	-56	50	330	660	142	233	51	332	664	149	244
33,000	-56	-60	45	301	602	127	218	46	304	608	139	236
35,000	-60	-64	---	---	---	---	---	41	275	550	125	222

BT055935

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 747. Maximum Cruise Power at 1700 RPM - ISA -10°C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA -10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	83	636	1272	221	219	83	635	1270	222	220
2000	6	1	83	617	1234	220	225	83	617	1234	222	226
4000	2	-3	83	600	1200	218	229	83	600	1200	220	230
6000	-2	-7	83	585	1170	216	234	83	585	1170	218	235
8000	-6	-11	83	572	1144	214	238	83	572	1144	215	240
10,000	-9	-15	83	561	1122	212	243	83	561	1122	213	244
12,000	-13	-19	83	550	1100	210	248	83	550	1100	211	250
14,000	-17	-23	83	540	1080	208	254	83	540	1080	210	255
16,000	-20	-27	83	532	1064	206	259	83	532	1064	208	261
18,000	-24	-31	81	514	1028	202	262	81	515	1030	204	264
20,000	-28	-35	78	490	980	196	263	78	490	980	198	266
22,000	-32	-39	73	462	924	190	263	73	462	924	192	266
24,000	-36	-43	68	433	866	183	262	69	434	868	185	265
26,000	-40	-47	64	404	808	175	261	64	405	810	178	264
28,000	-44	-50	59	375	750	167	258	59	375	750	170	262
29,000	-46	-52	56	360	720	163	256	56	361	722	167	261
31,000	-51	-56	51	333	666	155	252	52	334	668	159	258
33,000	-55	-60	47	306	612	145	247	47	308	616	150	254
35,000	-59	-64	42	279	558	135	239	42	281	562	141	249

BT055936

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-47. Maximum Cruise Power at 1700 RPM - ISA -10°C (Sheet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	83	613	1226	211	213	83	613	1226	212	214
2000	15	11	83	599	1198	209	217	83	598	1196	210	218
4000	12	7	83	584	1168	206	221	83	583	1166	208	223
6000	8	3	83	569	1138	204	225	83	568	1136	206	227
8000	4	-1	83	556	1112	202	229	83	555	1110	204	231
10,000	0	-5	83	544	1088	200	234	83	544	1088	202	236
12,000	-4	-9	83	534	1068	198	239	83	534	1068	200	241
14,000	-7	-13	83	527	1054	196	244	83	527	1054	198	246
16,000	-11	-17	81	509	1018	191	245	81	509	1018	193	248
18,000	-15	-21	76	481	962	184	245	77	481	962	187	248
20,000	-19	-25	72	455	910	177	244	72	456	912	181	248
22,000	-23	-29	68	430	860	170	242	68	430	860	174	247
24,000	-27	-33	64	404	808	163	240	64	405	810	167	246
26,000	-31	-37	59	378	756	154	236	59	379	758	159	243
28,000	-36	-40	54	351	702	144	230	55	352	704	151	239
29,000	-40	-44	49	324	648	133	220	52	339	678	146	236
31,000	-42	-46	47	311	622	126	213	48	313	626	136	229
33,000	-46	-50	---	---	---	---	---	43	288	576	125	219
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03283

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-48. Maximum Cruise Power at 1700 RPM - ISA (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	83	612	1224	213	215	83	612	1224	214	216
2000	15	11	83	598	1196	212	220	83	598	1196	213	221
4000	12	7	83	583	1166	209	224	83	583	1166	211	225
6000	8	3	83	568	1136	207	228	83	568	1136	209	230
8000	4	-1	83	555	1110	205	233	83	555	1110	207	234
10,000	0	-5	83	544	1088	203	238	83	543	1086	205	239
12,000	-3	-9	83	533	1066	201	243	83	533	1066	203	244
14,000	-7	-13	83	527	1054	200	248	83	526	1052	201	250
16,000	-11	-17	81	510	1020	195	251	81	510	1020	197	253
18,000	-15	-21	77	481	962	189	251	77	482	964	191	253
20,000	-19	-25	73	456	912	183	251	73	456	912	185	254
22,000	-23	-29	68	431	862	177	251	68	431	862	179	254
24,000	-27	-33	64	405	810	170	250	64	406	812	172	254
26,000	-31	-37	60	380	760	163	248	60	380	760	166	253
28,000	-35	-40	55	353	706	155	246	55	354	708	159	251
29,000	-37	-42	53	340	680	151	244	53	341	682	155	249
31,000	-41	-46	48	315	630	143	239	49	316	632	147	246
33,000	-45	-50	44	290	580	133	233	44	291	582	139	242
35,000	-50	-54	39	264	528	123	224	40	266	532	130	236

BT03284

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-48. Maximum Cruise Power at 1700 RPM - ISA (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	83	636	1272	218	220	83	635	1270	219	221
2000	16	11	83	621	1242	216	224	83	620	1240	217	226
4000	12	7	83	605	1210	214	228	83	605	1210	215	230
6000	8	3	83	589	1178	211	233	83	589	1178	213	235
8000	4	-1	83	575	1150	209	237	83	574	1148	211	239
10,000	1	-5	83	562	1124	207	242	83	561	1122	209	244
12,000	-3	-9	83	550	1100	205	247	83	550	1100	207	249
14,000	-7	-13	83	540	1080	202	252	83	540	1080	205	254
16,000	-11	-17	79	510	1020	196	252	79	510	1020	198	255
18,000	-15	-21	75	481	962	189	251	75	482	964	192	255
20,000	-19	-25	71	456	912	183	251	71	456	912	186	255
22,000	-23	-29	67	431	862	175	249	67	431	862	179	254
24,000	-27	-33	63	405	810	168	247	63	406	812	172	253
26,000	-31	-37	58	379	758	159	244	59	380	760	164	251
28,000	-35	-40	54	352	704	150	238	54	354	708	156	247
29,000	-37	-42	51	339	678	144	234	52	340	680	151	244
31,000	-42	-46	47	312	624	132	222	47	314	628	142	238
33,000	-47	-50	42	285	570	113	200	43	289	578	130	228
35,000	-50	-54	---	---	---	---	---	38	263	526	115	211

BT055937

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-49. Maximum Cruise Power at 1700 RPM - ISA (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	20	15	83	635	1270	221	223	83	635	1270	222	224
2000	16	11	83	620	1240	219	227	83	619	1238	220	228
4000	12	7	83	604	1208	217	232	83	604	1208	218	233
6000	8	3	83	588	1176	215	236	83	588	1176	216	237
8000	-5	-1	83	574	1148	212	241	83	574	1148	214	242
10,000	1	-5	83	561	1122	210	246	83	561	1122	212	247
12,000	-3	-9	83	549	1098	209	251	83	549	1098	210	253
14,000	-7	-13	83	541	1082	206	256	83	541	1082	208	258
16,000	-11	-17	79	511	1022	200	257	79	511	1022	202	259
18,000	-15	-21	75	482	964	194	257	75	482	964	196	260
20,000	-18	-25	71	457	914	188	258	71	457	914	190	261
22,000	-22	-29	67	432	864	182	258	67	432	864	184	261
24,000	-26	-33	63	406	812	175	257	63	407	814	178	261
26,000	-30	-37	59	381	762	168	256	59	381	762	171	260
28,000	-35	-40	54	355	710	160	253	55	355	710	164	258
29,000	-37	-42	52	341	682	156	252	52	342	684	160	257
31,000	-41	-46	48	316	632	148	247	48	317	634	152	254
33,000	-45	-50	43	291	582	138	241	44	292	584	144	250
35,000	-49	-54	39	265	530	128	233	39	267	534	135	244

BT055938

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-49. Maximum Cruise Power at 1700 RPM - ISA (Sheet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA +10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	83	619	1238	209	215	83	619	1238	211	216
2000	25	21	83	599	1198	207	219	83	599	1198	208	220
4000	22	17	83	581	1162	205	223	83	580	1160	206	225
6000	18	13	83	565	1130	202	227	83	565	1130	204	229
8000	14	9	83	553	1106	200	232	83	553	1106	202	234
10,000	10	5	83	545	1090	198	237	83	545	1090	200	239
12,000	7	1	83	533	1066	196	241	83	534	1068	198	243
14,000	3	-3	78	502	1004	189	240	78	503	1006	191	243
16,000	-1	-7	74	473	946	182	239	74	473	946	185	243
18,000	-5	-11	69	445	890	175	238	70	446	892	178	242
20,000	-9	-15	65	420	840	168	236	66	421	842	171	241
22,000	-14	-19	61	396	792	160	234	61	397	794	165	239
24,000	-18	-23	57	372	744	152	230	57	373	746	157	237
26,000	-22	-27	53	348	696	143	225	53	349	698	150	234
28,000	-26	-30	49	325	650	133	217	50	327	654	141	230
29,000	-28	-32	47	314	628	127	212	48	316	632	137	227
31,000	-31	-36-	---	---	---	---	---	44	293	586	127	219
33,000	-36	-40	---	---	---	---	---	---	---	---	---	---
35,000	-40	-44	---	---	---	---	---	---	---	---	---	---

BT03285

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-50. Maximum Cruise Power at 1700 RPM - ISA +10°C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA +10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	83	618	1236	212	218	83	618	1236	213	219
2000	26	21	83	598	1196	210	222	83	598	1196	211	223
4000	23	17	83	580	1160	208	226	83	580	1160	209	227
6000	18	13	83	564	1128	206	231	83	564	1128	207	232
8000	14	9	83	552	1104	204	236	83	552	1104	205	237
10,000	11	5	83	545	1090	202	241	83	544	1088	203	242
12,000	7	1	83	534	1068	200	246	83	534	1068	201	247
14,000	3	-3	79	503	1006	193	246	79	503	1006	195	248
16,000	-1	-7	74	474	948	187	245	74	474	948	189	248
18,000	-5	-11	70	446	892	181	245	70	447	894	183	248
20,000	-9	-15	66	422	844	174	245	66	422	844	177	248
22,000	-13	-19	62	398	796	168	244	62	398	796	170	248
24,000	-17	-23	58	373	746	161	243	58	374	748	164	247
26,000	-21	-27	54	350	708	154	241	54	351	702	157	246
28,000	-25	-30	50	328	656	147	238	50	329	658	151	244
29,000	-27	-32	48	317	634	143	237	48	318	636	147	243
31,000	-31	-36	44	294	588	135	232	45	295	590	140	241
33,000	-36	-40	40	272	544	125	225	41	273	546	132	237
35,000	-39	-44	36	248	496	114	215	37	250	500	123	230

BT03286

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-50. Maximum Cruise Power at 1700 RPM - ISA +10°C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA + 10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	30	25	83	640	1280	216	222	83	640	1280	218	224
2000	26	21	83	620	1240	214	226	83	620	1240	216	228
4000	22	17	83	602	1204	212	231	83	601	1202	214	232
6000	18	13	83	585	1170	210	235	83	585	1170	211	237
8000	14	9	83	572	1144	208	240	83	572	1144	209	242
10,000	11	5	83	563	1126	205	245	83	563	1126	207	247
12,000	7	1	80	534	1068	200	246	80	535	1070	202	248
14,000	3	-3	76	503	1006	193	245	76	504	1008	196	248
16,000	-1	-7	72	474	948	187	245	72	474	948	189	248
18,000	-5	-11	68	446	892	180	244	68	447	894	183	248
20,000	-9	-15	64	422	844	173	243	64	422	844	176	247
22,000	-13	-19	60	397	794	165	240	60	398	796	170	246
24,000	-17	-23	56	373	746	157	237	57	374	748	162	244
26,000	-21	-27	52	349	698	149	233	53	350	700	155	242
28,000	-26	-30	49	326	652	138	226	49	328	656	147	238
29,000	-28	-32	47	315	630	133	221	47	317	634	142	235
31,000	-33	-36	42	291	582	117	204	43	294	588	132	228
33,000	-36	-40-	---	---	---	---	---	39	270	540	119	215
35,000-	---	---	---	---	---	---	---	---	---	---	---	---

BT055939

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-51. Maximum Cruise Power at 1700 RPM - ISA +10°C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA + 10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	30	25	83	639	1278	219	225	83	639	1278	220	226
2000	26	21	83	619	1238	217	229	83	619	1238	218	230
4000	22	17	83	601	1202	215	234	83	600	1200	216	235
6000	18	13	83	584	1168	203	239	83	584	1168	214	240
8000	15	9	83	571	1142	211	244	83	571	1142	212	245
10,000	11	5	83	563	1126	209	244	83	562	1124	210	250
12,000	7	1	80	535	1070	204	249	80	535	1070	205	252
14,000	3	-3	76	504	1008	198	250	76	504	1008	200	253
16,000	-1	-7	72	475	950	192	251	72	475	950	194	254
18,000	-5	-11	68	447	894	185	251	68	448	896	188	254
20,000	-9	-15	64	423	846	179	251	65	423	846	182	254
22,000	-13	-19	61	399	798	173	251	61	399	798	175	254
24,000	-17	-23	57	374	748	166	250	57	375	750	169	254
26,000	-21	-27	53	351	702	159	248	53	352	704	163	253
28,000	-25	-30	49	329	658	152	246	50	329	658	156	252
29,000	-27	-32	48	318	636	148	244	48	319	638	152	251
31,000	-31	-36	44	295	590	140	240	44	296	592	145	248
33,000	-35	-40	40	273	546	130	234	40	274	548	137	244
35,000	-40	-44	36	250	500	119	223	37	251	502	128	238

BT0559310

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-51. Maximum Cruise Power at 1700 RPM - ISA +10°C (Sheet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA +20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	83	623	1246	207	217	83	623	1246	209	218
2000	36	31	83	602	1204	205	221	83	601	1202	207	222
4000	32	27	83	582	1164	203	225	83	582	1164	205	227
6000	28	23	83	566	1132	201	229	83	565	1130	203	232
8000	24	19	83	553	1106	199	234	83	553	1106	201	236
10,000	20	15	81	528	1056	194	236	81	528	1056	196	238
12,000	16	11	76	497	994	188	235	76	497	994	190	238
14,000	12	7	71	465	930	179	232	71	466	932	182	236
16,000	8	3	66	436	872	172	230	66	437	874	175	235
18,000	4	-1	62	410	820	164	228	62	411	822	168	234
20,000	0	-5	58	384	768	156	225	58	385	770	161	231
22,000	-4	-9	54	361	722	148	221	55	362	724	154	229
24,000	-8	-13	50	338	676	139	216	51	339	678	146	226
26,000	-12	-17	47	317	634	129	209	47	319	638	138	222
28,000	-16	-20	---	---	---	---	---	44	299	598	130	217
29,000	-18	-22	---	---	---	---	---	42	289	578	125	213
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03287

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-52. Maximum Cruise Power at 1700 RPM - ISA +20°C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA +20° C

WEIGHT®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	83	622	1244	210	220	83	622	1244	212	221
2000	36	31	83	601	1202	208	224	83	601	1202	209	225
4000	32	27	83	581	1162	206	228	83	581	1162	207	230
6000	28	23	83	565	1130	204	233	83	565	1130	206	235
8000	24	19	83	552	1104	202	238	83	552	1104	204	239
10,000	21	15	81	529	1058	198	240	81	529	1058	200	242
12,000	17	11	77	498	996	192	241	77	498	996	194	243
14,000	13	7	71	466	932	185	239	71	466	932	186	241
16,000	9	3	67	437	874	178	238	67	438	876	180	241
18,000	5	-1	63	411	822	171	238	63	412	824	174	241
20,000	1	-5	59	386	772	165	236	59	386	772	167	240
22,000	-3	-9	55	363	726	158	235	55	364	728	161	239
24,000	-8	-13	51	340	680	151	233	51	341	682	155	238
26,000	-12	-17	48	320	640	144	231	48	320	640	148	237
28,000	-16	-20	45	301	602	137	228	45	302	604	142	236
29,000	-18	-22	43	291	582	133	226	43	292	584	139	235
31,000	-22	-26	40	271	542	125	221	40	272	544	132	232
33,000	-26	-30	36	250	500	114	212	37	251	502	123	227
35,000	-30	-34	---	---	---	---	---	33	230	460	114	220

BT03288

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-52. Maximum Cruise Power at 1700 RPM - ISA +20°C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA + 20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	40	35	83	643	1286	215	224	83	643	1286	216	226
2000	36	31	83	622	1244	213	228	83	622	1244	214	230
4000	32	27	83	603	1206	210	233	83	603	1206	212	235
6000	28	23	83	587	1174	208	237	83	586	1172	210	239
8000	24	19	80	558	1116	203	239	81	558	1116	205	241
10,000	21	15	77	528	1056	197	240	77	529	1058	200	242
12,000	17	11	73	498	996	191	240	74	498	996	194	243
14,000	12	7	69	466	932	183	238	69	466	932	186	241
16,000	8	3	64	437	874	176	236	65	438	876	179	240
18,000	4	-1	61	411	822	169	234	61	412	824	173	240
20,000	0	-5	57	385	770	161	232	57	386	772	166	240
22,000	-4	-9	53	362	724	153	228	54	363	726	159	238
24,000	-8	-13	50	339	678	144	223	50	340	680	151	236
26,000	-12	-17	46	318	636	134	216	47	319	638	143	229
28,000	-17	-20	43	298	596	123	206	44	300	600	135	224
29,000	-19	-22	41	287	574	113	195	42	290	580	130	221
31,000	-22	-26	---	---	---	---	---	38	270	540	118	210
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000-	---	---	---	---	---	---	---	---	---	---	---	---

BT0559311

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-53. Maximum Cruise Power at 1700 RPM - ISA +20°C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA + 20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	40	35	83	642	1284	218	227	83	642	1284	219	228
2000	36	31	83	621	1242	216	232	83	621	1242	217	233
4000	32	27	83	602	1204	214	236	83	602	1204	215	238
6000	28	23	83	586	1172	211	241	83	586	1172	213	242
8000	25	19	81	559	1118	207	243	81	559	1118	208	245
10,000	21	15	77	529	1058	201	244	78	530	1060	203	246
12,000	17	11	74	499	998	196	245	74	499	998	198	247
14,000	13	7	69	467	934	189	244	69	467	934	191	247
16,000	9	3	65	438	876	182	244	65	439	878	184	246
18,000	5	-1	61	412	824	176	243	61	413	826	178	247
20,000	1	-5	57	387	774	169	243	58	387	774	172	246
22,000	-3	-9	54	364	728	163	242	54	365	730	166	246
24,000	-7	-13	50	341	682	156	240	51	342	684	159	245
26,000	-11	-17	47	321	642	149	238	47	321	642	153	244
28,000	-15	-20	44	302	604	142	236	44	302	604	147	243
29,000	-17	-22	43	292	584	138	234	43	293	586	143	242
31,000	-22	-26	39	272	544	129	229	40	273	546	136	239
33,000	-26	-30	36	251	502	119	220	36	252	504	128	235
35,000	-30	-34	32	229	458	106	206	33	231	462	119	228

BT0559312

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-53. Maximum Cruise Power at 1700 RPM - ISA +20°C (Sleet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA +30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	83	624	1248	206	219	83	623	1246	208	220
2000	46	41	83	604	1208	204	223	83	603	1206	205	225
4000	42	37	81	576	1152	199	225	81	576	1152	201	227
6000	38	33	78	547	1094	194	226	79	547	1094	197	228
8000	34	29	75	518	1036	189	227	75	519	1038	191	229
10,000	30	25	72	490	980	183	227	72	490	980	186	230
12,000	26	21	68	459	918	177	226	68	460	920	180	230
14,000	22	17	64	430	860	170	224	64	431	862	173	229
16,000	18	13	59	401	802	161	221	59	401	802	165	226
18,000	14	9	53	370	740	151	214	54	371	742	156	221
20,000	9	5	49	344	688	141	208	50	345	690	148	217
22,000	5	1	46	324	648	133	203	47	326	652	141	215
24,000	1	-3	43	304	608	122	195	44	306	612	133	211
26,000	-3	-7	---	---	---	---	---	41	288	576	125	206
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000-	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03289

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-54. Maximum Cruise Power at 1700 RPM - ISA +30°C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA +30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	50	45	83	623	1246	209	222	83	623	1246	210	223
2000	46	41	83	603	1206	207	226	83	603	1206	208	227
4000	42	37	81	576	1152	203	229	82	576	1152	204	230
6000	38	33	79	547	1094	198	230	79	547	1094	200	232
8000	34	29	76	519	1038	193	232	76	519	1038	195	234
10,000	30	25	72	491	982	188	233	72	491	982	190	235
12,000	26	21	68	460	920	182	233	68	461	922	184	235
14,000	22	17	64	431	862	176	232	65	432	864	178	235
16,000	18	13	60	402	804	168	230	60	402	804	171	234
18,000	14	9	54	372	744	160	226	54	372	744	163	230
20,000	10	5	50	346	692	152	224	50	347	694	156	228
22,000	6	1	47	327	654	146	222	47	327	654	150	228
24,000	2	-3	44	307	614	139	220	45	308	616	144	227
26,000	-2	-7	42	289	578	133	218	42	290	580	138	226
28,000	-6	-10	39	273	546	126	215	39	274	548	132	225
29,000	-8	-12	38	264	528	122	213	38	265	530	129	224
31,000	-12	-16	35	246	492	113	205	35	248	496	122	220
33,000	-16	-20	---	---	---	---	---	32	228	456	113	214
35,000	-20	-24	---	---	---	---	---	29	209	418	103	204

BT03290

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-54. Maximum Cruise Power at 1700 RPM - ISA +30°C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA + 30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	50	45	81	634	1268	210	223	81	634	1268	212	225
2000	46	41	78	605	1210	206	225	79	605	1210	208	227
4000	42	37	76	576	1152	202	227	76	576	1151	204	229
6000	38	33	74	547	1094	197	229	74	547	1094	199	231
8000	34	29	71	519	1038	192	230	72	519	1038	194	233
10,000	30	25	69	490	980	186	231	69	491	982	189	234
12,000	26	21	65	460	920	180	230	65	460	920	183	234
14,000	22	17	62	431	862	173	229	62	432	864	177	234
16,000	18	13	57	401	8026	165	226	58	402	804	169	231
18,000	14	9	52	371	7428	155	219	53	372	744	160	226
20,000	10	5	48	345	690	146	214	49	346	692	152	223
22,000	6	1	45	325	650	137	210	46	327	654	145	221
24,000	1	-3	43	305	610	127	203	43	307	614	137	217
26,000	-3	-7	40	286	572	114	189	41	289	578	129	213
28,000	-6	-10	---	---	---	---	---	38	272	544	120	206
29,000	-9	-12	---	---	---	---	---	37	263	526	114	200
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559313

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-55. Maximum Cruise Power at 1700 RPM - ISA +30°C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA + 30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	50	45	81	634	1268	214	227	81	635	1270	215	228
2000	46	41	79	605	1210	210	229	79	605	1210	211	231
4000	42	37	77	576	1152	205	231	77	576	1152	207	233
6000	38	33	74	547	1094	201	233	74	548	1096	203	235
8000	34	29	72	519	1038	196	235	72	519	1038	198	237
10,000	30	25	69	491	982	191	237	69	492	984	193	239
12,000	26	21	66	461	922	186	237	66	461	922	188	239
14,000	22	17	62	432	864	180	237	62	433	866	182	240
16,000	18	13	58	403	806	173	236	58	403	806	175	239
18,000	14	9	53	373	746	164	232	53	373	746	167	236
20,000	10	5	49	347	694	157	230	49	348	696	160	235
22,000	6	1	46	327	654	150	229	47	328	656	155	234
24,000	2	-3	44	308	616	144	227	44	308	616	148	234
26,000	-2	-7	41	290	580	137	225	41	290	580	143	233
28,000	-6	-10	39	273	546	130	222	39	274	548	137	232
29,000	-8	-12	37	265	530	126	220	38	266	532	133	231
31,000	-12	-16	34	247	494	117	213	35	249	498	126	228
33,000	-17	-20	31	227	454	104	199	32	229	458	118	222
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559314

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-55. Maximum Cruise Power at 1700 RPM - ISA +30°C (Sheet 2 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA +37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	78	607	1214	200	214	78	607	1214	201	216
2000	52	48	76	577	1154	195	216	76	577	1154	197	218
4000	48	44	74	548	1096	191	218	74	548	1096	193	220
6000	45	40	71	521	1042	186	219	72	521	1042	189	222
8000	41	36	69	493	986	181	220	69	494	988	184	223
10,000	37	32	66	465	930	175	220	66	466	932	178	224
12,000	33	28	62	434	868	168	218	62	434	868	172	222
14,000	29	24	58	405	810	161	216	58	405	810	165	221
16,000	24	20	53	376	752	152	211	54	377	754	157	218
18,000	20	16	49	346	692	142	205	49	348	696	148	213
20,000	16	12	44	320	640	131	196	45	322	644	139	208
22,000	12	8	---	---	---	---	---	42	302	604	131	203
24,000	8	4	---	---	---	---	---	39	282	564	121	195
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03291

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-56. Maximum Cruise Power at 1700 RPM - ISA +37°C (Sheet 1 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA +37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	78	607	1214	203	218	78	607	1214	204	219
2000	53	48	76	577	1154	199	220	76	577	1154	201	222
4000	49	44	74	548	1096	195	222	74	548	1096	197	224
6000	45	40	72	521	1042	191	224	72	521	1042	192	226
8000	41	36	69	494	988	186	226	69	494	988	188	228
10,000	37	32	66	466	932	181	227	66	466	932	183	229
12,000	33	28	62	435	870	175	226	62	435	870	177	229
14,000	29	24	58	406	812	168	225	59	406	812	171	228
16,000	25	20	54	377	754	161	223	54	378	756	164	227
18,000	21	16	50	349	698	153	219	50	349	698	156	224
20,000	17	12	46	323	646	145	216	46	324	648	149	222
22,000	13	8	42	303	606	138	213	43	303	606	142	220
24,000	9	4	39	283	566	130	209	39	283	566	135	217
26,000	4	0	37	266	532	123	205	37	267	534	129	215
28,000	0	-3	35	252	504	116	202	35	253	506	124	215
29,000	-2	-5	34	245	490	112	200	34	247	494	121	215
31,000	-5	-9	---	---	---	---	---	32	231	462	114	211
33,000	-10	-13	---	---	---	---	---	29	213	426	105	203
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03292

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-56. Maximum Cruise Power at 1700 RPM - ISA +37°C (Sheet 2 of 2) IR

MAXIMUM CRUISE POWER
1700 RPM
ISA + 37°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	72	606	1212	200	215	72	606	1212	202	217
2000	52	48	71	576	1152	197	218	71	576	1152	199	220
4000	49	44	69	548	1096	193	220	69	548	1096	195	222
6000	45	40	67	521	1042	188	222	67	521	1042	191	225
8000	41	36	65	494	988	184	223	65	494	988	186	226
10,000	37	32	62	466	932	178	223	63	466	932	181	227
12,000	33	28	59	434	868	171	222	59	435	870	175	226
14,000	29	24	56	405	810	164	220	56	406	812	168	225
16,000	25	20	52	376	752	156	216	52	377	754	161	223
18,000	20	16	47	347	694	146	210	48	349	698	152	219
20,000	16	12	44	321	642	135	202	44	323	646	143	214
22,000	12	8	40	300	600	123	192	41	302	604	135	209
24,000	8	4	---	---	---	---	---	38	282	564	125	202
26,000	4	0	---	---	---	---	---	36	265	530	115	194
28,000	0	3	---	---	---	---	---	33	250	500	103	181
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559315

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-57. Maximum Cruise Power at 1700 RPM - ISA +37°C (Sheet 1 of 2) CA

MAXIMUM CRUISE POWER
1700 RPM
ISA + 37°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	73	606	1212	204	219	73	606	1212	206	221
2000	53	48	71	576	1152	201	222	71	576	1152	203	224
4000	49	44	69	548	1096	197	225	69	548	1096	199	227
6000	45	40	68	521	1042	193	227	68	521	1042	195	229
8000	41	36	65	494	988	189	229	66	494	988	191	231
10,000	37	32	63	467	934	184	230	63	467	934	186	233
12,000	33	28	60	435	870	178	230	60	436	872	180	233
14,000	29	24	56	406	812	172	230	56	407	814	174	233
16,000	25	20	53	378	756	165	228	53	378	756	168	232
18,000	21	16	48	349	698	157	225	49	350	700	160	230
20,000	17	12	45	324	648	149	222	45	324	648	153	227
22,000	13	8	42	303	606	142	219	42	304	608	147	226
24,000	9	4	38	283	566	134	215	39	284	568	140	223
26,000	5	0	36	267	534	127	212	36	267	534	133	222
28,000	1	-3	34	253	506	120	209	35	254	508	128	222
29,000	-1	-5	33	246	492	117	207	34	247	494	126	221
31,000	-6	-9	31	229	458	106	198	32	232	464	119	218
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559316

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-57. Maximum Cruise Power at 1700 RPM - ISA +37°C (Sheet 2 of 2) CA

MAXIMUM CRUISE SPEEDS

1700 R P M

WEIGHT: 14,000 LBS

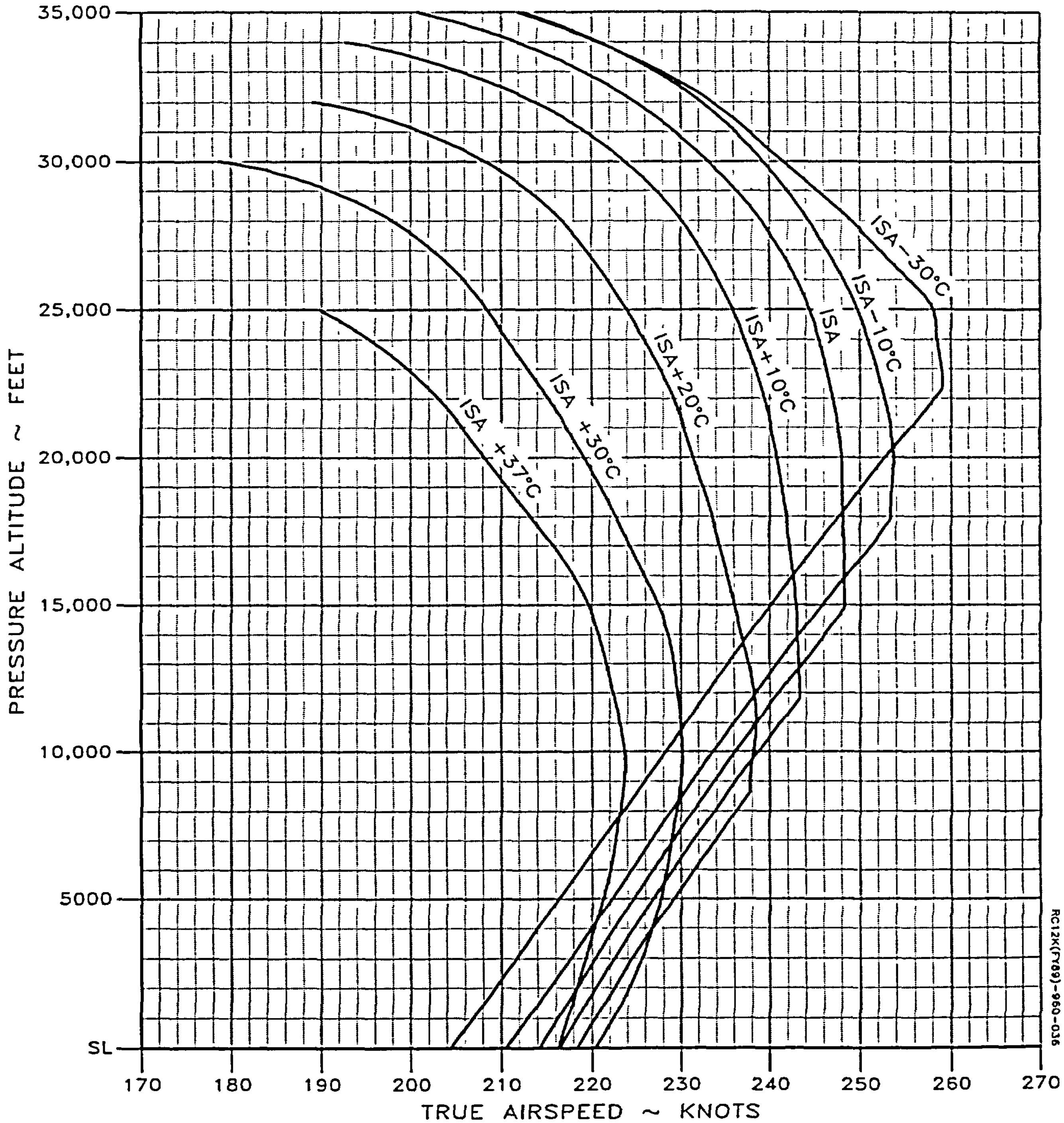


Figure 7-58. Maximum Cruise Speeds at 1700 RPM IR

MAXIMUM CRUISE SPEEDS

1700 RPM

WEIGHT: 14,000 LBS

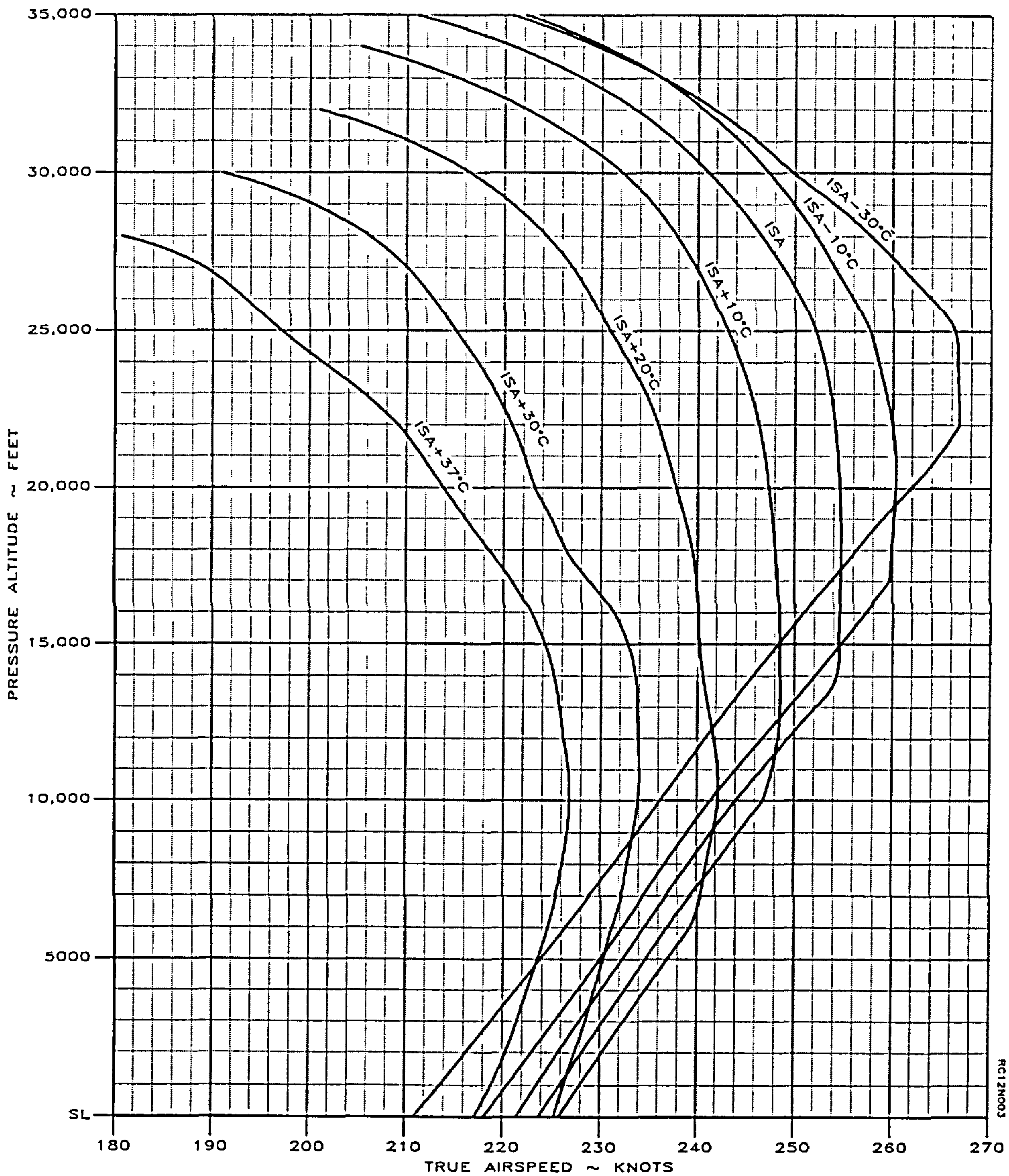


Figure 7-59. Maximum Cruise Speeds at 1700 RPM CA

MAXIMUM CRUISE POWER
1700 RPM
WEIGHT: 14,000 LBS

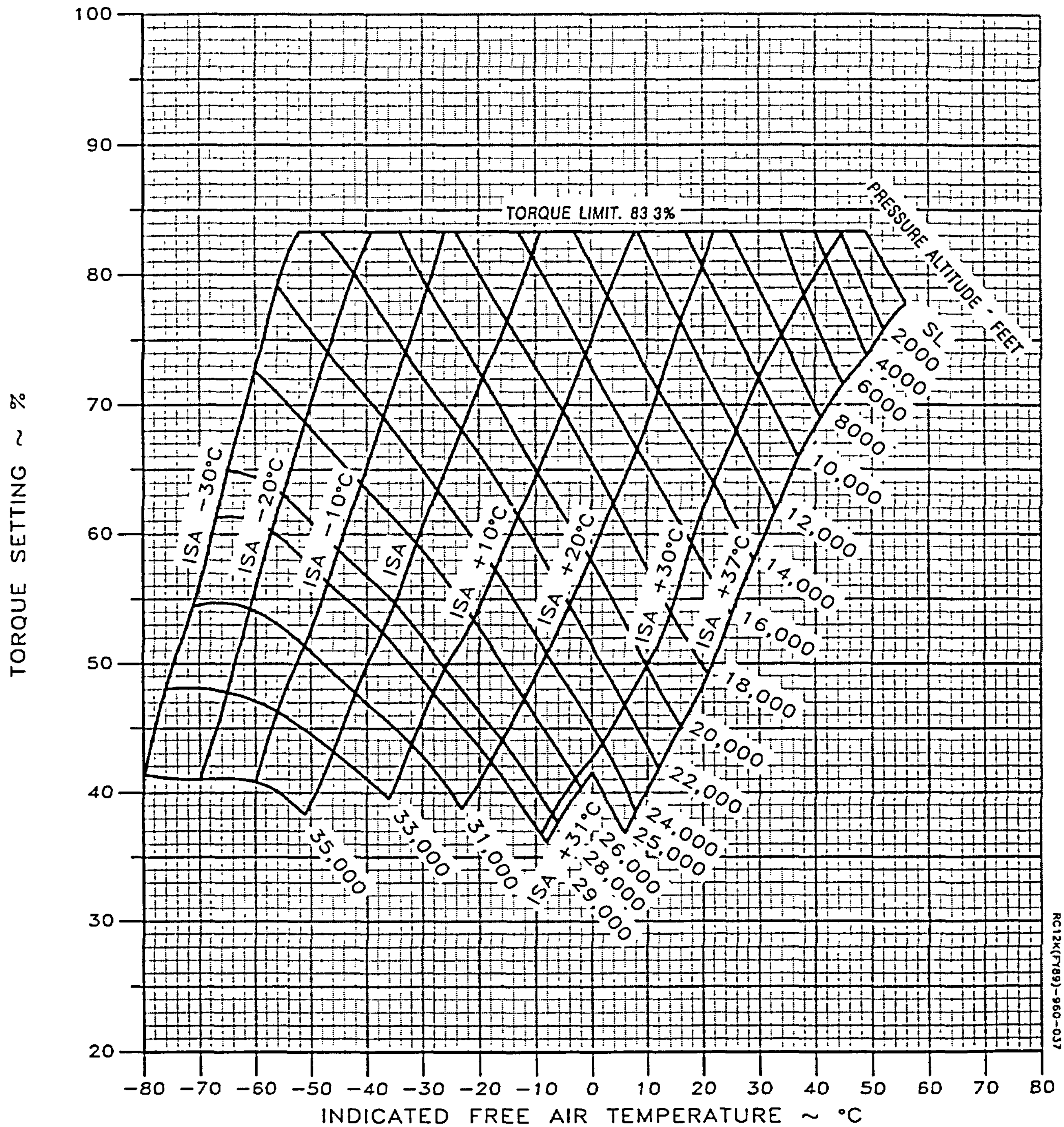


Figure 7-60. Maximum Cruise Power at 1700 RPM IR

MAXIMUM CRUISE POWER

1700 RPM

WEIGHT: 14,000 LBS

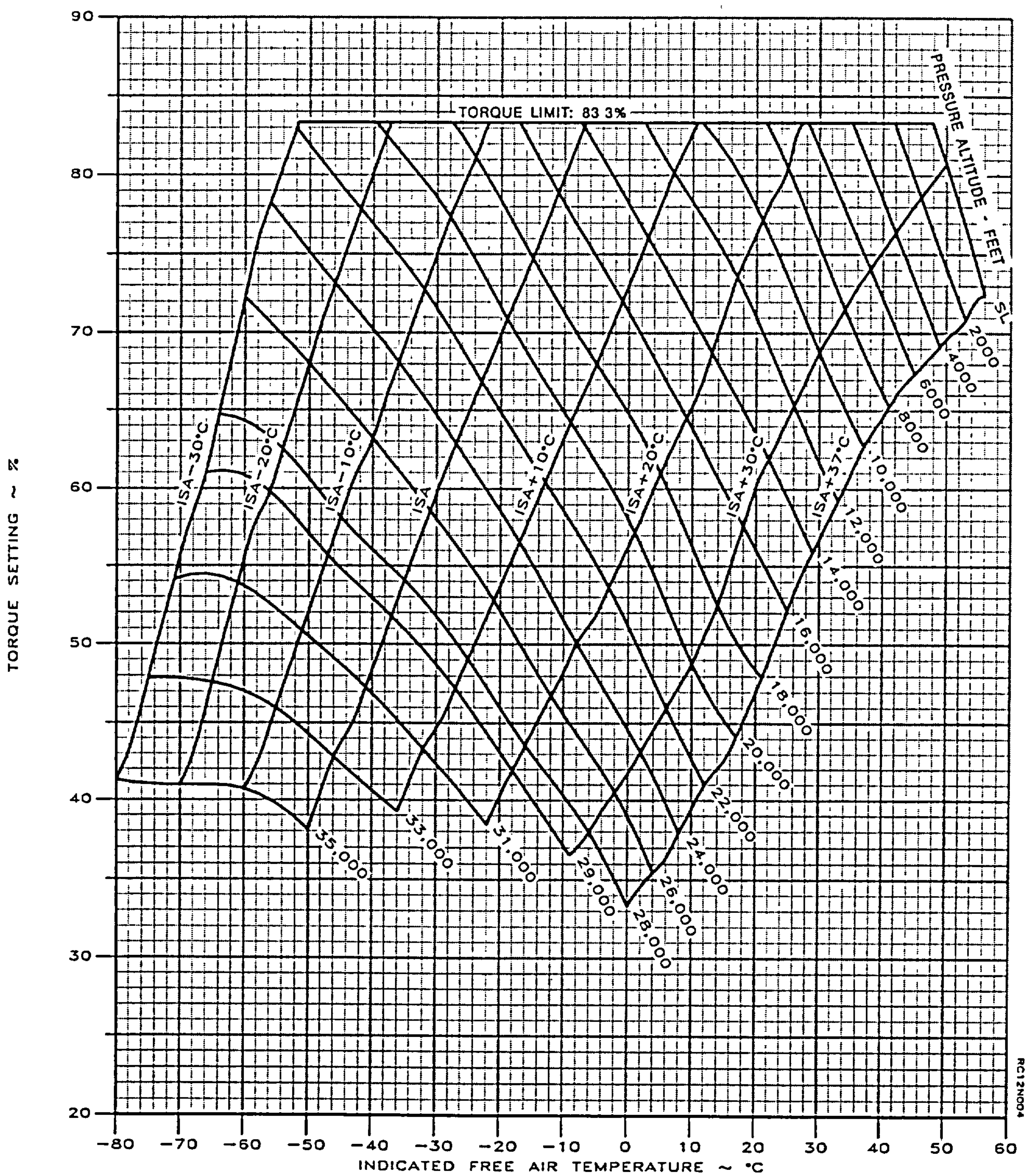


Figure 7-61. Maximum Cruise Power at 1700 RPM CA

FUEL FLOW AT MAXIMUM CRUISE POWER

1700 RPM

WEIGHT: 14,000 LBS

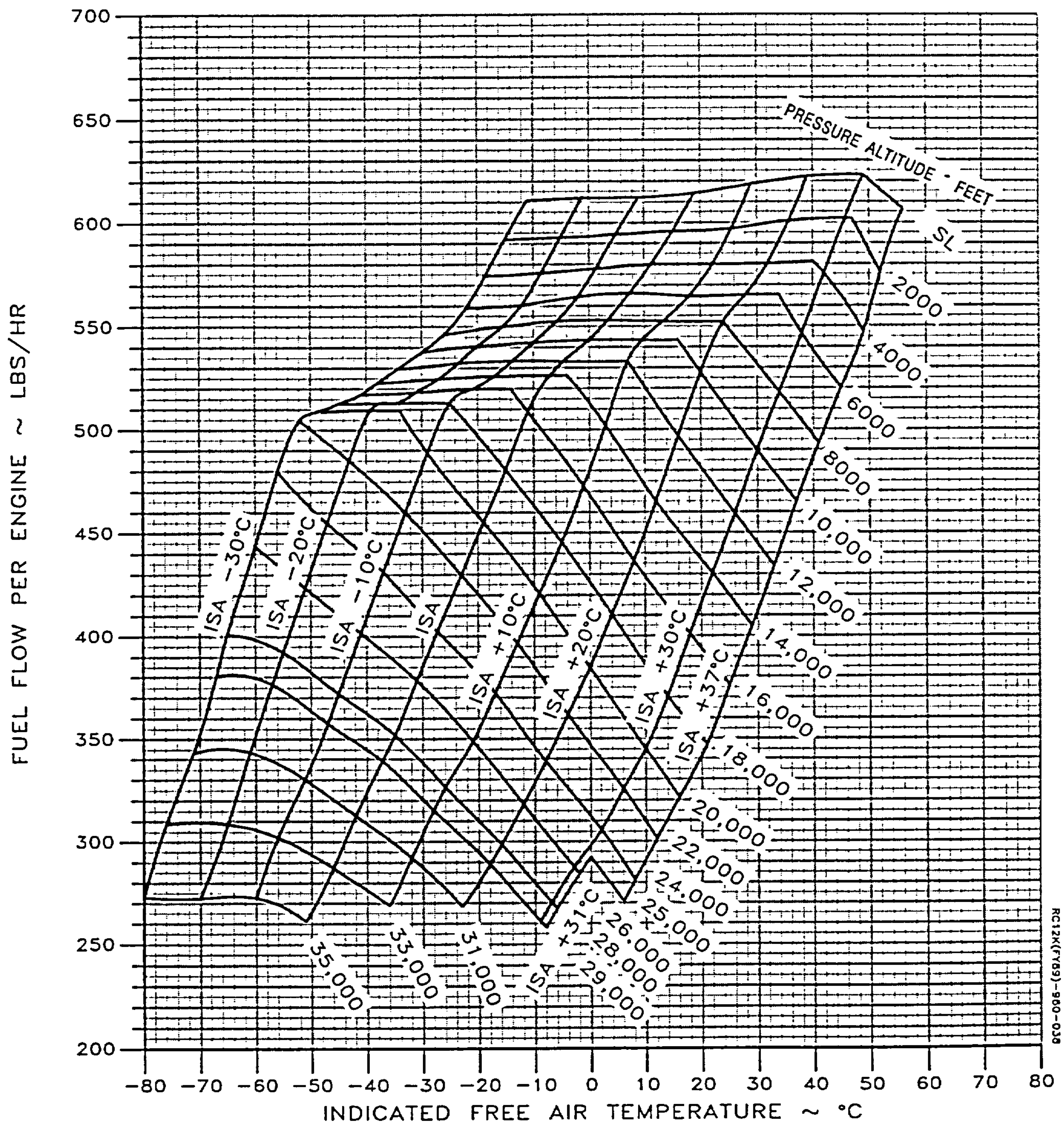


Figure 7-62. Fuel Flow at Maximum Cruise Power at 1700 RPM IR

FUEL FLOW AT MAXIMUM CRUISE POWER

1700 RPM

WEIGHT: 14,000 LBS

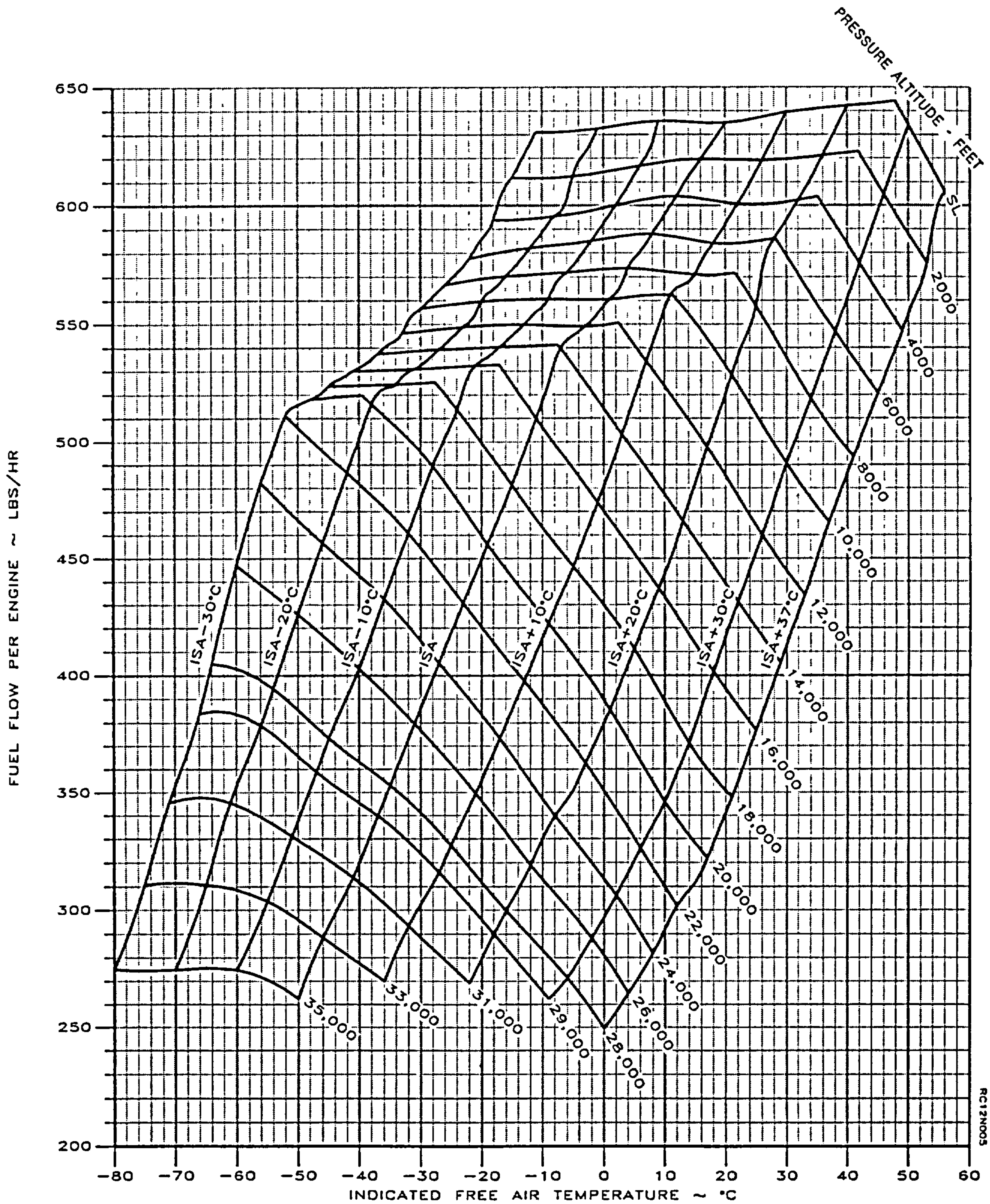


Figure 7-63. Fuel Flow at Maximum Cruise Power at 1700 RPM CA

RANGE PROFILE - MAXIMUM CRUISE POWER

1700 RPM

STANDARD DAY (ISA)

ZERO WIND

ASSOCIATED CONDITIONS:
WEIGHT......................*16,320 LBS BEFORE ENGINE START
FUEL ....AVIATION KEROSENE
FUEL DENSITY ....6.7 LBS/GAL
ICE VANES ....RETRACTED

EXAMPLE:
PRESSURE ALTITUDE 26,000 FT
FUEL ....2572 LBS
RANGE.......................578 NM

NOTES: 1. RANGE ALLOWS FOR START, TAXI, AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

***2. AT 16,320 LBS RAMP WEIGHT, THE MAXIMUM ZERO-FUEL WEIGHT LIMITATION OF 13,100 LBS WOULD BE EXCEEDED AT FUEL LOADING LESS THAN 3220 LBS.**

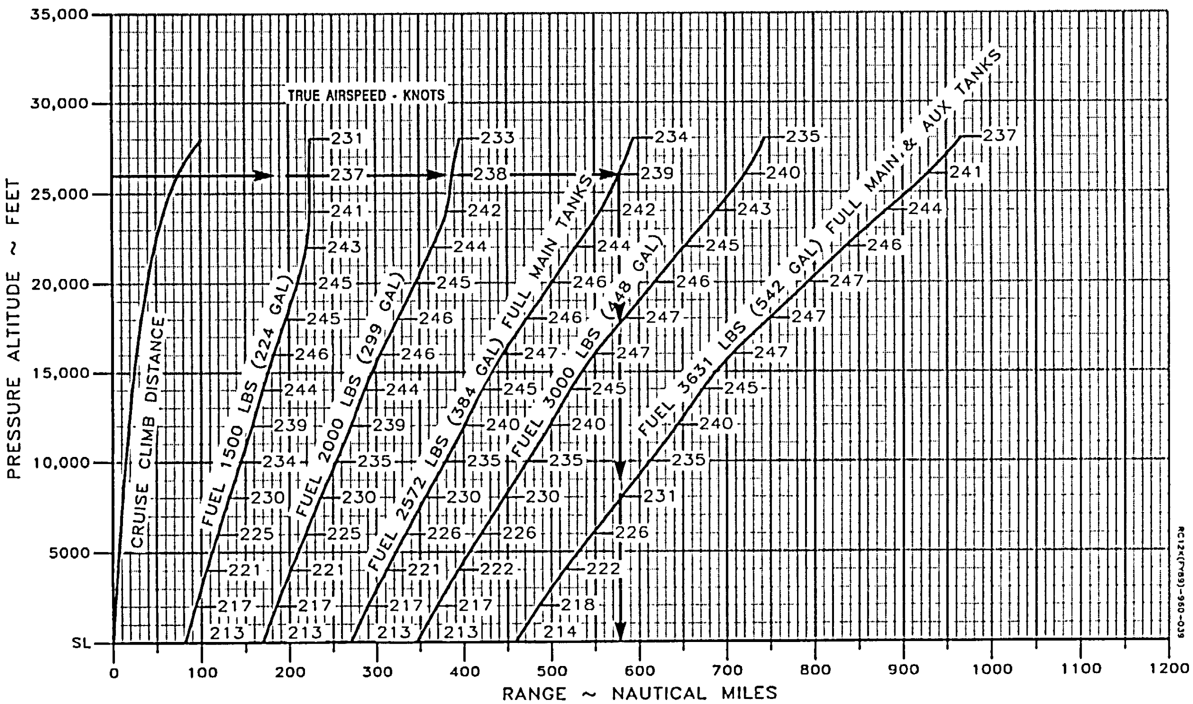


Figure 7-64. Range Profile - Maximum Cruise Power at 1700 RPM

NORMAL CRUISE POWER
1500 RPM
ISA -30°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	94	613	1226	215	205	94	613	1226	216	207
2000	-15	-19	94	595	1190	213	209	94	594	1188	214	211
4000	-19	-23	94	578	1156	211	213	94	578	1156	212	215
6000	-23	-27	94	563	1126	209	217	94	563	1126	210	219
8000	-26	-31	94	551	1102	207	222	94	550	1100	208	223
10,000	-30	-35	94	543	1086	205	226	94	542	1084	207	228
12,000	-34	-39	94	535	1070	203	230	94	535	1070	205	232
14,000	-38	-43	94	529	1058	201	235	94	528	1056	203	237
16,000	-41	-47	94	524	1048	198	239	94	523	1046	200	242
18,000	-45	-51	94	520	1040	196	244	94	519	1038	198	246
20,000	-49	-55	94	517	1034	193	248	94	516	1032	196	251
22,000	-53	-59	90	492	984	187	248	90	493	986	190	252
24,000	-57	-63	84	463	926	180	247	85	464	928	183	251
26,000	-61	-67	78	429	858	171	243	78	430	860	175	248
28,000	-65	-70	70	389	778	160	236	70	391	782	165	242
29,000	-68	-72	65	367	734	153	230	66	370	740	159	238
31,000	-72	-76	57	329	658	139	218	58	332	664	147	230
33,000	-76	-80	---	---	---	---	---	52	300	600	135	219
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03621

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-65. Normal Cruise Power at 1500 RPM - ISA -30°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA -30°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	94	612	1224	218	208	94	612	1224	219	209
2000	-15	-19	94	594	1188	216	212	94	594	1188	217	213
4000	-19	-23	94	577	1154	214	216	94	577	1154	215	217
6000	-22	-27	94	563	1126	212	220	94	562	1124	213	221
8000	-26	-31	94	550	1100	210	224	94	550	1100	211	225
10,000	-30	-35	94	542	1084	208	230	94	542	1084	210	231
12,000	-34	-39	94	534	1068	206	234	94	534	1068	208	236
14,000	-37	-43	94	528	1056	204	239	94	528	1056	206	240
16,000	-41	-47	94	523	1046	202	244	94	523	1046	203	245
18,000	-45	-51	94	519	1038	200	248	94	519	1038	201	250
20,000	-49	-55	94	515	1030	198	254	94	515	1030	199	255
22,000	-53	-59	90	493	986	192	255	91	494	988	194	257
24,000	-57	-63	85	465	930	186	255	85	465	930	188	257
26,000	-61	-67	79	432	864	178	252	79	433	866	180	256
28,000	-65	-70	71	392	784	168	247	71	394	788	171	252
29,000	-67	-72	67	372	744	163	244	67	373	746	166	249
31,000	-71	-76	59	335	670	153	237	60	336	672	157	243
33,000	-75	-80	53	303	606	142	230	53	305	610	147	238
35,000	-80	-84	46	271	542	130	220	47	273	546	137	230

BT03622

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-65. Normal Cruise Power at 1500 RPM - ISA -30°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA -30°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	94	625	1250	222	212	94	625	1250	224	214
2000	-15	-19	94	607	1214	220	216	94	607	1214	222	218
4000	-18	-23	94	590	1180	218	220	94	590	1180	220	222
6000	-22	-27	94	575	1150	216	225	94	574	1148	218	226
8000	-26	-31	94	564	1128	215	230	94	563	1126	217	232
10,000	-30	-35	94	554	1108	213	234	94	554	1108	214	236
12,000	-34	-39	94	545	1090	210	239	94	544	1088	212	241
14,000	-37	-43	94	536	1072	208	243	94	536	1072	210	245
16,000	-41	-47	94	530	1060	206	248	94	529	1058	208	250
18,000	-45	-51	94	524	1048	203	253	94	524	1048	205	255
20,000	-49	-55	94	515	1030	200	257	94	515	1030	203	260
22,000	-53	-59	89	487	974	193	256	89	488	976	196	260
24,000	-57	-63	83	458	916	186	255	84	460	920	189	259
26,000	-61	-67	77	426	852	177	252	78	427	854	181	257
28,000	-65	-70	69	386	772	166	244	70	388	776	171	251
29,000	-67	-72	65	365	730	159	239	66	367	734	165	247
31,000	-72	-76	57	327	654	146	227	58	330	660	153	238
33,000	-76	-80	50	294	588	130	212	52	298	596	141	228
35,000	-80	-84	---	---	---	---	---	45	266	532	126	213

BT05591

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBSIHR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-66. Normal Cruise Power at 1500 RPM - ISA -30°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA -30°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-11	-15	94	624	1248	225	215	94	624	1248	226	216
2000	-15	-19	94	606	1212	223	219	94	606	1212	224	220
4000	-18	-23	94	589	1178	221	223	94	589	1178	222	224
6000	-22	-27	94	574	1148	219	228	94	574	1148	220	229
8000	-26	-31	94	563	1126	218	233	94	563	1126	219	234
10,000	-30	-35	94	554	1108	216	238	94	553	1106	217	239
12,000	-33	-39	94	544	1088	214	242	94	543	1086	215	244
14,000	-37	-43	94	536	1072	212	247	94	535	1070	213	249
16,000	-41	-47	94	529	1058	209	252	94	528	1056	211	254
18,000	-45	-51	94	523	1046	207	257	94	523	1046	209	258
20,000	-48	-55	94	516	1032	205	262	94	516	1032	206	264
22,000	-52	-59	89	488	976	198	262	89	488	976	200	265
24,000	-56	-63	84	460	920	192	263	84	461	922	194	265
26,000	-60	-67	78	429	858	184	261	78	430	860	187	264
28,000	-64	-70	70	390	780	175	256	71	392	784	178	260
29,000	-67	-72	66	369	738	169	253	67	372	744	173	257
31,000	-71	-76	59	333	666	158	246	59	334	668	162	251
33,000	-75	-80	52	301	602	148	239	53	303	606	153	246
35,000	-80	-84	46	269	538	136	228	47	271	542	142	238

BT055912

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-66. Normal Cruise Power at 1500 RPM - ISA -30°C (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA - 20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	94	616	1232	213	208	94	616	1232	215	209
2000	-5	-9	94	597	1194	211	211	94	597	1194	213	213
4000	-9	-13	94	579	1158	209	215	94	579	1158	211	217
6000	-12	-17	94	565	1130	208	220	94	564	1128	209	222
8000	-16	-21	94	555	1110	205	224	94	555	1110	207	226
10,000	-20	-25	94	546	1092	203	229	94	546	1092	205	231
12,000	-24	-29	94	538	1076	201	233	94	538	1076	203	235
14,000	-28	-33	94	531	1062	198	237	94	531	1062	200	240
16,000	-31	-37	94	525	1050	196	242	94	525	1050	198	244
18,000	-35	-41	94	521	1042	194	246	94	520	1040	196	249
20,000	-39	-45	90	499	998	188	247	91	500	1000	190	250
22,000	-43	-49	85	470	940	180	245	85	470	940	183	249
24,000	-47	-53	79	440	880	172	243	79	441	882	176	248
26,000	-51	-57	73	407	814	163	238	73	408	816	168	244
28,000	-55	-60	66	374	748	153	232	67	375	750	158	239
29,000	-58	-62	63	358	716	147	228	63	359	718	154	237
31.000	-62	-66	57	327	654	135	217	57	329	658	143	230
33.000	-66	-70	---	---	---	---	---	51	300	600	132	220
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03623

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-67. Normal Cruise Power at 1500 RPM - ISA -20°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA -20°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	94	615	1230	216	210	94	615	1230	217	211
2000	-5	-9	94	596	1192	214	214	94	596	1192	215	215
4000	-9	-13	94	579	1158	212	218	94	578	1156	213	220
6000	-12	-17	94	564	1128	211	224	94	564	1128	212	225
8000	-16	-21	94	554	1108	209	228	94	554	1108	210	229
10,000	-20	-25	94	545	1090	207	232	94	545	1090	208	234
12,000	-24	-29	94	537	1074	204	237	94	537	1074	206	238
14,000	-27	-33	94	531	1062	202	242	94	530	1060	204	243
16,000	-31	-37	94	525	1050	200	246	94	524	1048	201	248
18,000	-35	-41	94	520	1040	198	251	94	519	1038	199	253
20,000	-39	-45	91	500	1000	193	253	91	500	1000	194	255
22,000	-43	-49	85	471	942	186	252	85	471	942	188	255
24,000	-47	-53	80	441	882	179	251	80	442	884	181	255
26,000	-51	-57	73	409	818	171	249	74	410	820	174	253
28,000	-55	-60	67	376	752	162	245	67	377	754	166	249
29,000	-57	-62	64	360	720	158	243	64	361	722	161	248
31,000	-61	-66	58	330	660	149	238	58	331	662	153	244
33,000	-65	-70	52	302	604	139	232	53	304	608	145	240
35,000	-70	-74	46	273	546	128	222	47	275	550	135	233

BT03624

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-67. Normal Cruise Power at 1500 RPM - ISA -20°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA - 20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	94	628	1256	220	215	94	627	1254	222	216
2000	-5	-9	94	609	1218	218	219	94	608	1216	220	220
4000	-8	-13	94	592	1184	218	224	94	591	1182	219	226
6000	-12	-17	94	579	1158	215	228	94	579	1158	217	230
8000	-16	-21	94	568	1136	213	232	94	568	1136	215	234
10,000	-20	-25	94	558	1116	211	237	94	558	1116	212	239
12,000	-23	-29	94	548	1096	208	241	94	547	1094	210	243
14,000	-27	-33	94	539	1078	206	246	94	538	1076	208	248
16,000	-31	-37	94	531	1062	203	250	94	531	1062	205	253
18,000	-35	-41	93	516	1032	199	253	93	516	1032	202	256
20,000	-39	-45	89	493	986	193	254	89	494	988	196	257
22,000	-43	-49	83	464	928	186	253	84	465	930	189	257
24,000	-47	-53	78	435	870	178	251	78	436	872	182	256
26,000	-51	-57	72	403	806	169	246	72	405	810	174	252
28,000	-55	-60	65	370	740	159	240	66	371	742	164	248
29,000	-57	-62	62	354	708	153	236	63	356	712	159	245
31,000	-62	-66	56	324	648	141	226	57	326	652	149	238
33,000	-66	-70	50	294	588	125	210	51	298	596	138	229
35,000	-70	-74	---	---	---	---	---	45	268	536	123	214

BT055913

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-68. Normal Cruise Power at 1500 RPM - ISA -20°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA -20°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	94	627	1254	223	217	94	627	1254	224	218
2000	-4	-9	94	608	1216	221	221	94	608	1216	222	222
4000	-8	-13	94	591	1182	220	227	94	591	1182	222	228
6000	-12	-17	94	578	1156	218	231	94	578	1156	219	232
8000	-16	-21	94	567	1134	216	236	94	567	1134	217	237
10,000	-19	-25	94	557	1114	214	240	94	557	1114	215	242
12,000	-23	-29	94	547	1094	212	245	94	547	1094	213	247
14,000	-27	-33	94	538	1076	209	250	94	538	1076	211	252
16,000	-31	-37	94	530	1060	207	255	94	530	1060	209	257
18,000	-34	-41	93	516	1032	204	259	93	517	1034	205	261
20,000	-38	-45	89	494	988	198	260	89	494	988	200	262
22,000	-42	-49	84	466	932	192	260	84	466	932	194	262
24,000	-46	-53	79	437	874	185	259	79	438	876	187	262
26,000	-50	-57	73	406	812	177	257	73	407	814	180	261
28,000	-55	-60	66	373	746	168	253	67	374	748	171	258
29,000	-57	-62	63	357	714	164	251	64	358	716	167	256
31,000	-61	-66	57	327	654	155	246	58	329	658	159	252
33,000	-65	-70	52	300	600	145	240	52	301	602	150	248
35,000	-69	-74	46	271	542	134	231	47	273	546	140	241

BT055914

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-68. Normal Cruise Power at 1500 RPM - ISA -20°C (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA -10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	94	619	1238	212	210	94	618	1236	213	211
2000	5	1	94	599	1198	210	215	94	598	1196	212	216
4000	1	-3	94	583	1166	208	219	94	582	1164	210	220
6000	-2	-7	94	569	1138	206	223	94	569	1138	207	224
8000	-6	-11	94	558	1116	203	227	94	558	1116	205	229
10,000	-10	-15	94	548	1096	201	231	94	548	1096	203	233
12,000	-14	-19	94	540	1080	199	235	94	540	1080	201	238
14,000	-17	-23	94	533	1066	196	240	94	533	1066	198	242
16,000	-21	-27	93	521	1042	193	243	93	521	1042	195	246
18,000	-25	-31	88	493	986	186	242	88	493	986	189	246
20,000	-29	-35	84	469	938	180	242	84	470	940	183	246
22,000	-33	-39	79	443	886	173	240	79	443	886	176	245
24,000	-37	-43	74	416	832	165	238	74	417	834	169	243
26,000	-41	-47	68	386	772	156	233	68	388	776	161	240
28,000	-46	-50	62	355	710	145	225	62	357	714	151	235
29,000	-48	-52	59	340	680	139	221	59	342	684	146	232
31,000	-52	-56	53	313	626	126	208	54	315	630	136	225
33,000	-56	-60	---	---	---	---	---	49	291	582	125	215
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03625

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-69. Normal Cruise Power at 1500 RPM - ISA -10°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA -10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	94	618	1236	214	213	94	618	1236	215	214
2000	5	1	94	598	1196	213	218	94	597	1194	214	219
4000	2	-3	94	582	1164	211	222	94	582	1164	212	223
6000	-2	-7	94	569	1138	209	226	94	568	1136	210	227
8000	-6	-11	94	557	1114	207	230	94	557	1114	208	232
10,000	-10	-15	94	548	1096	205	235	94	547	1094	206	236
12,000	-13	-19	94	539	1078	202	239	94	539	1078	204	241
14,000	-17	-23	94	532	1064	200	244	94	532	1064	202	246
16,000	-21	-27	93	522	1044	197	248	94	522	1044	199	250
18,000	-25	-31	89	493	986	191	248	89	494	988	193	250
20,000	-29	-35	84	470	940	185	249	84	470	940	187	252
22,000	-33	-39	79	444	888	179	249	79	444	888	181	252
24,000	-37	-43	74	418	836	172	248	75	418	836	175	251
26,000	-41	-47	69	389	778	164	245	69	389	778	167	250
28,000	-45	-50	63	358	716	156	241	63	359	718	159	246
29,000	-48	-52	60	343	686	152	239	60	344	688	155	245
31,000	-51	-56	55	317	634	143	235	55	318	636	147	241
33,000	-56	-60	50	293	586	134	229	50	294	588	140	238
35,000	-60	-64	45	269	538	124	221	45	270	540	131	233

BT03626

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-69. Normal Cruise Power at 1500 RPM - ISA -10°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA -10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	94	631	1262	220	218	94	631	1262	221	219
2000	6	1	94	614	1228	218	222	94	613	1226	219	224
4000	2	-3	94	597	1194	216	226	94	597	1194	217	228
6000	-2	-7	94	583	1166	213	230	94	582	1164	215	232
8000	-6	-11	94	570	1140	211	235	94	570	1140	213	237
10,000	-10	-15	94	560	1120	209	239	94	559	1118	210	241
12,000	-13	-19	94	549	1098	206	244	94	549	1098	208	246
14,000	-17	-23	94	540	1080	204	248	94	540	1080	206	251
16,000	-21	-27	91	515	1030	198	249	91	516	1032	200	252
18,000	-25	-31	86	487	974	191	249	86	487	974	194	252
20,000	-29	-35	82	464	928	185	249	82	464	928	188	253
22,000	-33	-39	77	438	876	178	248	78	438	876	182	252
24,000	-37	-43	73	412	824	170	245	73	413	826	175	251
26,000	-41	-47	67	383	766	161	241	68	384	768	166	248
28,000	-45	-50	61	352	704	151	234	62	354	708	157	243
29,000	-48	-52	58	337	674	145	229	59	339	678	152	240
31,000	-52	-56	53	310	620	132	218	54	312	624	142	233
33,000	-57	-60	47	285	570	113	197	49	288	576	131	224
35,000	-60	-64	---	---	---	---	---	44	264	528	117	210

BT055915

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%/0), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-70. Normal Cruise Power at 1500 RPM - ISA -10°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA -10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	94	630	1260	222	220	94	630	1260	223	221
2000	6	1	94	613	1226	221	225	94	612	1224	222	226
4000	2	-3	94	596	1192	219	229	94	596	1192	220	231
6000	-2	-7	94	582	1164	216	234	94	582	1164	218	235
8000	-6	-11	94	570	1140	214	238	94	569	1138	215	240
10,000	-9	-15	94	559	1118	212	243	94	559	1118	213	244
12,000	-13	-19	94	549	1098	210	248	94	548	1096	211	249
14,000	-17	-23	94	540	1080	207	253	94	539	1078	209	254
16,000	-21	-27	91	516	1032	202	255	91	516	1032	204	256
18,000	-25	-31	86	487	974	196	255	87	487	974	198	257
20,000	-29	-35	83	464	928	191	256	83	465	930	193	259
22,000	-33	-39	78	439	878	184	256	78	439	878	187	259
24,000	-37	-43	73	413	826	178	255	74	414	828	180	259
26,000	-41	-47	68	385	770	170	253	68	386	772	173	257
28,000	-45	-50	62	355	710	161	249	62	356	712	165	254
29,000	-47	-52	59	340	680	157	247	60	341	682	161	253
31,000	-51	-56	54	314	628	148	243	54	315	630	153	249
33,000	-55	-60	49	290	580	139	237	50	291	582	145	246
35,000	-59	-64	45	266	532	129	230	45	267	534	136	241

BT055916

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G. 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-70. Normal Cruise Power at 1500 RPM - ISA -10°C (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	94	617	1234	211	213	94	616	1232	212	214
2000	15	11	94	603	1206	209	217	94	602	1204	210	218
4000	12	7	94	588	1176	206	221	94	588	1176	208	222
6000	8	3	94	574	1148	204	225	94	573	1146	206	227
8000	4	-1	94	561	1122	202	229	94	561	1122	203	231
10,000	0	-5	94	550	1100	199	233	94	550	1100	201	235
12,000	-4	-9	94	540	1080	197	238	94	540	1080	199	240
14,000	-7	-13	91	517	1034	191	238	91	518	1036	194	241
16,000	-11	-17	86	488	976	185	238	86	489	978	187	241
18,000	-15	-21	81	462	924	178	237	82	463	926	181	241
20,000	-19	-25	77	438	876	171	236	77	439	878	175	240
22,000	-24	-29	72	413	826	164	233	72	413	826	168	239
24,000	-28	-33	67	387	774	155	230	68	388	776	160	237
26,000	-32	-37	62	360	720	146	224	63	361	722	152	233
28,000	-36	-40	57	333	666	135	216	57	335	670	143	228
29,000	-38	-42	54	320	640	129	211	55	323	646	139	225
31,000	-42	-46	---	---	---	---	---	50	298	596	128	217
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03627

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-71. Normal Cruise Power at 1500 RPM - ISA (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	94	616	1232	214	216	94	615	1230	215	217
2000	15	11	94	602	1204	212	220	94	602	1204	213	221
4000	12	7	94	588	1176	209	224	94	587	1174	210	225
6000	8	3	94	573	1146	207	228	94	573	1146	208	230
8000	4	-1	94	560	1120	205	233	94	560	1120	206	234
10,000	0	-5	94	549	1098	203	237	94	549	1098	204	239
12,000	-3	-9	94	539	1078	201	242	94	539	1078	202	243
14,000	-7	-13	91	518	1036	196	244	92	519	1038	197	246
16,000	-11	-17	86	490	980	190	244	87	490	980	191	246
18,000	-15	-21	82	463	926	183	244	82	464	928	185	246
20,000	-19	-25	77	439	878	177	244	78	440	880	180	247
22,000	-23	-29	73	414	828	171	243	73	415	830	173	247
24,000	-27	-33	68	389	778	164	242	68	389	778	167	246
26,000	-31	-37	63	362	724	157	240	63	363	726	160	244
28,000	-35	-40	58	337	674	149	236	58	337	674	153	242
29,000	-37	-42	56	324	648	145	234	56	325	650	149	241
31,000	-42	-46	51	300	600	136	229	51	301	602	142	238
33,000	-46	-50	46	278	556	127	223	47	279	558	134	234
35,000	-50	-54	42	255	510	116	213	42	256	512	125	228

BT03628

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-71. Normal Cruise Power at 1500 RPM - ISA (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA

WEIGHT®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	-15	94	631	1262	218	220	94	631	1262	220	222
2000	16	11	94	617	1234	216	224	94	616	1232	218	226
4000	12	7	94	602	1204	214	228	94	601	1202	215	230
6000	8	3	94	586	1172	211	233	94	586	1172	213	235
8000	4	-1	94	573	1146	209	237	94	572	1144	211	239
10,000	1	-5	94	560	1120	207	242	94	560	1120	208	244
12,000	-3	-9	93	542	1084	203	245	93	542	1084	205	247
14,000	-7	-13	88	511	1022	196	244	89	512	1024	199	247
16,000	-11	-17	84	483	966	190	244	84	484	968	192	247
18,000	-15	-21	79	457	914	183	243	80	457	914	186	247
20,000	-19	-25	75	433	866	176	243	76	434	868	180	247
22,000	-23	-29	71	408	816	169	241	71	409	818	173	246
24,000	-27	-33	66	383	766	161	238	67	384	768	166	244
26,000	-31	-37	61	356	712	152	233	62	358	716	158	241
28,000	-36	-40	56	330	660	141	225	57	332	664	149	236
29,000	-38	-42	54	317	634	135	219	54	320	640	144	233
31,000	-43	-46	49	292	584	119	203	50	296	592	134	225
33,000	-46	-50	---	---	---	---	---	45	273	546	121	214
35,000	-51	-54	---	---	---	---	---	40	248	496	100	186

BT055917

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-72. Normal Cruise Power at 1500 RPM - ISA (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	20	15	94	631	1262	221	223	94	630	1260	222	224
2000	16	11	94	616	1232	219	227	94	616	1232	220	228
4000	12	7	94	601	1202	217	232	94	601	1202	218	233
6000	8	3	94	586	1172	214	236	94	585	1170	216	237
8000	5	-1	94	572	1144	212	241	94	572	1144	213	242
10,000	1	-5	94	559	1118	210	246	94	559	1118	211	247
12,000	-3	-9	93	543	1086	207	249	93	543	1086	208	251
14,000	-7	-13	89	512	1024	201	250	89	513	1026	202	252
16,000	-11	-17	84	484	968	195	250	84	485	970	197	252
18,000	-15	-21	80	458	916	189	251	80	458	916	191	253
20,000	-19	-25	76	434	868	183	251	76	435	870	185	254
22,000	-23	-29	71	410	820	176	250	72	410	820	179	254
24,000	-27	-33	67	385	770	170	249	67	385	770	172	253
26,000	-31	-37	62	359	718	162	247	63	360	720	165	252
28,000	-35	-40	57	333	666	154	244	58	334	668	158	250
29,000	-37	-42	55	321	642	150	242	55	322	644	154	249
31,000	-41	-46	50	297	594	141	237	51	299	598	147	245
33,000	-45	-50	46	275	550	132	231	46	276	552	139	242
35,000	-50	-54	42	252	504	121	222	42	254	508	130	236

BT055918

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G. 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-72. Normal Cruise Power at 1500 RPM - ISA (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA +10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	94	624	1248	209	215	94	624	1248	211	216
2000	25	21	94	604	1208	207	219	94	603	1206	208	220
4000	22	17	94	586	1172	204	223	94	585	1170	206	224
6000	18	13	94	571	1142	202	227	94	570	1140	204	229
8000	14	9	94	559	1118	200	231	94	559	1118	202	233
10,000	10	5	91	538	1076	195	233	92	539	1078	197	235
12,000	6	1	87	510	1020	189	233	88	511	1022	191	236
14,000	2	-3	83	483	966	183	233	83	484	968	186	236
16,000	-2	-7	79	456	912	176	232	79	457	914	179	236
18,000	-6	-11	74	430	860	169	230	74	430	860	173	235
20,000	-10	-15	69	404	808	161	228	70	405	810	166	233
22,000	-14	-19	65	380	760	153	224	65	381	762	159	231
24,000	-18	-23	60	356	712	144	219	61	357	714	151	228
26,000	-22	-27	56	332	664	134	212	56	334	668	142	224
28,000	-26	-30	---	---	---	---	---	52	311	622	133	218
29,000	-28	-32	---	---	---	---	---	50	300	600	128	214
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03629

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-73. Normal Cruise Power at 1500 RPM - ISA +10°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA +10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	94	623	1246	212	218	94	623	1246	213	219
2000	25	21	94	603	1206	210	222	94	603	1206	211	223
4000	22	17	94	585	1170	208	226	94	585	1170	209	227
6000	18	13	94	570	1140	205	230	94	569	1138	207	232
8000	14	9	94	558	1116	203	235	94	558	1116	205	236
10,000	10	5	92	539	1078	199	237	92	539	1078	200	239
12,000	6	1	88	511	1022	193	238	88	511	1022	195	240
14,000	3	-3	84	484	968	188	239	84	485	970	190	241
16,000	-1	-7	79	458	916	182	239	79	458	916	184	241
18,000	-5	-11	75	431	862	176	238	75	431	862	178	241
20,000	-9	-15	70	406	812	169	238	70	407	814	172	241
22,000	-13	-19	66	382	764	162	236	66	383	766	165	240
24,000	-17	-23	61	358	716	155	235	61	359	718	159	239
26,000	-22	-27	57	335	670	148	232	57	336	672	152	238
28,000	-26	-30	52	312	624	140	228	53	313	626	145	236
29,000	-28	-32	50	301	602	136	226	51	302	604	141	234
31,000	-32	-36	46	280	560	128	221	47	281	562	134	231
33,000	-36	-40	42	259	518	118	213	43	260	520	126	227
35,000	-40	-44	---	---	---	---	---	39	240	480	118	221

BT03630

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-73. Normal Cruise Power at 1500 RPM - ISA +10°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA + 10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	30	25	94	637	1274	216	222	94	636	1272	218	224
2000	26	21	94	617	1234	214	226	94	616	1232	216	228
4000	22	17	94	599	1198	212	230	94	599	1198	214	232
6000	18	13	94	583	1166	209	235	94	583	1166	211	237
8000	14	9	93	565	1130	206	238	94	566	1132	208	240
10,000	10	5	88	532	1064	199	237	88	532	1064	201	240
12,000	6	1	84	504	1008	193	238	84	505	1010	196	241
14,000	3	-3	81	478	956	187	238	81	478	956	190	242
16,000	-1	-7	77	451	902	181	238	77	452	904	184	242
18,000	-5	-11	72	425	860	174	236	73	426	852	178	241
20,000	-10	-15	68	400	800	167	234	68	401	802	171	240
22,000	-14	-19	64	376	752	159	231	64	377	754	164	238
24,000	-18	-23	59	352	704	150	227	60	354	708	156	236
26,000	-22	-27	55	329	658	140	220	56	330	660	148	232
28,000	-26	-30	51	306	612	128	210	51	308	616	139	226
29,000	-29	-32	48	294	588	120	201	49	297	594	134	222
31,000	-32	-36	---	---	---	---	---	45	275	550	123	213
33,000	-37	-40	---	---	---	---	---	41	253	506	105	192
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055919

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-74. Normal Cruise Power at 1500 RPM - ISA +10°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA + 10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	30	25	94	636	1272	219	225	94	635	1270	220	226
2000	26	21	94	616	1232	217	229	94	616	1232	218	231
4000	22	17	94	598	1196	215	234	94	598	1196	216	235
6000	18	13	94	582	1164	213	238	94	582	1164	214	240
8000	15	9	94	566	1132	210	242	94	566	1132	211	244
10,000	11	5	88	532	1064	203	242	88	533	1066	204	244
12,000	7	1	85	505	1010	198	243	85	505	1010	199	245
14,000	3	-3	81	479	958	193	244	81	479	958	194	247
16,000	-1	-7	77	452	904	187	245	77	453	906	189	248
18,000	-5	-11	73	426	852	181	245	73	427	854	183	248
20,000	-9	-15	69	402	804	174	244	69	402	804	177	248
22,000	-13	-19	65	378	756	167	243	65	379	758	170	247
24,000	-17	-23	60	355	710	160	242	61	355	710	164	247
26,000	-21	-27	56	331	662	153	239	56	332	664	157	245
28,000	-25	-30	52	309	618	145	236	52	310	620	150	243
29,000	-27	-32	50	298	596	141	234	50	299	598	146	242
31,000	-32	-36	46	277	554	133	229	46	278	556	139	239
33,000	-36	-40	42	256	512	123	222	43	258	516	131	235
35,000	-40	-44	38	235	470	111	210	39	237	474	122	229

BT0559110

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-74. Normal Cruise Power at 1500 RPM - ISA +10°C (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA +20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	94	628	1256	207	217	94	628	1256	209	218
2000	36	31	94	607	1214	205	221	94	607	1214	207	222
4000	32	27	94	588	1176	203	225	94	588	1176	204	226
6000	28	23	92	562	1124	198	226	92	563	1126	200	229
8000	24	19	88	533	1066	193	227	88	533	1066	195	230
10,000	20	15	84	504	1008	187	227	84	505	1010	189	230
12,000	16	11	81	478	956	181	228	81	478	956	184	231
14,000	12	7	75	449	898	173	225	75	449	898	177	229
16,000	8	3	70	421	842	166	223	71	422	844	170	228
18,000	4	-1	66	396	792	158	220	66	397	794	163	226
20,000	0	-5	62	371	742	150	217	62	372	744	156	224
22,000	-4	-9	57	348	696	142	212	58	349	698	148	221
24,000	-9	-13	53	325	650	131	205	54	326	652	140	217
26,000	-12	-17	---	---	---	---	---	50	305	610	131	212
28,000	-17	-20	---	---	---	---	---	46	285	570	121	204
29,000	-28	-32	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03631

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBSIHR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-75. Normal Cruise Power at 1500 RPM - ISA +20°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA +20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	94	627	1254	210	220	94	627	1254	212	221
2000	36	31	94	607	1214	208	224	94	606	1212	209	225
4000	32	27	94	587	1174	206	228	94	587	1174	207	229
6000	28	23	93	563	1126	202	231	93	563	1126	204	232
8000	24	19	89	533	1066	197	232	89	533	1066	198	234
10,000	20	15	85	505	1010	192	235	85	505	1010	193	235
12,000	16	11	81	478	956	186	234	81	479	958	188	236
14,000	12	7	76	450	900	179	233	76	450	900	181	235
16,000	8	3	71	423	846	173	232	71	423	846	175	235
18,000	4	-1	67	397	794	166	231	67	398	796	169	234
20,000	0	-5	62	373	746	160	229	63	373	746	163	234
22,000	-4	-9	58	350	700	153	228	59	351	702	156	233
24,000	-8	-13	54	327	654	146	225	55	328	656	150	231
26,000	-12	-17	50	306	612	138	222	51	307	614	143	229
28,000	-16	-20	47	287	574	131	218	47	288	576	137	227
29,000	-18	-22	45	277	554	127	216	46	279	558	133	226
31,000	-22	-26	41	258	516	118	209	42	260	520	126	223
33,000	-26	-30	---	---	---	---	---	38	240	480	118	217
35,000	-30	-34	---	---	---	---	---	35	221	442	108	209

BT03632

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54/0), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-75. Normal Cruise Power at 1500 RPM - ISA +20°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA + 20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	40	35	94	640	1280	215	224	94	640	1280	216	226
2000	36	31	94	619	1238	212	228	94	619	1238	214	230
4000	32	27	91	587	1174	207	229	91	587	1174	209	231
6000	28	23	87	555	1110	201	230	87	555	1110	204	232
8000	24	19	84	526	1052	196	231	84	526	1052	198	233
10,000	20	15	80	498	996	190	231	81	498	996	193	234
12,000	16	11	78	472	944	185	232	78	472	944	188	236
14,000	12	7	73	443	886	178	230	73	444	888	181	235
16,000	8	3	68	417	834	170	228	69	417	834	174	233
18,000	4	-1	65	391	782	163	227	65	392	784	168	233
20,000	0	-5	60	367	734	155	223	61	368	736	160	231
22,000	-4	-9	56	344	688	146	219	57	345	690	153	228
24,000	-8	-13	52	321	642	137	212	53	323	646	145	224
26,000	-13	-17	49	299	598	125	202	49	302	604	136	219
28,000	-16	-20	---	---	---	---	---	46	282	564	127	212
29,000	-18	-22	---	---	---	---	---	44	273	546	121	207
31,000 -	-23	-26	---	---	---	---	---	40	251	502	104	187
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559111

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-76. Normal Cruise Power at 1500 RPM - ISA +20°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA + 20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	40	35	94	639	1278	218	227	94	639	1278	219	228
2000	36	31	94	619	1238	216	232	94	618	1236	217	233
4000	32	27	91	587	1174	210	233	91	587	1174	212	234
6000	28	23	88	556	1112	205	234	88	556	1112	207	236
8000	24	19	84	527	1054	200	236	84	527	1054	202	237
10,000	20	15	81	499	998	195	237	81	499	998	197	239
12,000	16	11	78	473	946	190	238	78	473	946	192	241
14,000	13	7	73	444	888	184	238	73	445	890	186	240
16,000	9	3	69	418	836	177	237	69	418	836	180	240
18,000	5	-1	65	393	786	171	237	66	394	788	174	241
20,000	1	-5	61	369	738	164	236	62	369	738	167	240
22,000	-3	-9	57	346	692	158	234	58	347	694	161	239
24,000	-8	-13	54	324	648	151	232	54	324	648	155	238
26,000	-12	-17	50	303	606	143	229	50	304	608	148	237
28,000	-16	-20	46	284	568	136	226	47	285	570	141	235
29,000	-18	-22	45	275	550	131	224	45	276	552	138	234
31,000	-22	-26	41	256	512	122	217	42	257	514	131	230
33,000	-26	-30	37	236	472	111	207	38	238	476	122	225
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559112

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-76. Normal Cruise Power at 1500 RPM - ISA +20°C (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA +30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	90	615	1230	202	215	90	615	1230	204	217
2000	45	41	87	584	1168	197	216	88	584	1168	200	218
4000	41	37	84	553	1106	192	217	85	553	1106	195	220
6000	38	33	81	524	1048	187	218	81	524	1048	190	220
8000	34	29	78	495	990	182	218	78	496	992	184	221
10,000	30	25	74	467	934	176	218	75	468	936	179	222
12,000	26	21	71	442	884	170	218	72	442	884	174	222
14,000	22	17	68	418	836	164	218	69	419	838	168	223
16,000	18	13	64	391	782	156	214	64	392	784	161	220
18,000	13	9	57	360	720	145	207	58	362	724	151	215
20,000	9	5	52	333	666	135	199	53	335	670	143	210
22,000	5	1	49	312	624	124	191	50	314	628	135	206
24,000	1	-3	---	---	---	---	---	46	294	588	126	200
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03633

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-77. Normal Cruise Power at 1500 RPM - ISA +30°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA +30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	91	615	1230	206	218	91	615	1230	207	220
2000	46	41	88	584	1168	201	220	88	584	1168	203	222
4000	42	37	85	554	1108	197	222	85	554	1108	198	223
6000	38	33	82	524	1048	192	223	82	524	1048	193	225
8000	34	29	78	496	992	187	224	78	496	992	188	226
10,000	30	25	75	468	936	181	225	75	468	936	183	227
12,000	26	21	72	443	886	176	226	72	443	886	179	228
14,000	22	17	69	419	838	171	226	69	419	838	174	229
16,000	18	13	64	392	784	165	225	64	393	786	167	229
18,000	14	9	58	363	726	156	221	59	363	726	159	225
20,000	10	5	53	336	672	148	217	54	336	672	152	223
22,000	6	1	50	315	630	141	215	50	316	632	146	222
24,000	2	-3	47	295	590	134	212	47	296	592	139	220
26,000	-2	-7	44	278	556	127	209	44	278	556	133	218
28,000	-7	-10	41	263	526	120	206	42	264	528	127	217
29,000	-9	-12	40	254	508	116	203	40	256	512	124	216
31,000	-12	-16	---	---	---	---	---	38	239	478	117	13
33,000	-16	-20	---	---	---	---	---	34	219	438	108	205
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03634

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-77. Normal Cruise Power at 1500 RPM - ISA +30°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA + 30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	84	606	1212	204	216	84	606	1212	206	219
2000	45	41	82	576	1152	199	218	82	576	1152	202	220
4000	42	37	79	546	1092	195	219	79	546	1092	197	222
6000	38	33	76	517	1034	189	220	77	517	1034	192	223
8000	34	29	74	489	978	184	221	74	489	978	187	224
10,000	30	25	71	461	922	179	221	71	462	924	182	225
12,000	26	21	68	436	872	174	222	69	437	874	177	226
14,000	22	17	66	413	826	168	222	66	413	826	172	227
16,000	18	13	62	387	774	160	220	62	387	774	165	226
18,000	14	9	56	356	712	150	213	56	358	716	156	221
20,000	9	5	51	329	658	139	205	52	331	662	147	216
22,000	5	1	48	309	618	129	198	49	311	622	139	212
24,000	1	-3	44	288	576	115	184	45	291	582	131	207
26,000	-3	-7	---	---	---	---	---	43	273	546	121	201
28,000	-7	-10	---	---	---	---	---	40	257	514	110	190
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559113

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-78. Normal Cruise Power at 1500 RPM - ISA +30°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA + 30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	85	606	1212	208	220	85	606	1212	209	222
2000	46	41	82	576	1152	203	222	82	576	1152	205	224
4000	42	37	80	546	1092	199	224	80	547	1094	201	226
6000	38	33	77	518	1036	194	226	77	518	1036	196	228
8000	34	29	74	490	980	189	227	74	490	980	191	229
10,000	30	25	71	462	924	185	228	71	462	924	187	231
12,000	26	21	69	437	874	180	230	69	437	874	182	233
14,000	22	17	66	414	828	175	231	67	414	828	178	234
16,000	18	13	62	388	776	169	230	63	388	776	171	234
18,000	14	9	57	359	718	160	226	57	359	718	163	231
20,000	10	5	52	332	664	152	223	53	333	666	156	229
22,000	6	1	49	312	624	145	221	50	313	626	150	228
24,000	2	-3	46	292	584	138	219	46	292	584	143	226
26,000	-2	-7	43	274	548	131	216	44	275	550	138	225
28,000	-6	-10	41	260	520	125	213	41	261	522	132	225
29,000	-8	-12	40	252	504	121	211	40	253	506	129	224
31,000	-13	-16	37	234	468	110	202	37	236	472	122	220
33,000	-18	-20	32	211	422	84	163	34	217	434	112	213
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559114

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-78. Normal Cruise Power at 1500 RPM - ISA +30°C (Sheet 2 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA +37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	81	591	1182	193	207	81	591	1182	195	210
2000	52	48	79	559	1118	189	209	79	559	1118	191	211
4000	48	44	76	528	1056	184	210	76	528	1056	186	213
6000	44	40	73	498	996	179	210	73	498	996	181	214
8000	40	36	70	470	940	173	211	71	470	940	176	214
10,000	36	32	67	444	888	168	211	68	444	888	171	215
12,000	32	28	65	420	840	162	211	65	420	840	166	216
14,000	28	24	62	396	792	156	210	62	397	794	161	216
16,000	24	20	58	370	740	148	206	58	371	742	154	213
18,000	20	16	52	340	680	137	198	53	341	682	144	208
20,000	16	12	47	310	620	123	185	48	313	626	134	201
22,000	12	8	---	---	---	---	---	44	292	584	124	194
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03635

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-79. Normal Cruise Power at 1500 RPM - ISA +37°C (Sheet 1 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA +37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	82	591	1182	197	212	82	591	1182	199	213
2000	52	48	79	559	1118	193	214	79	559	1118	194	215
4000	48	44	76	528	1056	188	215	77	528	1056	190	217
6000	44	40	74	498	996	184	216	74	498	996	186	218
8000	41	36	71	470	940	179	217	71	470	940	181	220
10,000	37	32	68	444	888	174	218	68	444	888	176	221
12,000	33	28	66	420	840	169	219	66	421	842	172	222
14,000	29	24	63	397	794	164	220	63	397	794	167	224
16,000	25	20	59	371	742	158	219	59	372	744	161	223
18,000	21	16	54	342	684	149	215	54	343	686	153	220
20,000	16	12	49	314	628	141	210	49	315	630	145	216
22,000	12	8	45	294	588	133	206	45	295	590	138	214
24,000	8	4	41	273	546	124	201	42	274	548	131	211
26,000	4	0	39	257	514	117	196	39	258	516	125	209
28,000	1	-3	----	---	---	---	---	38	246	492	120	208
29,000	-1	-5	---	---	---	---	---	37	239	478	117	208
31,000	-6	-9	---	---	---	---	---	34	223	446	110	203
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03635

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-79. Normal Cruise Power at 1500 RPM - ISA +37°C (Sheet 2 of 2) IR

NORMAL CRUISE POWER
1500 RPM
ISA + 37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	75	581	1162	194	208	76	581	1162	196	211
2000	52	48	73	550	1100	190	210	73	551	1102	192	213
4000	48	44	71	520	1040	185	211	71	520	1040	188	214
6000	44	40	69	491	982	180	212	69	491	982	183	216
8000	40	36	66	464	928	175	213	67	464	928	179	217
10,000	36	32	64	438	876	170	214	64	438	876	174	218
12,000	32	28	62	414	828	165	214	62	415	830	169	219
14,000	29	24	60	391	782	159	214	60	392	784	164	220
16,000	24	20	56	365	730	152	211	57	366	732	157	218
18,000	20	16	51	336	672	141	203	52	337	674	148	213
20,000	16	12	46	307	614	127	191	47	310	620	138	207
22,000	11	8	42	285	570	110	172	44	289	578	129	200
24,000	8	4	---	---	---	---	---	40	268	536	117	190
26,000	3	0	---	---	---	---	---	37	251	502	104	176
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559115

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-80. Normal Cruise Power at 1500 RPM - ISA +37°C (Sheet 1 of 2) CA

NORMAL CRUISE POWER
1500 RPM
ISA + 37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	76	581	1162	198	213	76	581	1162	200	215
2000	52	48	74	551	1102	194	215	74	551	1102	196	217
4000	48	44	71	520	1040	190	217	72	520	1040	192	219
6000	45	40	69	491	982	186	218	69	491	982	188	221
8000	41	36	67	464	928	181	220	67	464	928	183	223
10,000	37	32	64	438	876	177	222	65	439	878	179	224
12,000	33	28	63	415	830	172	223	63	415	830	175	227
14,000	29	24	60	392	784	168	225	61	392	784	171	228
16,000	25	20	57	367	734	162	224	57	367	734	165	228
18,000	21	16	52	339	678	153	220	53	339	678	157	226
20,000	17	12	48	311	622	145	216	48	312	624	149	222
22,000	13	8	44	290	580	137	212	45	291	582	142	220
24,000	8	4	41	270	540	129	207	41	271	542	135	217
26,000	4	0	38	254	508	121	203	39	255	510	129	215
28,000	0	-3	37	242	484	115	200	37	243	486	124	215
29,000	-2	-5	36	235	470	110	197	36	236	472	121	215
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559116

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 35 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-80. Normal Cruise Power at 1500 RPM - ISA +37°C (Sheet 2 of 2) CA

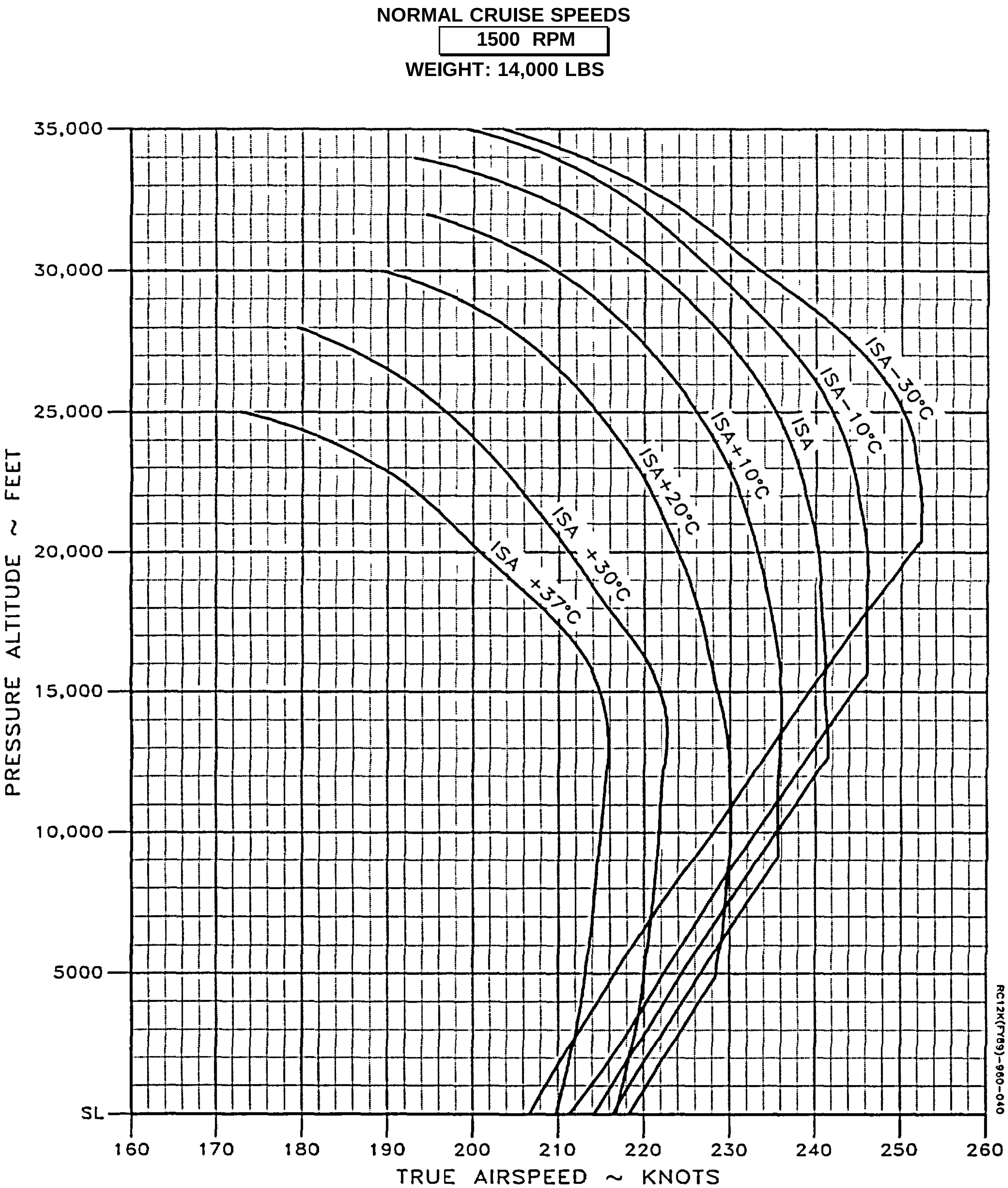


Figure 7-81. Normal Cruise Speeds at 1500 RPM IR

NORMAL CRUISE SPEEDS

1500 RPM

WEIGHT: 14,000 LBS

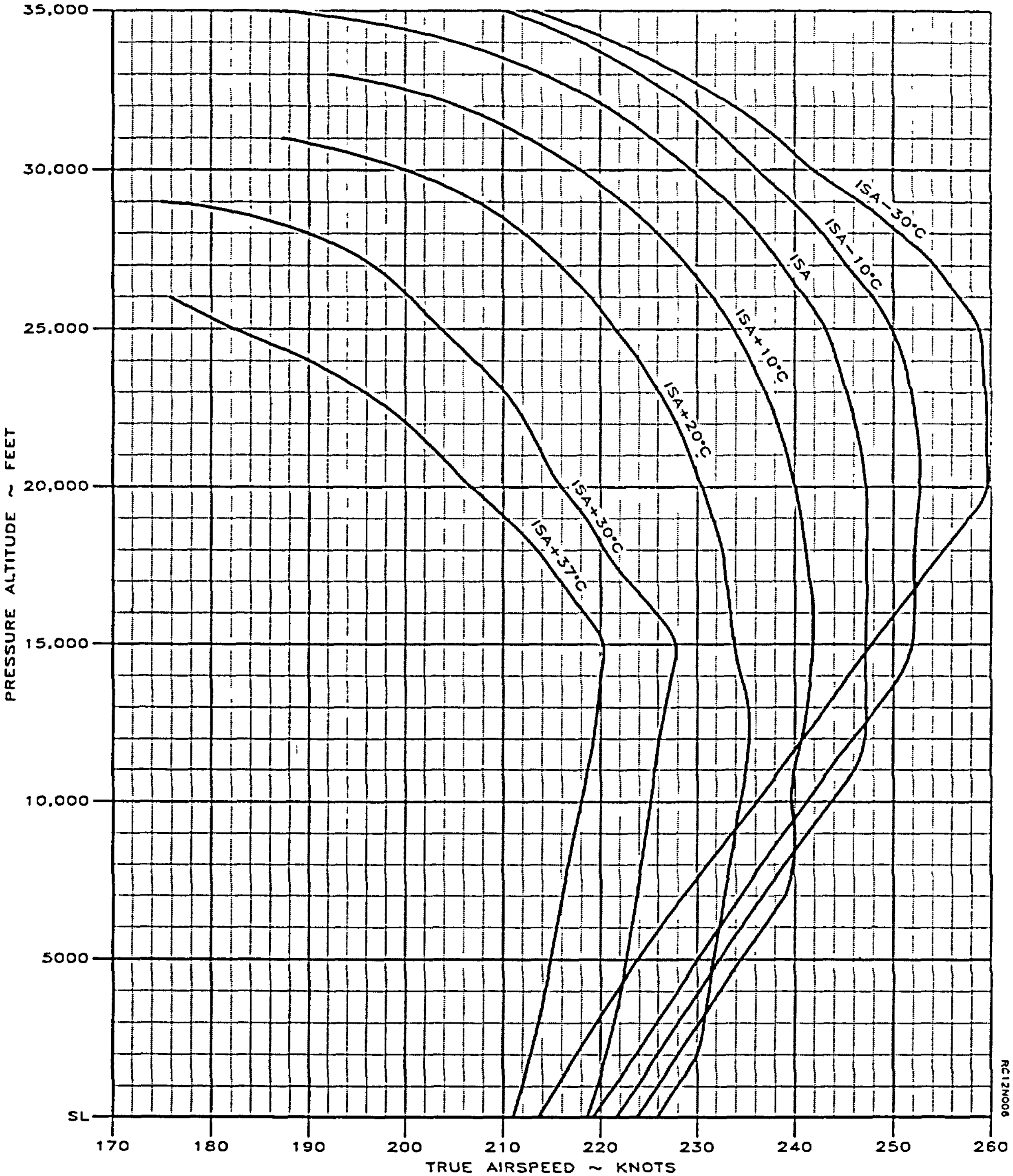


Figure 7-82. Normal Cruise Speeds at 1500 RPM CA

NORMAL CRUISE POWER
1500 RPM
WEIGHT: 14,000 LBS

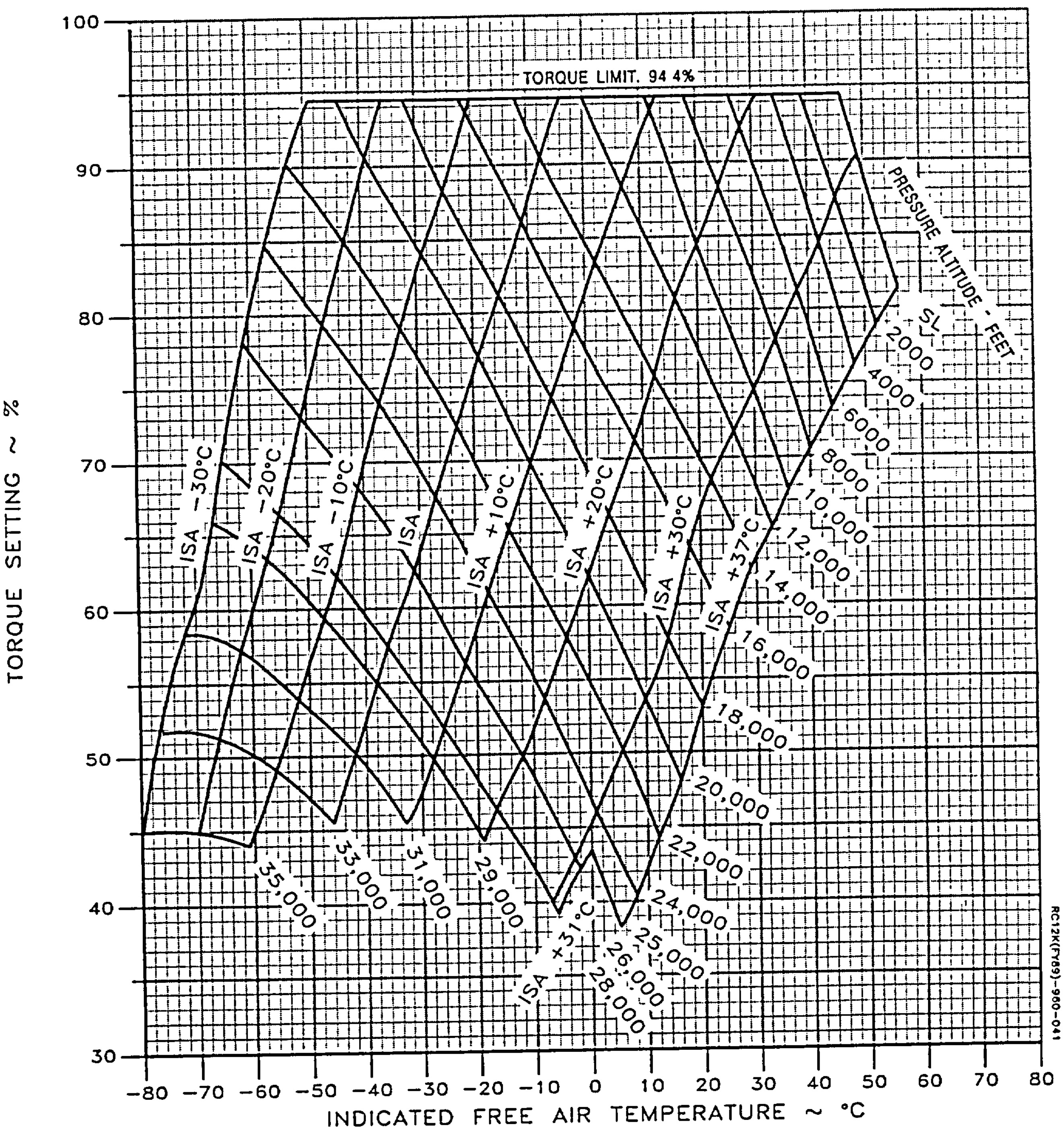


Figure 7-83. Normal Cruise Power at 1500 RPM IR

NORMAL CRUISE POWER

1500 RPM

WEIGHT: 14,000 LBS

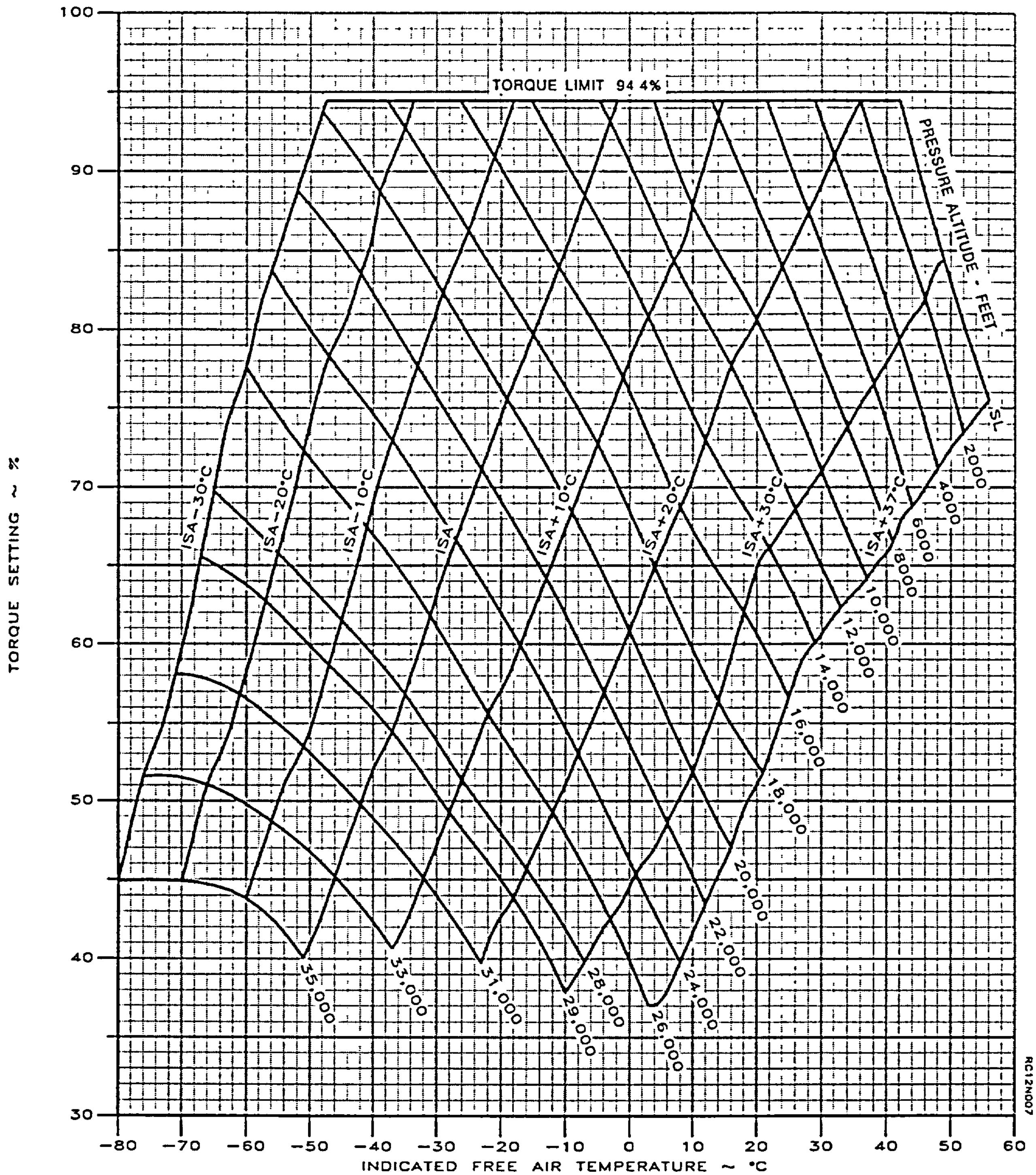


Figure 7-84. Normal Cruise Power at 1500 RPM CA

FUEL FLOW AT NORMAL CRUISE POWER
1500 RPM
WEIGHT: 14,000 LBS

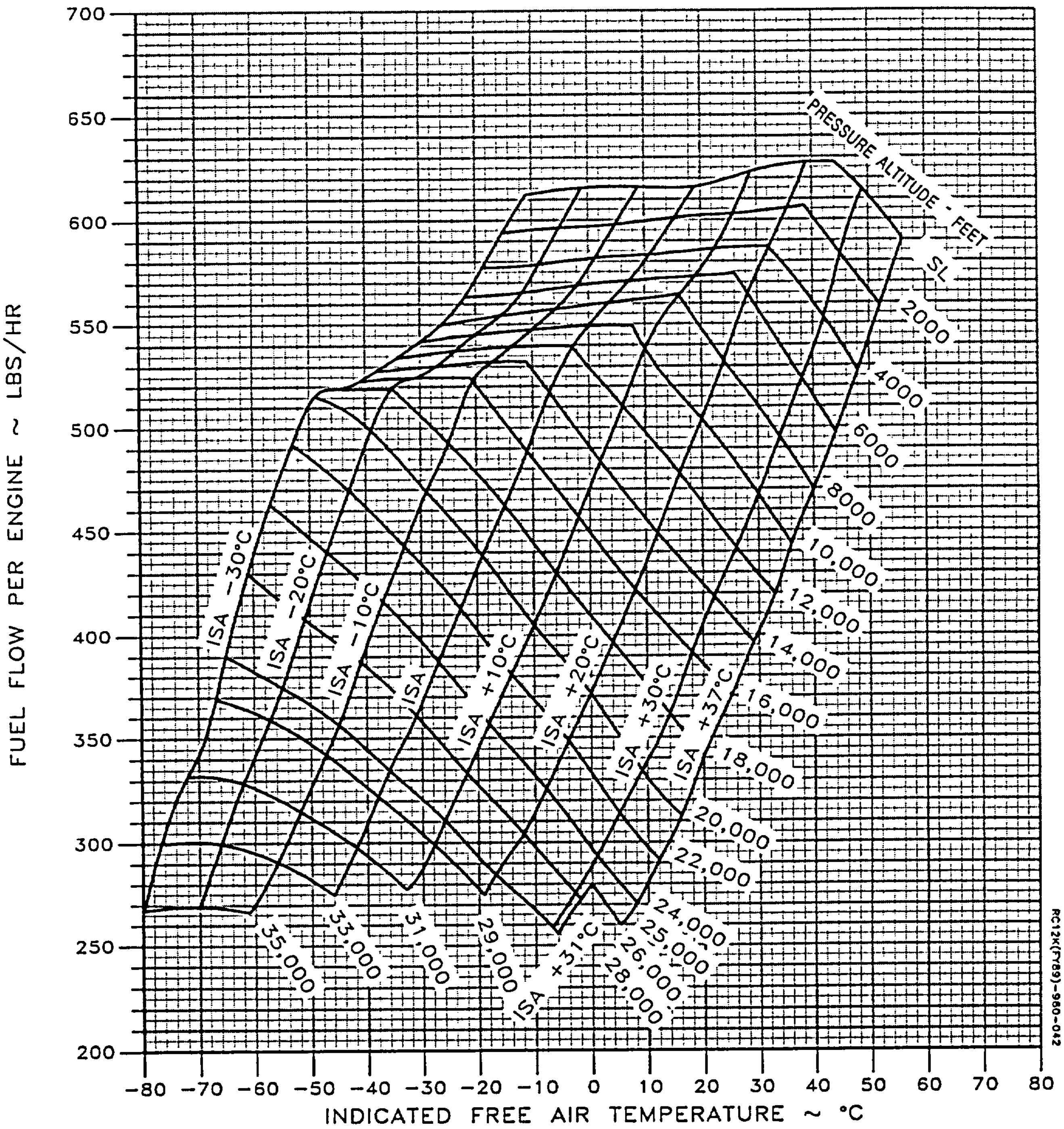


Figure 7-85. Fuel Flow at Normal Cruise Power at 1500 RPM IR

FUEL FLOW AT NORMAL CRUISE POWER

1500 RPM

WEIGHT: 14,000 LBS

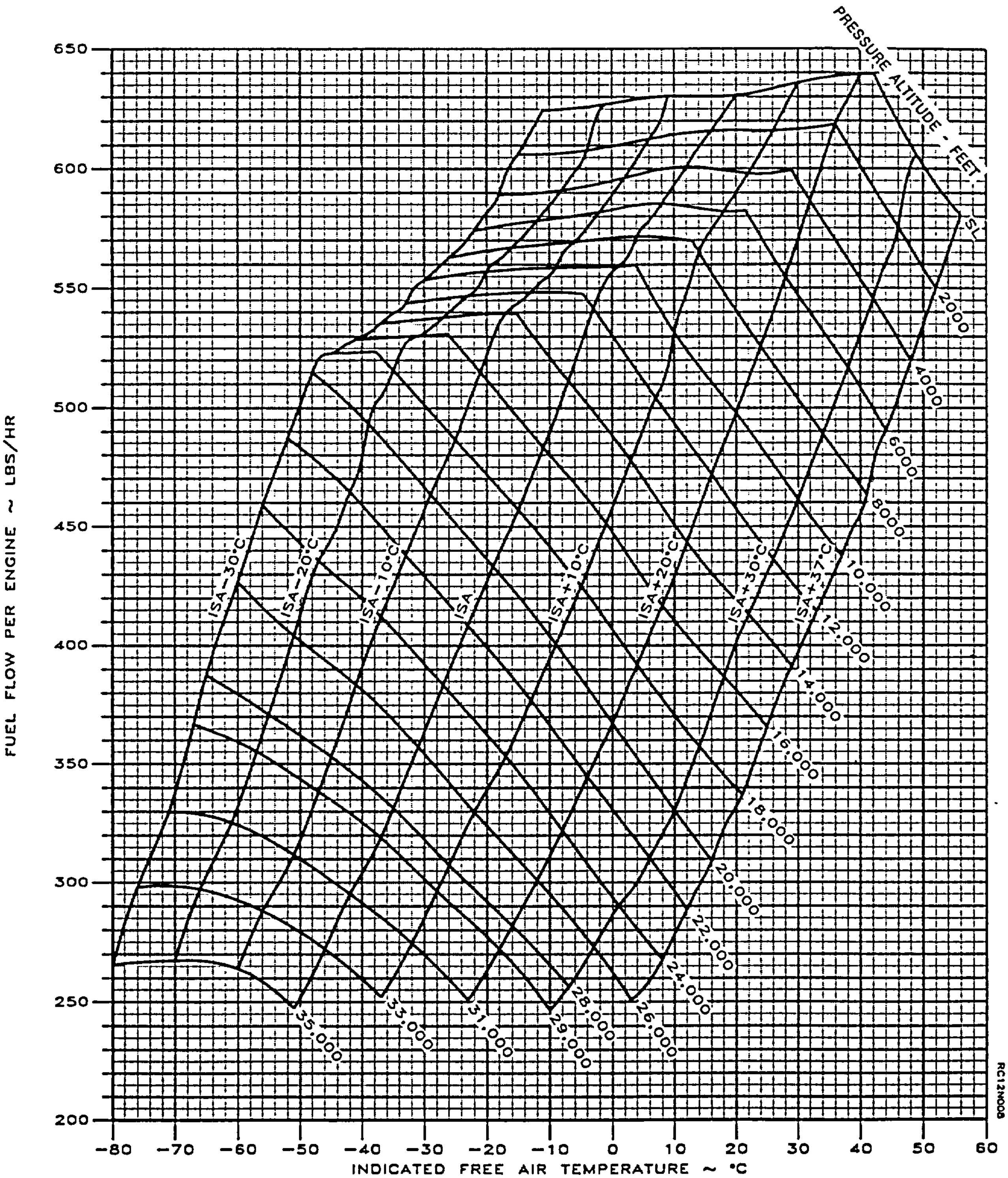


Figure 7-86. Fuel Flow at Normal Cruise Power at 1500 RPM CA

RANGE PROFILE - NORMAL CRUISE POWER

1500 RPM

STANDARD DAY (ISA)

ZERO WIND

ASSOCIATED CONDITIONS:
WEIGHT ....*16,320 LBS BEFORE ENGINE START
FUEL ....AVIATION KEROSENE
FUEL DENSITY ..6.7 LBS/GAL
ICE VANES ....RETRACTED

EXAMPLE:
PRESSURE ALTITUDE .....26,000 FT
FUEL ....2572 LBS
RANGE................................579 NM

NOTES: 1. RANGE ALLOWS FOR START, TAXI, AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

*2. AT 16,320 LBS RAMP WEIGHT, THE MAXIMUM ZERO-FUEL WEIGHT LIMITATION OF 13,100 LBS WOULD BE EXCEEDED AT FUEL LOADING LESS THAN 3220 LBS.

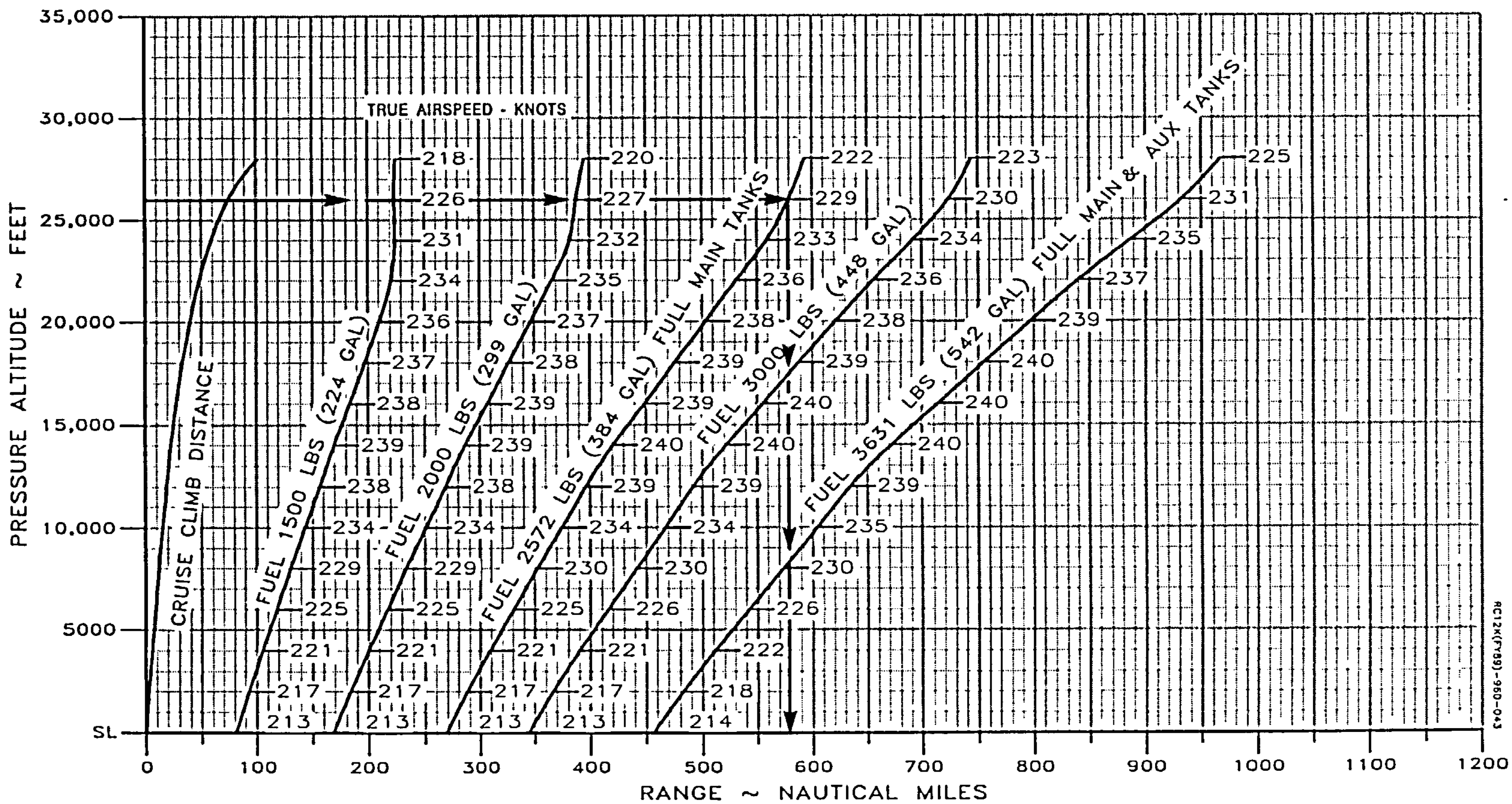


Figure 7-87. Range Profile - Normal Cruise Power at 1500 RPM

MAXIMUM RANGE POWER
1500 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-12	-15	76	548	1096	196	188	73	537	1074	195	187
2000	-16	-19	72	512	1024	189	187	70	504	1008	189	187
4000	-20	-23	68	480	960	183	186	66	472	944	184	186
6000	-24	-27	64	448	896	177	185	62	439	878	177	185
8000	-28	-31	61	421	842	171	184	59	411	822	171	184
10,000	-32	-35	58	395	790	165	183	55	382	764	164	182
12,000	-36	-39	56	374	748	160	183	53	359	718	159	182
14,000	-40	-43	56	361	722	157	185	50	336	672	152	180
16,000	-43	-47	55	348	696	153	187	48	321	642	148	181
18,000	-47	-51	54	337	674	150	189	46	304	608	143	181
20,000	-51	-55	53	327	654	146	191	45	293	586	139	182
22,000	-55	-59	54	324	648	145	195	46	290	580	138	187
24,000	-59	-63	54	324	648	144	200	46	287	574	136	190
26,000	-63	-67	54	319	638	141	203	47	285	570	135	195
28,000	-65	-70	---	---	---	---	---	48	284	568	135	201
29,000	-69	-72	---	---	---	---	---	46	275	550	130	198
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03583

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-88. Maximum Range Power at 1500 RPM - ISA -30°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA -30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-12	-15	70	525	1050	193	185	66	511	1022	191	183
2000	-16	-19	68	495	990	189	186	64	483	966	187	184
4000	-20	-23	65	464	928	184	186	62	455	910	183	185
6000	-24	-27	61	434	868	178	186	59	427	854	178	185
8000	-28	-31	58	405	810	172	185	56	399	798	172	186
10,000	-32	-35	54	377	754	166	184	53	371	742	166	185
12,000	-36	-39	51	352	704	160	183	50	346	692	161	184
14,000	-40	-43	48	329	658	154	182	47	323	646	155	183
16,000	-44	-47	45	308	616	148	181	44	302	604	150	183
18,000	-48	-51	43	289	578	143	180	42	284	568	145	183
20,000	-52	-55	41	272	544	137	179	40	267	534	140	183
22,000	-56	-59	39	259	518	132	178	37	249	498	133	180
24,000	-60	-63	39	252	504	128	180	35	234	468	127	178
26,000	-63	-67	40	252	504	128	186	32	218	436	120	174
28,000	-67	-70	40	251	502	127	191	33	217	434	119	179
29,000	-69	-72	41	250	- 500	127	194	33	217	434	119	183
31,000	-73	-76	40	245	490	124	197	34	214	428	118	187
33,000	-77	-80	38	233	466	117	193	34	212	424	117	192
35,000	-81	-84	---	---	---	---	---	32	202	404	111	190

BT03584

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-88. Maximum Range Power at 1500 RPM - ISA -30°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-12	-15	75	554	1108	201	192	71	538	1076	198	189
2000	-16	-19	71	518	1036	194	191	67	505	1010	192	188
4000	-20	-23	67	485	970	188	190	64	471	942	186	188
6000	-24	-27	64	455	910	182	190	60	440	880	180	187
8000	-28	-31	61	427	854	176	189	57	412	824	174	186
10,000	-32	-35	58	401	802	170	189	54	383	776	167	186
12,000	-35	-39	57	381	762	166	190	51	359	718	162	186
14,000	-39	-43	55	364	728	162	191	491	339	678	157	186
16,000	-43	-47	54	348	696	158	193	47	319	638	152	186
18,000	-47	-51	53	335	670	155	195	46	204	608	148	186
20,000	-51	-55	52	324	648	151	196	45	292	584	144	188
22,000	-53	-59	53	322	644	150	201	45	287	574	142	191
24,000	-59	-63	54	320	640	149	207	45	281	562	140	195
26,000	-62	-67	53	315	630	146	210	46	281	562	140	201
28,000	-65	-70	51	300	600	139	207	47	281	562	140	208
29,000	-68	-72	53	307	614	140	212	45	273	546	136	206
31,000	-72	-76	54	314	628	141	220	45	268	536	131	206
33,000	-76	-80	---	---	---	---	---	47	276	552	132	215
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT05592

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-89. Maximum Range Power at 1500 RPM - ISA -30°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA -30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-12	-15	67	523	1046	195	187	63	509	1018	192	184
2000	-16	-19	64	492	984	190	187	61	479	958	188	185
4000	-20	-23	61	461	922	185	187	58	450	900	183	186
6000	-24	-27	58	432	864	179	187	56	422	844	178	186
8000	-28	-31	55	403	806	174	187	53	395	790	173	187
10,000	-32	-35	52	375	750	168	186	50	367	734	168	186
12,000	-40	-39	49	348	696	161	185	47	343	686	163	186
14,000	-44	-43	47	327	654	157	185	45	320	640	157	186
16,000	-48	-47	44	306	612	151	185	43	300	600	152	186
18,000	-51	-51	42	288	576	146	185	41	281	562	148	187
20,000	-55	-55	40	271	542	141	184	39	264	528	143	186
22,000	-55	-59	38	256	512	135	183	37	248	496	137	185
24,000	-59	-63	38	250	500	133	186	34	231	462	130	183
26,000	-63	-67	39	247	494	133	190	32	217	434	124	180
28,000	-67	-70	39	246	492	131	196	32	214	428	123	185
29,000	-69	-72	40	246	492	131	200	33	213	426	122	187
31,000	-73	-76	39	242	484	129	203	33	210	420	121	191
33,000	-77	-80	37	229	458	121	199	33	207	414	120	197
35,000	-80	-84	39	235	470	122	208	32	200	400	116	197

BT055922

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-89. Maximum Range Power at 1500 RPM - ISA -30°C (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA -20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-2	-5	80	567	1134	198	193	73	542	1084	192	188
2000	-6	-9	76	531	1062	191	192	70	510	1020	187	188
4000	-10	-13	72	497	994	185	191	66	478	956	182	188
6000	-14	-17	68	467	934	179	191	63	447	894	175	187
8000	-17	-21	65	440	880	174	191	60	419	838	170	187
10,000	-21	-25	63	415	830	169	191	56	391	782	164	186
12,000	-25	-29	61	394	788	164	192	54	368	736	159	186
14,000	-29	-33	59	377	754	160	193	52	350	700	154	186
16,000	-33	-37	58	362	724	156	194	51	333	666	150	187
18,000	-37	-41	57	351	702	153	197	50	320	640	146	189
20,000	-41	-45	57	343	686	150	200	49	309	618	143	191
22,000	-45	-49	57	339	678	149	205	49	303	606	141	194
24,000	-49	-53	56	329	658	144	205	49	298	596	139	198
26,000	-53	-57	52	311	622	135	200	49	295	590	138	203
28,000	-57	-60	---	---	---	---	---	47	282	564	131	201
29,000	-59	-62	---	---	---	---	---	45	274	548	127	198
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03585

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-90. Maximum Range Power at 1500 RPM - ISA -20°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA -20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-2	-5	66	518	1036	187	183	60	495	990	181	177
2000	-6	-9	64	491	982	183	184	59	469	938	178	179
4000	-10	-13	62	462	924	179	185	57	445	890	175	181
6000	-14	-17	59	433	866	174	185	55	419	838	171	183
8000	-18	-21	56	405	810	168	185	53	393	786	166	183
10,000	-22	-25	53	377	754	162	184	50	367	734	161	183
12,000	-26	-29	49	350	700	156	182	48	342	684	156	183
14,000	-30	-33	47	328	656	150	182	45	318	636	150	182
16,000	-34	-37	45	309	618	145	181	42	297	594	144	180
18,000	-38	-41	43	292	584	140	181	40	279	558	139	180
20,000	-42	-45	42	279	558	136	182	38	262	524	134	180
22,000	-45	-49	41	272	544	134	185	36	247	494	129	179
24,000	-49	-53	41	266	532	132	188	34	233	466	123	177
26,000	-53	-57	41	260	520	129	192	34	227	454	121	181
28,000	-57	-60	41	256	512	128	196	34	224	448	120	185
29,000	-59	-62	41	255	510	127	199	34	221	442	119	187
31,000	-63	-66	40	247	494	123	199	34	218	436	118	191
33,000	-67	-70	---	---	---	---	---	34	215	430	116	196
35,000	-71	-74	---	---	---	---	---	32	205	410	110	194

BT03586

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-90. Maximum Range Power at 1500 RPM - ISA -20°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA -20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-1	-5	82	584	1168	207	201	75	558	1116	200	196
2000	-5	-9	77	545	1090	199	200	71	524	1048	195	195
4000	-9	-13	73	510	1020	193	199	67	489	978	188	195
6000	-13	-17	69	479	958	187	199	63	457	914	182	194
8000	-17	-21	66	450	900	181	198	60	427	854	176	193
10,000	-21	-25	63	423	846	175	198	57	399	798	170	193
12,000	-25	-29	61	399	798	170	199	54	374	748	165	192
14,000	-29	-33	59	380	760	166	200	52	353	706	160	193
16,000	-33	-37	58	364	728	162	202	50	334	668	155	193
18,000	-37	-41	57	352	704	159	204	49	319	638	151	194
20,000	-41	-45	56	342	684	156	207	48	307	614	147	196
22,000	-44	-49	56	336	672	154	211	48	301	602	146	201
24,000	-48	-53	55	324	648	149	211	48	296	592	144	205
26,000	-53	-57	52	308	616	141	208	48	292	584	142	210
28,000	-56	-60	53	310	620	139	212	46	279	558	136	208
29,000	-58	-62	54	315	630	140	217	45	271	542	132	206
31,000	-62	-66	--	---	---	---	---	46	275	550	131	211
33,000	-66	-70	--	---	---	---	---	48	282	564	131	219
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055923

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-91. Maximum Range Power at 1500 RPM - ISA -20°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA -20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-2-	5	66	526	1052	192	188	58	498	996	185	180
2000	-6	9	63	496	992	188	188	57	471	942	181	182
4000	-10	-13	61	466	932	183	189	55	444	888	177	183
6000	-14	-17	58	436	872	177	189	53	418	836	173	184
8000	-18	-21	55	408	816	172	189	51	391	782	168	185
10,000	-22	-25	52	379	758	166	188	48	365	730	163	185
12,000	-26	-29	49	353	706	160	187	46	340	680	158	185
14,000	-30	-33	46	329	658	154	186	43	316	632	153	185
16,000	-33	-37	44	309	618	149	186	41	295	590	148	184
18,000	-37	-41	42	291	582	144	186	39	2778	556	143	185
20,000	-41	-45	41	277	554	140	187	37	261	522	138	185
22,000	-45	-49	41	269	538	138	190	35	245	490	133	184
24,000	-49	-53	40	261	522	135	193	34	233	466	128	184
26,000	-53	-57	40	255	510	133	197	34	226	452	125	186
28,000	-57	-60	41	253	506	132	203	33	220	440	123	190
29,000	-59	-62	41	252	504	132	206	33	217	434	122	192
31,000	-62	-66	40	244	488	128	206	33	214	428	121	196
33,000	-67	-70	37	231	462	120	202	33	211	422	120	201
35,000	-70	-74	40	241	482	122	212	32	203	406	115	201

BT055924

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-91. Maximum Range Power at 1500 RPM - ISA -20°C (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA -10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	89	601	1202	206	204	80	571	1142	198	197
2000	5	1	84	562	1124	199	203	77	540	1080	194	198
4000	1	-3	79	526	1052	192	202	73	504	1008	187	197
6000	-3	-7	75	494	988	186	201	68	471	942	181	196
8000	-7	-11	71	465	930	180	201	65	441	882	175	196
10,000	-11	-15	68	438	876	174	201	61	413	826	169	195
12,000	-15	-19	66	415	830	169	202	59	389	778	164	195
14,000	-19	-23	64	396	792	165	203	57	368	736	159	196
16,000	-23	-27	62	380	760	161	205	54	350	700	154	196
18,000	-27	-31	60	365	730	156	205	53	334	668	150	197
20,000	-31	-35	59	353	706	152	206	52	323	646	146	199
22,000	-35	-39	56	336	672	145	204	52	317	634	144	203
24,000	-39	-43	53	320	640	138	201	51	307	614	141	205
26,000	-43	-47	---	---	---	---	---	48	290	580	133	202
28,000	-47	-50	---	---	---	---	---	46	278	556	126	199
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03587

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-92. Maximum Range Power at 1500 RPM - ISA -10°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA -10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	8	5	64	517	1034	183	182	54	477	954	171	171
2000	4	1	66	500	1000	183	187	53	454	908	169	173
4000	0	-3	64	475	950	180	190	53	435	870	168	177
6000	-4	-7	62	448	896	175	190	53	417	834	167	181
8000	-7	-11	59	420	840	170	191	52	394	788	163	183
10,000	-11	-15	56	392	784	164	190	50	370	740	159	184
12,000	-15	-19	53	366	732	158	189	47	346	692	154	184
14,000	-19	-23	50	344	688	153	189	45	323	646	148	183
16,000	-23	-27	48	324	648	148	189	42	301	602	143	183
18,000	-27	-31	46	306	612	143	189	40	281	562	137	181
20,000	-31	-35	44	293	586	139	190	38	265	530	132	181
22,000	-35	-39	44	284	568	136	193	37	255	510	129	183
24,000	-39	-43	44	276	552	134	196	37	247	494	127	186
26,000	-43	-47	44	271	542	133	201	36	239	478	124	189
28,000	-47	-50	42	262	524	129	202	36	232	464	122	192
29,000	-49	-52	41	255	510	125	201	35	228	456	121	194
31,000	-53	-56	39	241	482	118	196	35	223	446	119	197
33,000	-57	-60	---	---	---	---	---	34	217	434	115	199
35,000	-61	-64	---	---	---	---	---	32	205	410	108	195

BT03588

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-92. Maximum Range Power at 1500 RPM - ISA -10°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA -10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	91	617	1234	215	213	85	597	1194	211	209
2000	5	1	86	579	1158	208	213	80	558	1116	204	208
4000	1	-3	81	542	1084	201	212	74	518	1036	196	206
6000	-3	-7	76	508	1016	195	211	70	483	966	189	205
8000	-7	-11	72	577	954	188	210	66	451	902	182	204
10,000	-11	-15	69	448	896	182	210	62	421	842	176	203
12,000	-15	-19	66	423	846	177	210	59	395	790	170	203
14,000	-19	-23	64	401	802	172	211	57	372	744	165	203
16,000	-23	-27	62	382	764	168	213	55	353	706	161	204
18,000	-27	-31	59	362	724	162	212	53	336	672	156	205
20,000	-30	-35	58	349	698	157	212	52	324	648	152	207
22,000	-35	-39	55	330	660	149	210	51	315	630	150	211
24,000	-39	-43	52	315	630	142	207	50	303	606	146	212
26,000	-42	-47	52	311	622	139	210	47	286	572	138	208
28,000	-46	-50	54	319	638	139	217	45	274	548	131	206
29,000	-48	-52	55	323	646	140	222	45	275	550	131	209
31,000	-52	-56	---	---	---	---	---	47	282	564	131	216
33,000	-56	-60	---	---	---	---	---	49	288	576	131	224
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055925

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-93. Maximum Range Power at 1500 RPM - ISA -10°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA -10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	9	5	73	554	1108	199	197	52	480	960	175	174
2000	5	1	71	528	1056	195	200	57	478	956	180	185
4000	1	-3	68	496	992	190	200	56	454	908	177	187
6000	-3	-7	63	460	920	183	199	54	428	856	173	189
8000	-7	-11	59	428	856	176	197	52	401	802	169	189
10,000	-11	-15	56	397	794	170	196	50	375	750	164	189
12,000	-15	-19	53	370	740	164	195	47	349	698	158	189
14,000	-19	-23	50	346	692	158	195	45	325	650	153	189
16,000	-23	-27	48	325	650	153	195	42	302	604	147	188
18,000	-27	-31	45	306	612	148	195	39	281	562	142	187
20,000	-31	-35	44	291	582	144	196	37	265	530	137	187
22,000	-35	-39	43	282	564	141	199	37	254	508	134	189
24,000	-39	-43	43	275	550	139	203	36	244	488	131	191
26,000	-43	-47	43	268	536	137	207	35	235	470	128	194
28,000	-46	-50	42	259	518	134	209	35	228	456	126	198
29,000	-48	-52	41	252	504	130	208	35	225	450	124	199
31,000	-53	-56	38	238	476	122	203	35	221	442	123	204
33,000	-56	-60	39	239	478	120	208	34	215	430	120	206
35,000	-60	-64	40	246	492	121	216	32	202	404	112	202

BT055926

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-93. Maximum Range Power at 1500 RPM - ISA -10°C (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	92	607	1214	208	210	87	591	1182	205	207
2000	15	11	87	573	1146	201	209	83	560	1120	199	207
4000	11	7	83	542	1084	195	209	80	530	1060	194	208
6000	7	3	79	510	1020	189	209	76	499	998	189	208
8000	3	-1	75	480	960	183	208	71	467	934	182	207
10,000	-1	-5	71	452	904	177	208	68	438	876	176	207
12,000	-5	-9	68	424	848	171	207	64	411	822	170	207
14,000	-9	-13	64	400	800	164	206	61	387	774	164	206
16,000	-13	-17	61	378	756	158	205	59	366	732	159	206
18,000	-17	-21	57	355	710	151	202	56	349	698	154	207
20,000	-21	-25	55	339	678	144	201	53	330	660	148	205
22,000	-25	-29	53	323	646	137	198	51	314	628	142	204
24,000	-39	-43	---	---	---	---	---	48	295	590	134	200
26,000	-33	-37	---	---	---	---	---	46	285	570	128	198
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000 -	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03589

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-94. Maximum Range Power at 1500 RPM - ISA (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	18	15	72	542	1084	191	193	53	472	944	169	172
2000	15	11	75	534	1068	193	201	57	470	940	173	181
4000	11	7	73	507	1014	188	202	59	458	916	174	187
6000	7	3	69	474	948	182	202	58	436	872	171	189
8000	3	-1	65	443	886	176	201	57	418	836	169	193
10,000	-1	-5	61	413	826	170	200	55	392	784	164	194
12,000	-5	-9	57	386	772	164	199	52	365	730	158	193
14,000	-9	-13	54	362	724	158	199	49	340	680	153	192
16,000	-13	-17	52	341	682	153	199	46	318	636	147	192
18,000	-17	-21	50	323	646	148	199	43	299	598	142	191
20,000	-21	-25	48	308	616	144	201	41	282	564	137	192
22,000	-25	-29	47	297	594	141	203	40	268	536	133	192
24,000	-29	-33	46	286	572	137	205	39	256	512	129	194
26,000	-33	-37	43	270	540	130	202	38	246	492	126	196
28,000	-37	-40	40	255	510	123	199	37	238	476	123	199
29,000	-39	-42	40	249	498	120	197	37	235	470	122	201
31,000	-43	-46	---	---	---	---	---	35	223	446	116	199
33,000	-47	-50	---	---	---	---	---	33	212	424	111	197
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03590

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-94. Maximum Range Power at 1500 RPM - ISA (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	88	607	1214	212	214	86	598	1196	211	213
2000	15	11	83	573	1146	205	213	81	565	1130	205	213
4000	11	7	79	539	1078	198	212	77	531	1062	198	213
6000	7	3	75	508	1016	192	212	73	499	998	192	212
8000	3	-1	72	478	956	187	122	70	469	938	187	213
10,000	-10	-5	68	449	898	180	212	67	441	882	181	213
12,000	-5	-9	65	422	844	175	121	63	413	826	175	213
14,000	-9	-13	62	395	790	168	210	60	386	772	169	212
16,000	-13	-17	59	374	748	162	210	58	365	730	164	212
18,000	-17	-21	56	352	704	155	208	55	346	692	159	212
20,000	-21	-25	54	335	670	149	207	52	327	654	152	211
22,000	-25	-29	52	321	642	143	205	50	311	622	146	210
24,000	-28	-33	53	322	644	142	211	47	292	584	139	207
26,000	-32	-37	55	326	652	141	217	45	281	562	133	205
28,000	-36	-40	56	330	660	141	224	47	285	570	132	212
29,000	-38	-42	---	---	---	---	----	47	286	572	132	215
31,000	-42	-46	---	---	---	---	---	49	290	580	131	222
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055927

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G..64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-95. Maximum Range Power at 1500 RPM - ISA (Sleet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	19	15	82	585	1170	209	211	67	530	1060	192	195
2000	15	11	78	552	1104	203	211	66	511	1022	191	199
4000	11	7	74	518	1036	196	210	65	489	978	188	202
6000	7	3	70	486	972	190	210	64	465	930	185	204
8000	3	-1	66	453	906	184	209	59	431	862	178	203
10,000	-1	-5	62	421	842	177	208	55	398	796	171	201
12,000	-5	-9	58	392	784	171	207	51	368	684	164	200
14,000	-9	-13	55	366	7328	165	207	48	342	636	158	198
16,000	-13	-17	52	344	688	159	207	45	318	596	152	197
18,000	-17	-21	50	325	650	154	207	43	298	560	146	197
20,000	-21	-25	48	308	616	150	208	41	280	534	142	197
22,000	-24	-29	47	297	594	146	210	39	267	534	138	198
24,000	-28	-33	45	284	568	142	211	38	254	508	134	200
26,000	-32	-37	43	267	534	135	209	37	244	488	131	202
28,000	-37	-40	40	252	504	128	206	37	236	472	128	206
29,000	-39	-42	39	246	492	125	204	36	231	462	126	206
31,000	-42	-46	39	243	486	122	207	35	221	442	121	206
33,000	-46	-50	40	247	494	121	214	33	209	418	115	203
35,000	-50	-54	41	250	500	120	220	31	201	402	109	202

BT055928

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HRIENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-95. Maximum Range Power at 1500 RPM - ISA (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA +10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	87	597	1194	202	207	84	587	1174	201	207
2000	25	21	83	563	1126	196	208	81	554	1108	196	208
4000	21	17	79	528	1056	190	207	78	521	1042	191	208
6000	17	13	75	495	990	184	207	74	489	978	185	208
8000	13	9	70	464	928	177	205	70	461	922	179	208
10,000	9	5	65	434	868	169	202	65	431	862	171	205
12,000	5	1	63	411	822	163	202	62	406	812	166	205
14,000	1	-3	60	386	772	157	201	59	382	764	160	205
16,000	-3	-7	57	366	732	151	200	56	358	716	154	203
18,000	-7	-11	55	348	696	145	199	53	338	676	148	202
20,000	-11	-15	55	341	682	142	202	49	316	632	140	199
22,000	-15	-19	57	345	690	142	209	47	301	602	134	197
24,000	-18	-23	58	346	692	141	214	47	296	592	131	200
26,000	-22	-27	---	---	---	---	---	49	302	604	132	208
28,000	-26	-30	---	---	---	---	---	51	304	608	131	214
29,000	-28	-32	---	---	---	---	---	51	304	608	130	217
31,000--	---	---	---	---	---	---	---	---	---	---	---	---
33,000--	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03591

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-96. Maximum Range Power at 1500 RPM - ISA +10°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA +10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	80	573	1146	199	204	63	515	1030	181	187
2000	25	21	78	544	1088	195	207	64	495	990	181	192
4000	21	17	75	512	1024	191	208	65	478	956	181	197
6000	17	13	71	479	958	184	207	65	458	916	179	201
8000	13	9	67	449	898	178	207	62	432	864	174	202
10,000	9	5	64	425	850	173	207	60	411	822	170	204
12,000	5	1	61	400	800	167	207	56	383	766	164	203
14,000	1	-3	58	375	750	162	207	53	357	714	158	202
16,000	-3	-7	54	352	704	156	206	50	334	668	152	202
18,000	-7	-11	51	330	660	150	205	47	314	628	147	202
20,000	-11	-15	49	312	624	144	204	45	296	592	143	202
22,000	-15	-19	45	292	584	137	202	43	281	562	138	203
24,000	-19	-23	42	274	548	130	199	40	263	526	132	201
26,000	-23	-27	40	257	514	123	195	38	248	496	126	200
28,000	-27	-30	40	253	506	119	197	36	235	470	121	199
29,000	-29	-32	---	---	---	---	---	35	226	452	117	196
31,000	-33	-36	---	---	---	---	---	33	216	432	111	195
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03592

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-96. Maximum Range Power at 1500 RPM - ISA +10°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA + 10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	83	595	1190	205	210	82	590	1180	205	211
2000	25	21	79	560	1120	199	211	78	554	1108	200	211
4000	21	17	75	523	1046	193	210	74	519	1038	194	211
6000	17	13	71	490	980	186	209	70	488	976	188	212
8000	-3	9	68	462	924	180	209	66	457	914	181	211
10,000	9	5	64	434	868	173	207	62	428	856	175	209
12,000	5	1	61	408	816	167	207	60	403	806	169	210
14,000	1	-3	58	383	766	161	206	57	378	756	164	209
16,000	-3	-7	56	363	726	155	206	54	354	708	157	208
18,000	-7	-11	55	348	696	151	206	52	335	670	152	208
20,000	-11	-15	54	340	680	148	209	48	313	626	144	205
22,000	-14	-19	55	338	676	146	214	46	298	5960	138	203
24,000	-18	-23	56	336	672	144	219	46	291	582	135	205
26,000	-22	-27	---	---	---	---	---	48	294	588	135	213
28,000	-26	-30	---	---	---	---	---	49	295	590	134	218
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055929

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-97. Maximum Range Power at 1500 RPM - ISA +10°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA + 10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	29	25	79	580	1160	205	210	77	571	1142	204	209
2000	25	21	76	546	1092	199	211	73	536	1072	198	210
4000	21	17	72	512	1024	194	212	70	502	1004	193	210
6000	17	13	69	480	960	188	212	66	469	938	187	210
8000	13	9	65	452	904	183	212	62	440	880	181	210
10,000	9	5	61	422	844	176	211	59	415	830	176	211
12,000	5	1	58	396	792	171	211	56	388	776	171	211
14,000	1	-3	56	372	744	165	211	53	361	722	164	210
16,000	-3	-7	53	349	698	160	211	50	336	672	158	209
18,000	-7	-11	50	328	656	154	211	47	315	630	153	209
20,000	-11	-15	48	308	616	148	210	45	296	592	148	209
22,000	-15	-19	45	289	578	141	207	42	279	558	142	209
24,000	-19	-23	42	273	546	135	206	40	262	524	136	208
26,000	-23	-27	39	254	508	127	201	38	247	494	131	207
28,000	-27	-30	38	246	492	122	201	36	232	464	125	205
29,000	-28	-32	39	249	298	123	206	34	224	448	121	203
31,000	-32	-36	41	253	506	123	214	33	213	426	115	202
33,000	-37	-40	---	---	---	---	---	32	206	422	111	201
35,000	-40	-44	---	---	---	---	---	33	211	412	112	210

BT0559210

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-97. Maximum Range Power at 1500 RPM - ISA +10°C (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA +20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	85	596	1192	198	207	80	581	1162	196	205
2000	35	31	79	556	1112	191	206	76	545	1090	190	205
4000	31	27	75	520	1040	185	205	73	511	1022	185	205
6000	27	23	71	485	970	178	204	69	479	958	179	205
8000	23	19	67	454	908	171	203	65	446	892	172	203
10,000	19	15	63	424	848	165	201	62	417	834	166	203
12,000	15	11	60	398	796	158	200	59	392	784	161	203
14,000	11	7	58	382	764	153	200	55	368	736	153	200
16,000	7	3	59	376	752	152	205	51	345	690	146	198
18,000	3	-1	60	370	740	150	209	49	327	654	141	197
20,000	0	-5	60	364	728	148	213	50	321	642	139	201
22,000	-4	-9	59	356	712	144	215	51	320	640	138	207
24,000	-8	-13	---	---	---	---	---	52	317	634	137	212
26,000	-12	-17	---	---	---	---	---	51	310	620	133	214
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03593

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-98. Maximum Range Power at 1500 RPM - ISA +20°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA +20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	76	566	1132	194	203	71	551	1102	191	200
2000	35	31	73	533	1066	189	204	69	520	1040	187	201
4000	31	27	70	501	1002	184	204	67	489	978	182	202
6000	27	23	67	471	942	179	205	64	460	920	178	204
8000	23	19	64	442	884	174	206	62	433	866	173	205
10,000	19	15	61	413	826	168	205	59	405	810	168	206
12,000	15	11	58	387	774	163	205	56	379	758	163	205
14,000	11	7	53	361	722	155	202	52	357	714	157	205
16,000	7	3	50	338	676	149	201	49	334	668	151	203
18,000	3	-1	47	315	630	142	198	46	312	624	145	202
20,000	-1	-5	44	298	596	136	197	43	290	580	138	200
22,000	-5	-9	42	280	560	129	195	40	272	544	132	199
24,000	-9	-13	41	271	542	126	197	38	256	512	127	198
26,000	-13	-17	42	267	534	124	201	35	239	478	120	195
28,000	-16	-20	43	267	534	123	207	33	225	450	114	192
29,000	-18	-22	43	268	536	123	210	33	222	444	112	193
31,000	-22	-26	43	266	532	120	214	33	218	436	110	196
33,000	-26	-35	---	---	---	---	---	30	222	444	110	205
35,000	-30	-34	---	---	---	---	---	36	225	450	110	212

BT03594

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-98. Maximum Range Power at 1500 RPM - ISA +20°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA + 20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	81	596	1192	202	211	78	584	1168	201	210
2000	35	31	76	556	1112	195	210	74	546	1092	194	209
4000	31	27	72	520	1040	188	209	70	510	11020	188	209
6000	27	23	69	488	976	183	209	66	477	954	182	208
8000	23	19	65	455	910	176	207	63	445	890	176	208
10,000	19	15	62	425	850	169	206	59	413	826	169	206
12,000	15	11	60	402	804	164	207	56	388	776	163	206
14,000	11	7	59	387	774	160	208	53	365	730	157	205
16,000	7	3	59	376	752	157	212	51	347	694	152	205
18,000	4	-1	58	366	732	154	215	49	329	658	146	205
20,000	0	-5	58	357	714	151	218	50	321	642	144	209
22,000	-4	-9	---	---	---	---	---	50	315	630	142	213
24,000	-8	-13	---	---	---	---	---	50	309	618	140	217
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559211

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-99. Maximum Range Power at 1500 RPM - ISA +20°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA + 20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	39	35	75	573	1146	200	209	72	562	1124	198	207
2000	35	31	71	537	1074	194	209	69	527	1054	193	208
4000	31	27	68	503	1006	188	209	66	494	988	188	208
6000	27	23	65	471	942	183	209	63	463	926	182	209
8000	23	19	61	438	876	176	209	60	433	866	177	210
10,000	19	15	58	408	816	171	208	57	405	810	172	210
12,000	15	11	55	383	766	165	208	54	379	758	167	211
14,000	11	7	52	359	718	159	208	51	354	708	161	209
16,000	7	3	48	335	670	152	205	48	331	662	154	208
18,000	3	-1	46	314	628	146	204	45	309	618	149	208
20,000	-1	-5	44	295	590	140	203	42	288	576	143	206
22,000	-5	-9	41	279	558	134	202	40	271	542	137	206
24,000	-9	-13	40	267	534	130	202	37	253	506	131	203
26,000	-12	-17	41	264	528	129	208	35	236	472	124	201
28,000	-16	-20	41	261	522	126	212	33	222	444	118	198
29,000	-18	-22	41	260	520	126	214	32	217	434	116	198
31,000	-23	-26	---	---	---	---	---	32	212	424	113	201
33,000	-26	-30	---	---	---	---	---	34	217	434	114	210
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559212

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true air speed will be reduced approximately 10 knots.

Figure 7-99. Maximum Range Power at 1500 RPM - ISA +20°C (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA +30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	89	610	1220	201	213	79	580	1160	194	206
2000	45	41	86	579	1158	196	215	78	553	1106	191	209
4000	41	37	81	542	1084	189	214	74	518	1036	185	208
6000	37	33	76	506	1012	182	212	69	481	962	177	206
8000	33	29	72	474	948	175	211	64	449	898	170	205
10,000	29	25	69	447	894	170	210	61	418	836	163	203
12,000	25	21	66	423	846	164	211	57	390	780	157	202
14,000	21	17	64	401	802	159	211	55	366	732	151	201
16,000	18	13	63	389	778	156	213	54	354	708	148	204
18,000	13	9	---	---	---	---	---	55	350	700	147	210
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03595

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-100. Maximum Range Power at 1500 RPM - ISA +30°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA +30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	71	553	1106	188	200	65	532	1064	183	195
2000	45	41	70	528	1056	185	203	64	508	1016	180	198
4000	41	37	68	499	998	181	204	63	481	962	177	200
6000	37	33	64	466	932	175	203	60	452	904	172	201
8000	33	29	60	434	868	168	203	57	423	846	167	201
10,000	29	25	57	404	808	162	202	55	396	792	162	202
12,000	25	21	54	377	754	156	201	52	370	740	157	202
14,000	21	17	51	352	704	151	200	49	345	690	152	202
16,000	17	13	47	328	656	144	198	45	319	638	145	199
18,000	13	9	45	313	626	138	198	41	296	592	137	195
20,000	9	5	45	304	608	136	201	38	276	552	130	193
22,000	5	1	45	297	594	134	205	37	262	524	126	193
24,000	2	-3	45	290	580	132	209	36	250	500	122	194
26,000	-2	-7	45	281	562	128	211	35	240	480	118	195
28,000	-7	-10	---	---	---	---	---	35	234	468	115	199
29,000	-9	-12	---	---	---	---	---	35	231	462	114	200
31,000	-13	-16	---	---	---	---	---	34	218	436	109	199
33,000	---	--	---	---	---	---	---	---	---	---	---	---
35,000	---	--	---	---	---	---	---	---	---	---	---	---

BT03596

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-100. Maximum Range Power at 1500 RPM - ISA +30°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA + 30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	84	606	1212	204	216	82	600	1200	204	217
2000	45	41	82	82	1152	199	218	76	557	1114	196	215
4000	42	37	79	546	1092	195	219	71	519	1038	189	213
6000	37	33	74	509	1018	187	217	67	483	966	181	211
8000	34	29	70	478	956	181	217	63	450	900	175	210
10,000	30	25	67	450	900	175	217	60	421	842	169	210
12,000	26	21	65	423	846	169	217	57	395	790	164	210
14,000	22	17	62	400	800	164	217	55	370	740	158	209
16,000	17	13	---	---	---	---	---	54	354	708	154	211
18,000	14	9	---	---	---	---	---	54	347	694	152	215
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559213

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G..64% 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-101. Maximum Range Power at 1500 RPM - ISA +30°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA + 30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	49	45	76	577	1154	199	212	70	556	1112	194	207
2000	45	41	71	538	1076	192	211	67	523	1046	189	208
4000	41	37	66	501	1002	185	209	62	488	976	183	207
6000	37	33	62	466	933	178	208	59	455	910	177	207
8000	33	29	58	433	866	172	207	56	424	848	172	206
10,000	29	25	55	403	806	166	206	53	395	790	166	206
12,000	25	21	52	376	752	160	206	51	369	738	161	207
14,000	21	17	49	349	698	154	205	48	342	684	155	206
16,000	17	13	47	328	656	148	204	45	319	638	149	205
18,000	13	9	45	314	628	144	205	40	293	586	140	200
20,000	9	5	45	304	608	142	209	38	275	550	135	199
22,000	6	1	45	294	588	139	212	36	260	520	130	199
24,000	2	-3	44	285	570	136	215	35	246	492	125	199
26,000	-3	-7	---	---	---	---	---	35	237	474	122	202
28,000	-7	-10	---	---	---	---	---	34	230	460	119	204
29,000	-8	-12	---	---	---	---	---	34	228	456	119	207
31,000	-12	-16	---	---	---	---	---	33	214	428	113	205
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559214

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-101. Maximum Range Power at 1500 RPM - ISA +30°C (Sheet 2 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA +37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	86	605	1210	197	212	76	573	1146	190	205
2000	52	48	82	570	1140	192	212	74	542	1084	186	206
4000	48	44	80	542	1084	188	214	73	517	1034	183	209
6000	44	40	77	512	1024	183	215	73	495	990	180	213
8000	40	36	74	482	964	177	215	70	467	934	175	213
10,000	36	32	71	455	910	171	215	66	437	874	169	212
12,000	32	28	---	---	---	---	---	62	408	816	162	211
14,000	28	24	---	---	---	---	---	59	386	772	157	211
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03597

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-102. Maximum Range Power at 1500 RPM - ISA +37°C (Sheet 1 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA +37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	69	547	1094	184	198	62	523	1046	179	193
2000	52	48	66	516	1032	180	200	61	499	998	177	196
4000	48	44	64	488	976	176	201	59	469	938	172	197
6000	44	40	64	467	934	174	205	58	446	892	169	199
8000	40	36	62	440	880	169	206	56	420	840	165	201
10,000	36	32	58	409	818	162	204	53	393	786	160	201
12,000	32	28	54	379	758	155	202	50	365	730	154	200
14,000	28	24	51	353	706	149	201	47	340	680	148	199
16,000	24	20	49	336	672	145	203	44	315	630	141	197
18,000	20	16	49	325	650	143	206	41	296	592	136	197
20,000	16	12	49	313	626	140	210	40	281	562	132	198
22,000	13	8	47	300	600	135	210	39	270	540	128	200
24,000	8	4	38-	---	---	---	---	38	259	518	125	201
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03598

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E. G., 64% 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-102. Maximum Range Power at 1500 RPM - ISA +37°C (Sheet 2 of 2) IR

MAXIMUM RANGE POWER
1500 RPM
ISA + 37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	75	581	1162	194	208	76	581	1162	196	211
2000	52	48	73	550	1100	190	210	73	551	1102	192	213
4000	48	44	71	520	1040	185	211	71	520	1040	188	214
6000	44	40	69	491	982	180	212	69	491	982	183	216
8000	40	36	66	464	928	175	213	67	464	928	179	217
10,000	36	32	64	438	876	170	214	64	438	876	174	218
12,000	33	28	---	---	---	---	---	62	415	830	169	219
14,000	29	24	---	---	---	---	---	58	385	770	162	217
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559215

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%0), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-103. Maximum Range Power at 1500 RPM - ISA +37°C (Sheet 1 of 2) CA

MAXIMUM RANGE POWER
1500 RPM
ISA + 37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	56	52	76	581	1162	198	213	71	563	1126	194	209
2000	52	48	74	551	1102	194	215	67	527	1054	189	209
4000	48	44	67	520	1040	190	217	64	495	990	184	210
6000	44	40	62	484	968	183	216	61	464	928	179	211
8000	40	36	57	448	896	176	214	57	430	860	172	210
10,000	36	32	54	412	824	168	211	52	393	786	164	206
12,000	32	28	51	383	766	161	210	49	365	730	158	206
14,000	28	24	49	357	714	155	209	46	339	678	152	205
16,000	24-	20	48	337	674	151	210	43	316	632	146	204
18,000	21	16	48	324	648	148	213	41	294	588	140	203
20,000	17	12	48	311	622	145	216	41	284	568	138	207
22,000	12	8	---	---	---	---	---	39	271	542	134	208
24,000	9	4	---	---	---	---	---	38	259	518	130	210
26,000	4	0	---	---	---	---	---	31	221	442	113	191
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559216

NOTE

During operations with ice vanes extended, torque will decrease approximately 10 percentage points (E.G., 64% - 10 percentage points = 54%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 10 knots.

Figure 7-103. Maximum Range Power at 1500 RPM - ISA +37°C (Sheet 2 of 2) CA

RANGE PROFILE - MAXIMUM RANGE POWER

1500 RPM

ASSOCIATED CONDITIONS

WEIGHT ....16,320 LBS BEFORE ENGINE START
FUE ....AVIATION KEROSENE
FUEL DENSITY..............6.7 LBS/GAL
ICE VANES ....RETRACTED

ZERO WIND

STANDARD DAY (ISA)

EXAMPLE:

PRESSURE ALTITUDE ....26,000 FT
FUEL ....2572 LBS
RANGE...600 NM

NOTES: 1. RANGE ALLOWS FOR START, TAXI, ANO RUNUP; INCLUDES CRUISE CUIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER

2. AT 16,320 LBS RAMP WEIGHT, THE MAXIMUM ZERO-FUEL WEIGHT UMITATION OF 13,100 LBS WOULD BE EXCEEDED AT FUEL LOADING LESS THAN 3220 LBS.

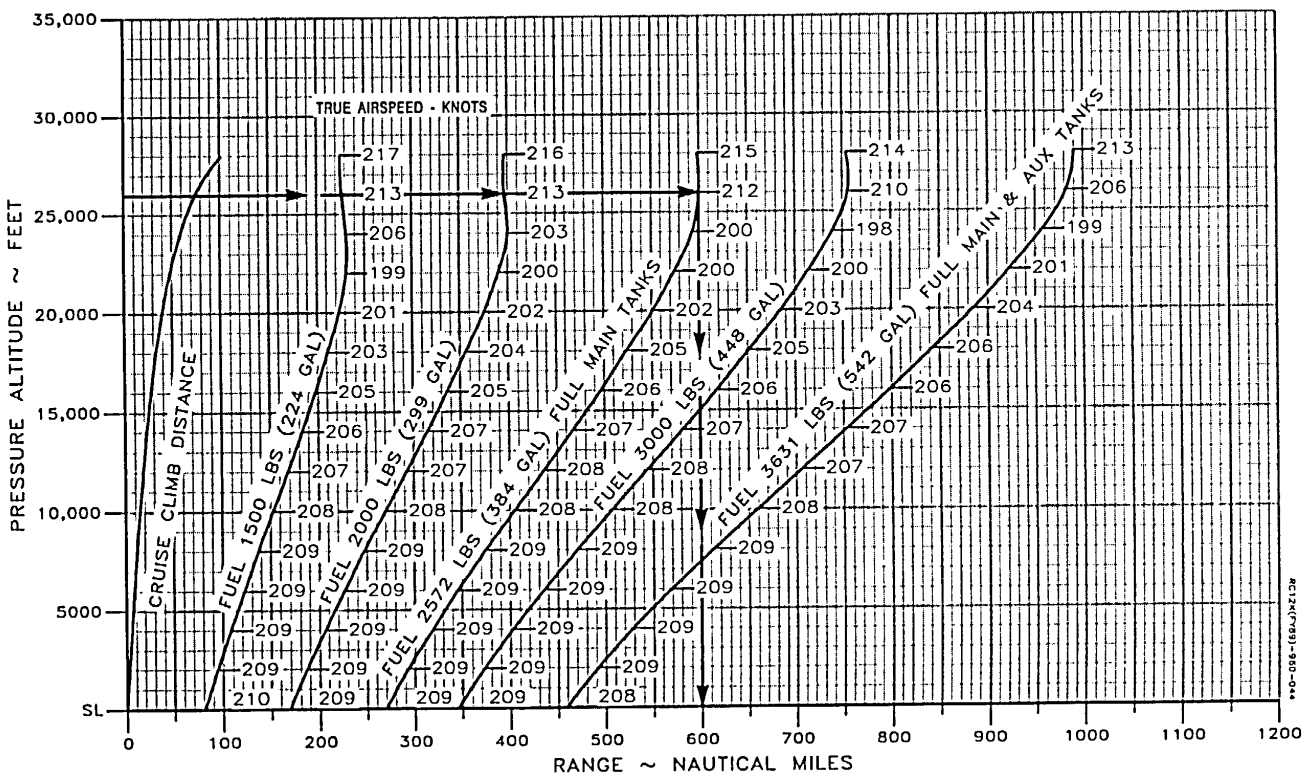


Figure 7-104. Range Profile - Maximum Range Power at 1500 RPM

LOITER POWER
1700 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-14	-15	32	408	816	124	121	30	396	792	124	121
2000	-18	-19	33	390	780	124	125	30	379	758	124	125
4000	-21	-23	33	373	746	124	128	30	362	724	124	128
6000	-25	-27	34	358	716	124	132	31	346	692	124	132
8000	-29	-31	34	343	686	124	136	31	331	662	124	136
10,000	-33	-35	35	329	658	124	140	32	317	634	124	140
12,000	-37	-39	35	316	632	124	144	32	304	608	124	144
14,000	-41	-43	36	306	612	124	149	33	293	586	124	149
16,000	-45	-47	37	298	596	124	153	33	283	566	124	153
18,000	-48	-51	37	292	584	124	158	34	275	550	124	158
20,000	-52	-55	38	287	574	124	163	35	270	540	124	163
22,000	-56	-59	39	284	568	124	169	36	267	534	124	169
24,000	-60	-63	40	281	562	124	174	36	263	526	124	174
26,000	-63	-67	40	279	558	124	180	37	261	522	124	180
28,000	-67	-70	41	278	556	124	186	37	259	518	124	186
29,000	-69	-72	42	281	562	124	190	37	258	516	124	190
31,000	-73	-76	43	286	572	124	196	39	263	526	124	196
33,000	-77	-80	44	291	582	124	203	40	267	534	124	203
35,000	-80	-84	---	---	---	---	---	41	271	542	124	210

BT03599

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-105. Loiter Power at 1700 RPM - ISA -30°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA -30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-14	-15	28	386	772	124	121	26	378	756	124	121
2000	-18	-19	28	369	738	124	125	26	360	720	124	125
4000	-21	-23	28	352	704	124	128	26	343	686	124	128
6000	-25	-27	28	336	672	124	132	26	327	654	124	132
8000	-29	-31	29	321	642	124	136	27	312	624	124	136
10,000	-33	-35	29	306	612	124	140	27	297	594	124	140
12,000	-37	-39	30	293	586	124	144	27	284	568	124	144
14,000	-41	-43	30	282	564	124	149	28	272	544	124	149
16,000	-45	-47	31	272	544	124	153	28	262	524	124	153
18,000	-48	-51	31	263	526	124	158	29	253	506	124	158
20,000	-52	-55	32	255	510	124	163	29	245	490	124	163
22,000	-56	-59	33	252	504	124	169	30	239	478	124	169
24,000	-60	-63	33	248	496	124	174	31	235	470	124	174
26,000	-63	-67	34	246	492	124	180	31	232	464	124	180
28,000	-67	-70	34	243	486	124	186	32	230	460	124	186
29,000	-69	-72	34	242	484	124	190	32	229	458	124	190
31,000	-73	-76	35	242	484	124	196	32	227	454	124	196
33,000	-77	-80	36	247	494	124	203	33	229	458	124	203
35,000	-80	-84	-37	251	502	124	210	34	233	466	124	210

BT03600

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-105. Loiter Power at 1700 RPM - ISA -30°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-14	-15	30	412	824	124	121	28	400	800	124	121
2000	-18	-19	30	394	788	124	125	28	382	764	124	125
4000	-21	-23	31	376	752	124	128	28	364	728	124	128
6000	-25	-27	31	360	720	124	132	29	347	694	124	132
8000	-29	-31	32	345	690	124	136	29	332	664	124	136
10,000	-33	-35	33	330	660	124	140	30	317	634	124	140
12,000	-37	-39	33	316	632	124	144	30	303	606	124	144
14,000	-41	-43	34	305	610	124	149	31	291	582	124	149
16,000	-45	-47	35	295	590	124	153	32	281	562	124	153
18,000	-48	-51	35	288	576	124	158	33	272	544	124	158
20,000	-52	-55	36	282	564	124	163	34	266	532	124	163
22,000	-56	-59	37	279	558	124	169	34	261	522	124	169
24,000	-60	-63	38	275	550	124	174	34	257	514	124	174
26,000	-63	-67	38	273	546	124	180	35	254	508	124	180
28,000	-67	-70	39	270	540	124	186	35	252	504	124	186
29,000	-69	-72	39	272	544	124	190	35	251	502	124	190
31,000	-73	-76	41	278	556	124	196	37	254	508	124	196
33,000	-77	-80	42	282	564	124	203	38	258	516	124	203
35,000	-80	-84-	---	---	---	---	---	39	261	522	124	210

BT05594

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-106. Loiter Power at 1700 RPM - ISA -30°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA -30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-14	-15	25	390	780	124	121	23	381	762	124	121
2000	-18	-19	26	371	742	124	125	24	362	724	124	125
4000	-21	-23	26	353	706	124	128	24	344	688	124	128
6000	-25	-27	26	337	674	124	132	24	328	656	124	132
8000	-29	-31	27	321	642	124	136	25	312	624	124	136
10,000	-33	-35	27	306	612	124	140	25	297	594	124	140
12,000	-37	-39	28	292	584	124	144	25	283	566	124	144
14,000	-41	-43	28	280	560	124	149	26	270	540	124	149
16,000	-45	-47	29	269	538	124	153	26	259	518	124	153
18,000	-48	-51	30	260	520	124	158	27	249	498	124	158
20,000	-52	-55	31	251	502	124	163	27	241	482	124	163
22,000	-56	-59	31	246	492	124	169	28	234	468	124	169
24,000	-60	-63	32	242	484	124	174	29	229	458	124	174
26,000	-63	-67	32	239	478	124	180	29	225	450	124	180
28,000	-67	-70	32	236	472	124	186	30	223	446	124	186
29,000	-69	-72	32	235	470	124	190	30	321	442	124	190
31,000	-73	-76	33	234	468	124	196	30	220	440	124	296
33,000	-77	-80	34	237	474	124	203	31	220	440	124	203
35,000	-80	-84	35	241	482	124	210	32	224	448	124	210

BT055942

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-106. Loiter Power at 1700 RPM - ISA -30°C (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA -20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-4	-5	32	411	822	124	123	30	399	798	124	123
2000	-7	-9	33	394	788	124	127	30	381	762	124	127
4000	-11	-13	33	377	754	124	131	31	365	730	124	131
6000	-15	-17	34	362	724	124	135	31	349	698	124	135
8000	-19	-21	34	347	694	124	139	31	335	670	124	139
10,000	-23	-25	35	334	668	124	143	32	321	642	124	143
12,000	-27	-29	35	321	642	124	147	32	308	616	124	147
14,000	-31	-33	36	311	622	124	152	33	296	592	124	152
16,000	-34	-37	37	302	604	124	157	34	287	574	124	157
18,000	-38	-41	38	296	592	124	162	35	280	560	124	162
20,000	-42	-45	39	291	582	124	167	35	275	550	124	167
22,000	-46	-49	39	287	574	124	173	36	270	540	124	173
24,000	-50	-53	40	284	568	124	178	37	267	534	124	178
26,000	-53	-57	41	282	564	124	185	37	264	528	124	185
28,000	-57	-60	42	285	570	124	191	38	263	526	124	191
29,000	-59	-62	43	288	576	124	194	38	263	526	124	194
31,000	-63	-66	44	293	586	124	201	40	268	536	124	201
33,000	-66	-70	45	298	596	124	208	41	273	546	124	208
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03601

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-107. Loiter Power at 1700 RPM - ISA -20°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA -20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-4	-5	28	388	776	124	123	26	379	758	124	123
2000	-7	-9	28	371	742	124	127	26	362	724	124	127
4000	-11	-13	28	354	708	124	131	26	345	690	124	131
6000	-15	-17	29	338	676	124	135	26	329	658	124	135
8000	-19	-21	29	324	648	124	139	27	314	628	124	139
10,000	-23	-25	29	309	618	124	143	27	300	600	124	143
12,000	-27	-29	30	296	592	124	147	28	287	574	124	147
14,000	-31	-33	30	285	570	124	152	28	275	550	124	152
16,000	-34	-37	31	275	550	124	157	29	265	530	124	157
18,000	-38	-41	32	267	534	124	162	29	256	512	124	162
20,000	-42	-45	32	261	522	124	167	30	249	498	124	167
22,000	-46	-49	33	256	512	124	173	30	244	488	124	173
24,000	-50	-53	34	252	504	124	178	31	239	478	124	178
26,000	-53	-57	34	249	498	124	185	32	236	472	124	185
28,000	-57	-60	35	247	494	124	191	32	233	466	124	191
29,000	-59	-62	35	246	492	124	194	32	232	464	124	194
31,000	-63	-66	36	247	494	124	201	33	230	460	124	201
33,000	-66	-70	37	251	502	124	208	34	233	466	124	208
35,000	-70	-74	38	256	512	124	216	35	238	476	124	216

BT03602

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-107. Loiter Power at 1700 RPM - ISA -20°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA -20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-4	-5	30	415	830	124	123	27	402	804	124	123
2000	-7	-9	31	397	794	124	127	28	384	768	124	127
4000	-11	-13	31	380	760	124	131	28	367	734	124	131
6000	-15	-17	32	364	728	124	125	29	351	702	124	135
8000	-19	-21	32	349	698	124	139	29	336	672	124	139
10,000	-23	-25	33	335	670	124	143	30	321	642	124	143
12,000	-27	-29	34	321	642	124	147	30	307	614	124	147
14,000	-31	-33	34	310	620	124	152	31	295	590	124	152
16,000	-34	-37	35	300	600	124	157	32	285	570	124	157
18,000	-38	-41	36	293	586	124	162	33	277	554	124	162
20,000	-42	-45	37	287	574	124	167	33	270	540	124	167
22,000	-46	-49	37	282	564	124	173	34	265	530	124	173
24,000	-50	-53	38	278	556	124	178	35	261	522	124	178
26,000	-53	-57	39	276	552	124	185	35	258	516	124	185
28,000	-57	-60	40	276	552	124	191	36	255	510	124	191
29,000	-59	-62	40	278	556	124	194	36	254	508	124	194
31,000	-63	-66	42	283	566	124	201	37	258	516	124	201
33,000	-66	-70	43	288	576	124	208	38	263	526	124	208
35,000	-70	-74	---	---	---	---	---	40	268	536	124	216

BT055943

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-108. Loiter Power at 1700 RPM - ISA -20°C (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA -200C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-4	-5	25	391	782	124	123	23	382	764	124	123
2000	-7	-9	26	373	746	124	127	24	364	728	124	127
4000	-11	-13	26	356	712	124	131	24	346	692	124	131
6000	-15	-17	26	339	678	124	135	24	330	660	124	135
8000	-19	-21	27	324	648	124	139	25	314	628	124	139
10,000	-23	-25	27	309	618	124	143	25	299	598	124	143
12,000	-27	-29	28	295	590	124	147	26	285	570	124	147
14,000	-31	-33	28	283	566	124	152	26	273	546	124	152
16,000	-34	-37	29	272	544	124	157	27	262	524	124	157
18,000	-38	-41	30	263	526	124	162	27	252	504	124	162
20,000	-42	-45	30	256	512	124	167	28	244	488	124	167
22,000	-46	-49	31	250	500	124	173	28	238	476	124	173
24,000	-50	-53	32	246	492	124	178	29	233	466	124	178
26,000	-53	-57	32	242	484	124	185	30	229	458	124	185
28,000	-57	-60	33	239	478	124	191	30	226	452	124	191
29,000	-59	-62	33	238	476	124	194	30	225	450	124	194
31,000	-63	-66	33	236	472	124	201	31	222	444	124	201
33,000	-66	-70	35	241	482	124	208	31	222	444	124	208
35,000	-70	-74	36	246	492	124	216	32	227	454	124	216

BT055944

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-108. Loiter Power at 1700 RPM - ISA -20°C (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA -10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	6	5	32	414	828	124	126	30	401	802	124	126
2000	3	1	33	398	796	124	129	30	385	770	124	129
4000	-1	-3	33	382	764	124	133	31	369	738	124	133
6000	-5	-7	34	367	734	124	137	31	354	708	124	137
8000	-9	-11	35	353	706	124	141	32	340	680	124	141
10,000	-13	-15	35	340	680	124	146	32	326	652	124	146
12,000	-17	-19	36	327	654	124	150	33	314	628	124	150
14,000	-21	-23	37	316	632	124	155	34	302	604	124	155
16,000	-24	-27	38	307	614	124	160	34	292	584	124	160
18,000	-28	-31	38	299	598	124	165	35	284	568	124	165
20,000	-32	-35	39	294	588	124	171	36	278	556	124	171
22,000	-36	-39	40	289	578	124	176	36	273	546	124	176
24,000	-39	-43	41	286	572	124	182	37	270	540	124	182
26,000	-43	-47	42	287	574	124	189	38	266	532	124	189
28,000	.47	-50	43	292	584	124	195	39	268	536	124	195
29,000	-49	-52	44	295	590	124	199	39	270	540	124	199
31,000	-52	-56	45	300	600	124	206	41	274	548	124	206
33,000	-56	-60	---	---	---	---	---	42	280	560	124	213
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03603

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HRIENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-109. Loiter Power at 1700 RPM - ISA -10°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA -10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	6	5	27	390	780	124	126	26	380	760	124	126
2000	3	1	28	373	746	124	129	26	364	728	124	129
4000	-1	-3	28	357	714	124	133	26	347	694	124	133
6000	-5	-7	29	342	684	124	137	27	332	664	124	137
8000	-9	-11	29	328	656	124	141	27	318	636	124	141
10,000	-13	-15	30	314	628	124	146	27	304	608	124	146
12,000	-17	-19	30	301	602	124	150	28	291	582	124	150
14,000	-21	-23	31	290	580	124	155	28	279	558	124	155
16,000	-24	-27	31	279	558	124	160	29	269	538	124	160
18,000	-28	-31	32	271	542	124	165	30	259	518	124	165
20,000	-32	-35	33	264	528	124	171	30	252	504	124	171
22,000	-36	-39	33	259	518	124	176	31	247	494	124	176
24,000	-39	-43	34	255	510	124	182	31	243	486	124	182
26,000	-43	-47	35	251	502	124	189	32	239	478	124	189
28,000	-47	-50	35	249	498	124	195	32	235	470	124	195
29,000	-49	-52	35	248	496	124	199	33	234	468	124	199
31,000	-52	-56	37	253	506	124	206	33	234	468	124	206
33,000	-56	-60	38	257	514	124	213	35	238	476	124	213
35,000	-60	-64	39	262	524	124	221	36	243	486	124	221

BT03604

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-109. Loiter Power at 1700 RPM - ISA -10°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA -10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	6	5	30	418	836	124	126	28	405	810	124	126
2000	3	1	31	402	804	124	129	28	388	776	124	129
4000	-1	-3	31	386	772	124	133	29	372	744	124	133
6000	-5	-7	32	370	740	124	137	29	356	712	124	137
8000	-9	-11	32	355	710	124	141	30	341	682	124	141
10,000	-13	-15	33	341	682	124	146	30	326	652	124	146
12,000	-17	-19	34	327	654	124	150	31	313	626	124	150
14,000	-21	-23	35	315	630	124	155	32	300	600	124	55
16,000	-24	-27	36	304	608	124	160	32	290	580	124	160
18,000	-28	-31	36	296	592	124	165	33	280	560	124	165
20,000	-32	-35	37	289	578	124	171	34	273	546	124	171
22,000	-36	-39	38	284	568	124	176	34	268	536	124	176
24,000	-39	-43	38	280	560	124	182	35	263	526	124	182
26,000	-43	-47	39	278	556	124	189	36	260	520	124	189
28,000	-47	-50	41	283	566	124	195	36	258	516	124	195
29,000	-49	-52	41	285	570	124	199	37	260	520	124	199
31,000	-52	-56	43	290	580	124	206	38	264	528	124	206
33,000	-56	-60	44	296	592	124	213	39	269	538	124	213
35,000	-60	-64	---	---	---	---	---	41	274	548	124	221

BT055945

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-110. Loiter Power at 1700 RPM - ISA -10°C (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA -10° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	6	5	25	393	786	124	126	23	383	766	124	126
2000	3	1	26	376	752	124	129	24	366	732	124	129
4000	-1	-3	26	359	718	124	133	24	349	698	124	133
6000	-5	-7	27	343	686	124	137	24	333	666	124	137
8000	-9	-11	27	328	656	124	141	25	317	634	124	141
10,000	-13	-15	27	314	628	124	146	25	303	606	124	146
12,000	-17	-19	28	300	600	124	150	26	289	578	124	150
14,000	-21	-23	29	288	576	124	155	26	277	554	124	155
16,000	-24	-27	29	277	554	124	160	27	266	532	124	160
18,000	-28	-31	30	267	534	124	165	28	255	510	124	165
20,000	-32	-35	31	259	518	124	171	28	248	496	124	171
22,000	-36	-39	31	253	506	124	176	29	241	482	124	176
24,000	-39	-43	32	249	498	124	182	29	236	472	124	182
26,000	-43	-47	32	244	488	124	189	30	232	464	124	189
28,000	-47	-50	33	241	482	124	195	30	228	456	124	195
29,000	-49	-52	33	240	480	124	199	31	226	452	124	199
31,000	-52	-56	34	242	484	124	206	31	224	448	124	206
33,000	-56	-60	35	247	494	124	213	32	227	454	124	213
35,000	-60	-64	37	251	502	124	221	33	231	462	124	221

BT055948

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-110. Loiter Power at 1700 RPM - ISA -10°C (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	33	414	828	124	128	30	401	802	124	128
2000	13	11	33	400	800	124	132	30	386	772	124	132
4000	9	7	33	386	772	124	136	31	372	744	124	136
6000	5	3	34	373	746	124	140	31	358	716	124	140
8000	1	-1	35	360	720	124	144	32	346	692	124	144
10,000	-3	-5	36	345	690	124	149	32	332	664	124	149
12,000	-7	-9	37	332	664	124	153	33	319	638	124	153
14,000	-10	-13	37	321	642	124	158	34	307	614	124	158
16,000	-14	-17	38	311	622	124	163	35	296	592	124	163
18,000	-18	-21	39	302	604	124	169	35	287	574	124	169
20,000	-22	-25	39	295	590	124	174	36	280	560	124	174
22,000	-26	-29	40	291	582	124	180	37	275	550	124	180
24,000	-29	-33	41	291	582	124	186	37	271	542	124	186
26,000	-33	-37	43	295	590	124	193	38	271	542	124	193
28,000	-37	-40	44	299	598	124	200	40	275	550	124	200
29,000	-39	-42	45	301	602	124	203	40	276	552	124	203
31,000	-42	-46	46	307	614	124	211	42	280	560	124	211
33,000	-46	-50	---	---	---	---	---	43	286	572	124	218
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03605

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-111. Loiter Power at 1700 RPM - ISA (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	28	389	778	124	128	26	380	760	124	128
2000	13	11	28	374	748	124	132	26	364	728	124	132
4000	9	7	28	360	720	124	136	26	350	700	124	136
6000	5	3	29	346	692	124	140	27	335	670	124	140
8000	1	-1	29	333	666	124	144	27	322	644	124	144
10,000	-3	-5	30	320	640	124	149	27	309	618	124	149
12,000	-7	-9	30	307	614	124	153	28	296	592	124	153
14,000	-10	-13	31	295	590	124	158	29	285	570	124	158
16,000	-14	-17	32	284	568	124	163	29	273	546	124	163
18,000	-18	-21	32	275	550	124	169	30	264	528	124	169
20,000	-22	-25	33	267	534	124	174	30	255	510	124	174
22,000	-26	-29	34	261	522	124	180	31	250	500	124	180
24,000	-29	-33	34	257	514	124	186	32	244	488	124	186
26,000	-33	-37	35	253	506	124	193	32	240	480	124	193
28,000	-37	-40	36	253	506	124	200	33	237	474	124	200
29,000	-39	-42	36	255	510	124	203	33	237	474	124	203
31,000	-42	-46	38	259	518	124	211	34	240	480	124	211
33,000	-46	-50	39	263	526	124	218	35	244	488	124	218
35,000	-50	-54	---	---	---	---	---	36	248	496	124	226

BT03606

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-111. Loiter Power at 1700 RPM - ISA (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	31	420	840	124	128	28	406	812	124	128
2000	13	-11	31	407	814	124	132	29	392	784	124	132
4000	9	7	32	393	786	124	136	29	378	756	124	136
6000	5	3	33	379	758	124	140	30	364	728	124	140
8000	1	-1	33	363	726	124	144	30	350	700	124	144
10,000	-3	-5	34	348	696	124	149	31	334	668	124	149
12,000	-7	-9	35	333	666	124	153	32	319	638	124	153
14,000	-10	-13	36	320	640	124	158	32	306	612	124	158
16,000	-14	-17	36	309	618	124	163	33	294	588	124	163
18,000	-18	-21	37	299	598	124	169	33	284	568	124	169
20,000	-22	-25	37	292	584	124	174	34	276	552	124	174
22,000	-26	-29	38	287	574	124	180	35	270	540	124	180
24,000	-29	-33	39	284	568	124	186	35	266	532	124	186
26,000	-33	-37	40	287	574	124	193	36	263	526	124	193
28,000	-37	-40	42	290	580	124	200	37	266	532	124	200
29,000	-39	-42	42	291	582	124	203	38	267	534	124	203
31,000	-42	-46	44	296	592	124	211	39	270	540	124	211
33,000	-46	-50	---	---	---	---	---	40	275	550	124	218
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055947

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-112. Loiter Power at 1700 RPM - ISA (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	26	394	788	124	128	24	383	766	124	128
2000	13	11	26	379	758	124	132	24	368	736	124	132
4000	9	7	27	364	728	124	136	24	353	706	124	136
6000	5	3	27	350	700	124	140	25	338	676	124	140
8000	1	-1	28	336	672	124	144	25	324	648	124	144
10,000	-3	-5	28	322	644	124	149	26	310	620	124	149
12,000	-7	-9	29	307	614	124	153	26	296	592	124	153
14,000	-10	-13	29	294	588	124	158	27	283	5666	124	158
16,000	-14	-17	30	281	562	124	163	27	271	542	124	163
18,000	-18	-21	30	271	542	124	169	28	260	520	124	169
20,000	-22	-25	31	262	524	124	174	28	251	502	124	174
22,000	-26	-29	32	256	512	124	180	29	244	488	124	180
24,000	-29	-33	32	251	502	124	186	30	239	478	124	186
26,000	-33	-37	33	247	494	124	193	30	234	468	124	193
28,000	-37	-40	34	245	490	124	200	31	230	460	124	200
29,000	-39	-42	34	246	492	124	203	31	229	458	124	203
31,000	-42	-46	35	249	498	124	211	32	230	460	124	211
33,000	-46	-50	36	252	504	124	218	33	233	466	124	218
35,000	-50	-54	37	256	512	124	226	34	236	472	124	226

BT055948

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-112. Loiter Power at 1700 RPM - ISA (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA +10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	27	25	33	420	840	124	130	30	406	812	124	130
2000	23	21	33	404	808	124	134	31	389	778	124	134
4000	19	17	34	388	776	124	138	31	373	746	124	138
6000	15	13	35	374	748	124	142	32	359	718	124	142
8000	11	9	36	361	722	124	147	32	348	696	124	147
10,000	7	5	37	350	700	124	151	33	337	674	124	151
12,000	3	1	37	337	674	124	156	34	324	648	124	156
14,000	0	-3	38	325	650	124	161	35	311	622	124	161
16,000	-4	-7	39	314	628	124	165	35	300	600	124	166
18,000	-8	-11	39	305	610	124	172	36	291	582	124	172
20,000	-12	-15	40	299	598	124	178	37	283	566	124	178
22,000	-16	-19	41	299	598	124	184	37	278	556	124	184
24,000	-19	-23	43	300	600	124	190	39	279	558	124	190
26,000	-23	-27	44	302	604	124	197	40	280	560	124	197
28,000	-27	-30	45	305	610	124	204	41	281	562	124	204
29,000	-28	-32	46,	307	614	124	208	41	283	566	124	208
31,000	-42	-46	---	---	---	---	---	43	286	572	124	215
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03607

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-113. Loiter Power at 1700 RPM - ISA +10°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA +10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	27	25	28	394	788	124	130	26	383	766	124	130
2000	23	21	28	377	754	124	134	26	366	732	124	134
4000	19	17	29	361	722	124	138	26	330	700	124	138
6000	15	13	29	346	692	124	142	27	335	670	124	142
8000	11	9	30	335	670	124	147	27	324	648	124	147
10,000	7	5	31	326	652	124	151	28	316	632	124	151
12,000	3	1	31	312	624	124	156	29	303	606	124	156
14,000	0	-3	32	300	600	124	161	29	290	580	124	161
16,000	-4	-7	32	288	576	124	166	30	278	556	124	166
18,000	-8	-11	33	278	556	124	172	30	268	536	124	172
20,000	-12	-15	33	270	540	124	178	31	259	518	124	178
22,000	-15	-19	34	265	530	124	184	32	253	506	124	184
24,000	-19	-23	35	260	520	124	190	32	248	496	124	190
26,000	-23	-27	36	260	520	124	197	33	244	488	124	197
28,000	-27	-30	37	261	522	124	204	34	244	488	124	204
29,000	-28	-32	37	262	524	124	208	34	245	490	124	208
31,000	-32	-36	39	264	528	124	215	35	246	492	124	215
33,000	-36	-40	---	---	---	---	---	36	249	498	124	223
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03608

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-113. Loiter Power at 1700 RPM - ISA +10°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA + 10° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	27	25	32	430	860	124	130	29	414	828	124	130
2000	23	21	32	413	826	124	134	29	397	794	124	134
4000	19	17	33	396	792	124	138	30	381	762	124	138
6000	15	13	33	379	758	124	142	30	365	730	124	142
8000	11	9	34	364	728	124	147	31	351	702	124	147
10,000	7	5	35	352	704	124	151	32	339	678	124	151
12,000	3	1	36	338	676	124	156	32	324	648	124	156
14,000	0	-3	36	325	650	124	161	33	311	622	124	161
16,000	-4	-7	37	313	626	124	166	33	299	598	124	166
18,000	-8	-11	37	303	606	124	172	34	288	576	124	172
20,000	-12	-15	38	295	590	124	178	35	280	560	124	178
22,000	-15	-19	39	294	588	124	184	35	274	548	124	184
24,000	-19	-23	40	293	586	124	190	36	271	542	124	190
26,000	-23	-27	42	294	588	124	297	37	272	544	124	197
28,000	-27	-30	43	296	592	124	204	38	272	544	124	204
29,000	-28	-32	43	297	594	124	208	39	273	546	124	208
31,000	-32	-36	---	---	---	---	---	40	276	552	124	215
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055949

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-114. Loiter Power at 1700 RPM - ISA +10°C (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA + 10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	27	25	26	400	800	124	130	24	388	776	124	130
2000	23	21	27	383	766	124	134	24	371	742	124	134
4000	19	17	27	367	734	124	138	25	355	710	124	138
6000	15	13	28	351	702	124	142	25	339	678	124	142
8000	11	9	28	339	678	124	147	26	327	654	124	147
10,000	7	5	29	327	654	124	151	27	317	634	124	151
12,000	3	1	29	312	624	124	156	27	302	604	124	156
14,000	0	-3	30	299	598	124	161	28	288	576	124	161
16,000	-4	-7	30	286	572	124	166	28	276	552	124	166
18,000	-8	-11	31	275	550	124	172	28	265	530	124	172
20,000	-12	-15	32	266	532	124	178	29	255	510	124	178
22,000	-15	-19	32	260	520	124	184	30	248	496	124	184
24,000	-19	-23	33	254	508	124	190	30	242	474	124	190
26,000	-23	-27	34	252	504	124	197	31	237	474	124	197
28,000	-27	-30	35	252	504	124	204	32	235	470	124	204
29,000	-28	-32	35	253	506	124	208	32	235	470	124	208
31,000	-32	-36	36	254	508	124	215	33	236	472	124	215
33,000	-36	-40	37	257	514	124	223	34	238	476	124	223
35,000	-39	-44	---	---	---	---	---	35	240	480	124	232

BT0559410

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-114. Loiter Power at 1700 RPM - ISA +10°C (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA +20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	34	430	860	124	132	31	415	830	124	132
2000	33	31	34	413	826	124	136	31	398	796	124	136
4000	29	27	35	395	790	124	140	32	382	764	124	140
6000	25	23	36	379	758	124	145	33	366	732	124	145
8000	21	19	36	364	728	124	149	33	351	702	124	149
10,000	17	15	37	350	700	124	154	34	336	672	124	154
12,000	14	11	38	336	672	124	159	34	323	646	124	159
14,000	10	7	39	327	654	124	164	35	313	626	124	164
16,000	6	3	39	318	636	124	170	36	304	608	124	170
18,000	2	-1	40	312	624	124	175	36	294	588	124	175
20,000	-2	-5	41	308	616	124	181	37	289	578	124	181
22,000	-5	-9	42	306	612	124	187	38	287	574	124	187
24,000	-9	-13	43	304	608	124	194	39	285	570	124	194
26,000	-13	-17	45	305	610	124	201	40	283	566	124	201
28,000	---	---	---	---	---	---	---	41	285	570	124	208
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03609

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-115. Loiter Power at 1700 RPM - ISA +20°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA +20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	28	401	802	124	132	26	390	780	124	132
2000	33	31	29	385	770	124	136	27	373	746	124	136
4000	29	27	29	369	738	124	140	27	357	714	124	140
6000	25	23	30	355	710	124	145	28	343	686	124	145
8000	21	19	30	340	680	124	149	28	330	660	124	149
10,000	17	15	31	325	650	124	154	29	315	630	124	154
12,000	14	11	32	311	622	124	159	29	301	602	124	159
14,000	10	7	32	302	604	124	164	30	292	584	124	164
16,000	6	3	33	292	584	124	170	30	282	564	124	170
18,000	2	-1	33	282	564	124	175	31	272	544	124	175
20,000	-2	-5	34	274	548	124	181	32	263	526	124	181
22,000	-5	-9	35	270	540	124	187	32	257	514	124	187
24,000	-9	-13	36	267	534	124	194	33	253	506	124	194
26,000	-13	-17	37	265	530	124	201	34	250	500	124	201
28,000	-16	-20	38	265	530	124	208	35	249	498	124	208
29,000	-18	-22	38	266	532	124	212	35	250	500	124	216
31,000	-22	-26	39	269	538	124	220	36	250	500	124	220
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03610

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBSIHR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-115. Loiter Power at 1700 RPM - ISA +20°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA + 20° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	32	439	878	124	132	30	426	852	124	132
2000	33	31	33	420	840	124	136	30	407	814	124	136
4000	29	27	33	401	802	124	140	31	388	776	124	140
6000	25	23	34	384	768	124	145	31	371	742	124	145
8000	21	19	35	368	736	124	149	32	354	676	124	149
10,000	17	-15	35	352	704	124	154	32	338	646	124	154
12,000	14	-11	36	337	674	124	159	33	323	624	124	159
14,000	10	-7	37	327	654	124	164	33	312	604	124	164
16,000	6	3	37	316	632	124	170	34	302	584	124	170
18,000	2	-1	38	308	616	124	175	34	292	570	124	175
20,000	-2	-5	39	303	606	124	181	35	285	562	124	181
22,000	-5	-9	40	300	600	124	187	36	281	552	124	187
24,000	-9	-13	41	297	594	124	194	37	278	556	124	194
26,000	-13	-17	42	296	592	124	201	38	276	552	124	201
28,000	-16	-20	---	---	---	---	---	39	276	552	124	208
29,000	-18	-22	---	---	---	---	---	39	277	554	124	212
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559411

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-116. Loiter Power at 1700 RPM - ISA +20°C (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA + 20° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	27	410	820	124	132	25	397	794	124	132
2000	33	31	27	394	788	124	126	25	380	760	124	136
4000	29	27	28	376	752	124	140	26	364	728	124	140
6000	25	23	28	359	718	124	145	26	349	698	124	145
8000	21	19	29	342	684	124	149	27	332	664	124	149
10,000	17	15	29	326	652	124	154	27	316	632	124	154
12,000	14	11	30	311	622	124	159	27	301	602	124	159
14,000	10	7	30	300	600	124	164	28	290	580	124	164
16,000	6	3	31	290	580	124	170	28	279	558	124	170
18,000	2	-1	31	279	558	124	175	29	268	536	124	175
20,000	-2	-5	32	270	540	124	181	30	259	518	124	181
22,000	-5	-9	33	265	530	124	187	30	252	504	124	187
24,000	-9	-13	34	261	522	124	194	31	246	492	124	194
26,000	-13	-17	35	258	516	124	201	32	242	484	124	201
28,000	-16	-20	35	257	514	124	208	32	240	480	124	208
29,000	-18	-22	36	257	514	124	212	33	240	480	124	212
31,000	-22	-26	37	258	516	124	220	33	240	480	124	220
33,000	-26	-30	---	---	---	---	---	34	241	482	124	228
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559412

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-116. Loiter Power at 1700 RPM - ISA +20°C (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA +30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	45	34	433	866	124	134	32	419	838	124	134
2000	43	41	35	417	834	124	138	32	403	806	124	138
4000	39	37	36	401	802	124	143	33	387	774	124	143
6000	35	33	36	386	772	124	147	33	372	744	124	147
8000	31	29	37	370	740	124	152	34	356	712	124	152
10,000	27	25	38	355	710	124	157	34	341	682	124	157
12,000	24	21	38	341	682	124	162	35	327	654	124	162
14,000	20	17	39	329	658	124	167	36	314	628	124	167
16,000	16	13	40	320	640	124	173	36	304	608	124	173
18,000	12	9	41	316	632	124	178	37	300	600	124	178
20,000	9	5	42	310	620	124	185	38	294	588	124	185
22,000	5	1	43	307	614	124	191	39	289	578	124	191
24,000	1	-3	---	---	---	---	---	40	286	572	124	198
26,000	-3	-7	---	---	---	---	---	41	286	572	124	205
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03611

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-117. Loiter Power at 1700 RPM - ISA +30°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA +30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	45	29	407	814	124	134	27	395	790	124	134
2000	43	41	30	391	782	124	138	27	381	762	124	138
4000	39	37	30	376	752	124	143	28	365	730	124	143
6000	35	33	31	360	720	124	147	28	350	700	124	147
8000	31	29	31	344	688	124	152	29	334	668	124	152
10,000	27	25	32	329	658	124	157	29	319	638	124	157
12,000	24	21	32	315	630	124	162	30	305	610	124	162
14,000	20	17	33	302	604	124	167	30	292	584	124	167
16,000	16	13	33	292	584	124	173	31	281	562	124	173
18,000	12	9	34	286	572	124	178	31	274	548	124	178
20,000	9	5	35	279	558	124	185	32	267	534	124	185
22,000	5	1	36	275	550	124	191	33	262	524	124	191
24,000	1	-3	36	270	540	124	198	34	257	514	124	198
26,000	-3	-7	37	267	534	124	205	34	253	506	124	205
28,000	-6	-10	38	268	536	124	212	35	252	504	124	212
29,000	-8	-12	---	---	---	---	---	35	251	502	124	216
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03612

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-117. Loiter Power at 1700 RPM - ISA +30°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA + 30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	45	33	439	878	124	134	30	426	852	124	134
2000	43	41	33	422	844	124	138	30	409	818	124	138
4000	39	37	34	406	812	124	143	31	392	784	124	143
6000	35	33	34	389	778	124	147	31	375	750	124	147
8000	31	29	35	373	746	124	152	32	359	718	124	152
10,000	27	25	36	357	714	124	157	32	343	686	124	157
12,000	24	21	36	342	684	124	162	33	327	654	124	162
14,000	20	17	37	328	656	124	167	34	313	626	124	167
16,000	16	13	38	318	636	124	173	34	302	604	124	173
18,000	12	9	39	312	624	124	178	35	296	592	124	178
20,000	9	5	39	305	610	124	185	36	289	578	124	185
22,000	5	1	40	5301	602	124	191	37	284	568	124	191
24,000	1	-3	41	300	600	124	198	37	279	558	124	198
26,000	-3	-7	---	---	---	---	---	38	277	554	124	205
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559413

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-118. Loiter Power at 1700 RPM - ISA +30°C (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA + 30° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	45	27	414	828	124	134	25	404	808	124	134
2000	43	41	28	397	794	124	138	26	387	774	124	138
4000	39	37	28	380	760	124	143	26	370	740	124	143
6000	35	33	29	363	726	124	147	27	353	706	124	147
8000	31	29	29	346	692	124	152	27	336	672	124	152
10,000	27	25	30	330	660	124	157	27	320	640	124	157
12,000	24	21	30	315	630	124	162	28	304	608	124	162
14,000	20	17	31	301	602	124	167	28	290	580	124	167
16,000	16	13	31	289	578	124	173	29	279	558	124	173
18,000	12	9	32	282	564	124	178	29	270	540	124	178
20,000	9	5	33	275	550	124	185	30	262	524	124	185
22,000	5	1	33	269	538	124	191	31	256	512	124	191
24,000	1	-3	34	264	528	124	198	31	250	500	124	198
26,000	-3	-7	35	260	520	124	205	32	246	492	124	205
28,000	-6	-10	36	258	516	124	212	33	243	486	124	212
29,000	-8	-12	36	259	518	124	216	33	242	484	124	216
31,000	-12	-16	---	---	---	---	---	34	242	484	124	224
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559414

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-118. Loiter Power at 1700 RPM - ISA +30°C (Sheet 2 of 2) CA

LOITER POWER
1700 RPM
ISA +37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	35	433	866	124	136	32	419	838	124	136
2000	50	48	35	418	836	124	140	32	404	808	124	140
4000	46	44	36	402	804	124	144	33	388	776	124	144
6000	42	40	36	388	776	124	149	33	373	746	124	149
8000	38	36	37	374	748	124	154	34	359	718	124	154
10,000	35	32	38	360	720	124	158	35	345	690	124	158
12,000	31	28	39	345	690	124	164	35	331	662	124	164
14,000	27	24	39	333	666	124	169	36	318	636	124	169
16,000	23	20	40	322	644	124	175	37	307	614	124	175
18,000	19	16	41	314	628	124	181	37	299	598	124	181
20,000	16	12	42	307	614	124	187	38	292	584	124	187
22,000	12	8	---	---	---	---	---	39	287	574	124	193
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03619

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-119. Loiter Power at 1700 RPM - ISA +37°C (Sheet 1 of 2) IR

LOITER POWER
1700 RPM
ISA +37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	29	407	814	124	136	27	397	794	124	136
2000	50	48	30	391	782	124	140	28	381	762	124	140
4000	46	44	30	376	752	124	144	28	365	730	124	144
6000	42	40	31	361	722	124	149	29	351	702	124	149
8000	38	36	31	347	694	124	154	29	336	672	124	154
10,000	35	32	32	333	666	124	158	29	322	644	124	158
12,000	31	28	32	319	638	124	164	30	308	616	124	164
14,000	27	24	33	306	612	124	169	30	295	590	124	169
16,000	23	20	33	295	590	124	175	31	284	568	124	175
18,000	19	16	34	286	572	124	181	32	275	550	124	181
20,000	16	12	35	278	556	124	187	32	267	534	124	187
22,000	12	8	36	273	546	124	193	33	261	522	124	193
24,000	8	4	36	269	538	124	200	33	257	514	124	200
26,000	5	0	---	---	---	---	---	34	253	506	124	207
28,000	1	-3	---	---	---	---	---	35	253	506	124	215
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03620

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-119. Loiter Power at 1700 RPM - ISA +37°C (Sheet 2 of 2) IR

LOITER POWER
1700 RPM
ISA + 37° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	32	440	880	124	136	30	426	852	124	136
2000	50	48	33	423	846	124	140	30	409	818	124	140
4000	46	44	34	406	812	124	144	31	392	784	124	144
6000	42	40	34	391	782	124	149	31	376	752	124	149
8000	38	36	35	376	752	124	154	32	361	722	124	154
10,000	35	32	36	361	722	124	158	33	346	692	124	158
12,000	31	28	36	345	690	124	164	33	331	662	124	164
14,000	27	24	37	332	664	124	169	34	317	634	124	169
16,000	23	20	38	320	640	124	175	34	305	610	124	175
18,000	19	16	39	311	622	124	181	35	296	592	124	181
20,000	16	12	39	303	606	124	187	36	287	574	124	187
22,000	12	8	---	---	---	---	---	36	282	564	124	193
24,000	8	4	---	---	---	---	---	37	280	560	124	200
26,000-	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559415

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-120. Loiter Power at 1700 RPM - ISA +37°C (Sheet 1 of 2) CA

LOITER POWER
1700 RPM
ISA + 37° C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	27	414	828	124	136	27	403	806	124	136
2000	50	48	28	396	792	124	140	26	386	772	124	140
4000	46	44	28	379	758	124	144	26	369	738	124	144
6000	42	40	29	364	728	124	149	27	353	706	124	149
8000	38	36	29	348	696	124	154	27	337	674	124	154
10,000	35	32	30	333	666	124	158	27	322	644	124	158
12,000	31	28	30	318	636	124	164	28	307	614	124	164
14,000	27	24	31	304	608	124	169	28	293	586	124	169
16,000	23	20	31	292	584	124	175	29	281	562	124	175
18,000	19	16	32	282	564	124	181	30	271	542	124	181
20,000	16	12	33	274	548	124	187	30	262	524	124	187
22,000	12	8	33	268	536	124	193	31	256	512	124	193
24,000	8	4	34	263	526	124	200	31	250	500	124	200
26,000	5	0	35	260	520	124	207	32	246	492	124	207
28,000	1	-3	---	---	---	---	---	33	243	486	124	215
29,000	-1	-5	---	---	---	---	---	33	243	486	124	219
31,000-	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559416

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 20 LBS/HR/ENG, and true airspeed will be reduced approximately 20 knots.

Figure 7-120. Loiter Power at 1700 RPM - ISA +37°C (Sheet 2 of 2) CA

ENDURANCE PROFILE - LOITER POWER

1700 RPM

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

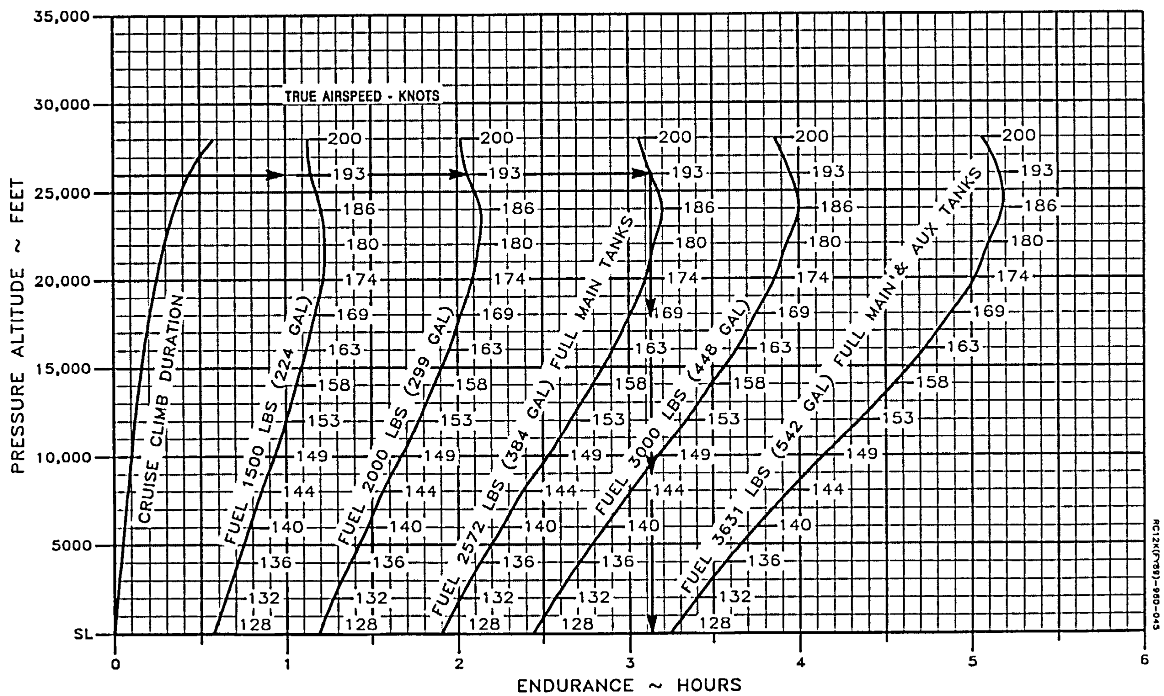
WEIGHT...*16,320 LBS BEFORE ENGINE START
FUEL ....AVIATION KEROSENE
FUEL DENSITY ....6.7 LBS/GAL
ICE VANES ....RETRACTED

EXAMPLE

PRESSURE ALTITUDE ....26,000 FT
FUEL ....2572 LBS
ENDURANCE ....313 HRS

NOTES: 1. ENDURANCE SHOWN ALLOWS FOR START, TAXI, AND RUNUP; INCLUDOES CRUISE CUMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT UAXIMUM RANGE POWER.

*2. AT 16,320 LBS RAMP WEIGHT, THE MAXIMUM ZERO-FUEL WEIGHT UUITATION OF 13,100 LBS WOULD BE EXCEEDED AT FUEL LOADING LESS THAN 3220 LBS.



☛ CA Reduce endurance by approximately 1%.

Figure 7-121. Endurance Profile - Loiter Power IR

RANGE PROFILE - FULL MAIN TANKS

STANDARD DAY (ISA)
ZERO WIND

ASSOCIATED CONDITIONS:
WEIGHT.................................15,672 LBS BEFORE ENGINE START
FUEL ....AVIATION KEROSENE
FUEL DENSITY ....6 7 LBS/GAL
ICE VANES ....RETRACTED

NOTE: RANGE ALLOWS FOR START, TAXI, AND RUNUP; INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 UINUTES RESERVE FUEL AT MAXIUUM RANGE POWER

EXAMPLE
PRESSURE ALTITUDE ....26,000 FT
RANGE @:
MAXIMUU CRUISE POWER ....594 NM
NORUAL CRUISE POWER.............596 NU
MAXIUUM RANGE POWER............626 NY

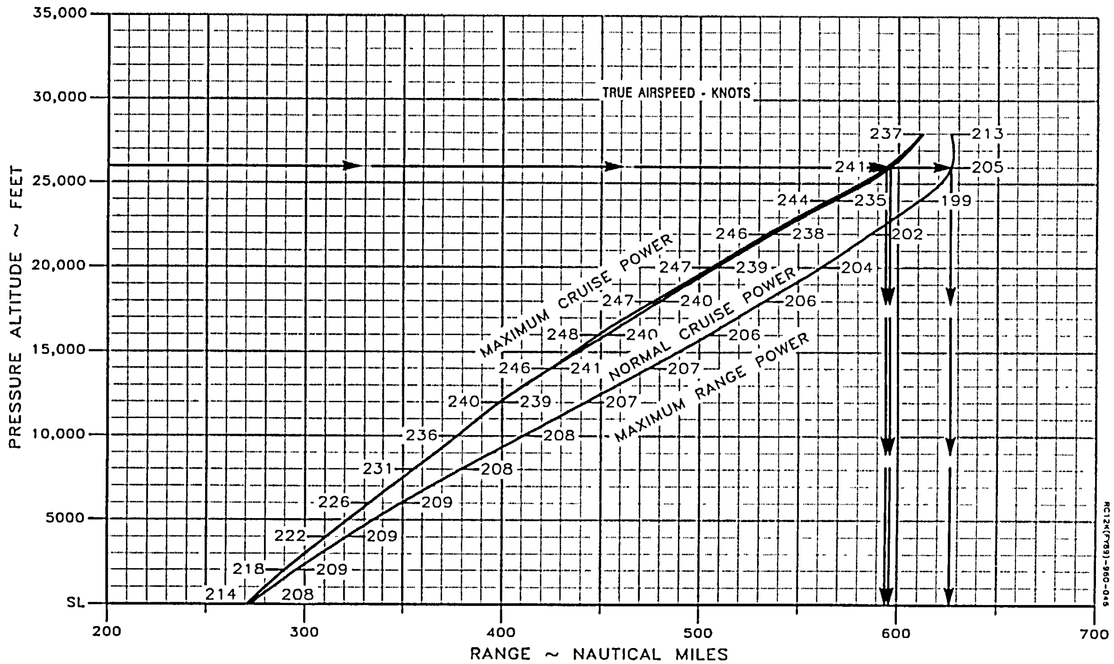


Figure 7-122. Range Profile - Full Main Tanks

ENDURANCE PROFILE - FULL MAIN TANKS

STANDARD DAY (ISA)

ASSOCIATED CONODITIONS:
WEIGHT ....15,672 LBS BEFORE ENGINE START
FUEL ....AVATION KEROSENE
FUEL DENSITY ....6.7 LBS/CAL
ICE VANES ....RERACTED

NOTE: ENDURANCE ALLOWS FOR START, TAXI, AND RUNUP, INCLUDES CRUISE CUMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MUAXIUM RANGE POWER.

☛ CA Reduce endurance by approximately 3% for Maximum Cruise Power and Normal Cruise Power. Reduce endurance by approximately 1% for Loiter Power.

EXAMPLE:
PRESSURE ALTITUDE ....26,000 FT
ENDURANCE @:
MAXIMU CRUISE POWER ....2.57 HRS
NORUAL CRUISE POWR ....2.66 MRS
LOITER POWER ....3.27 HRS

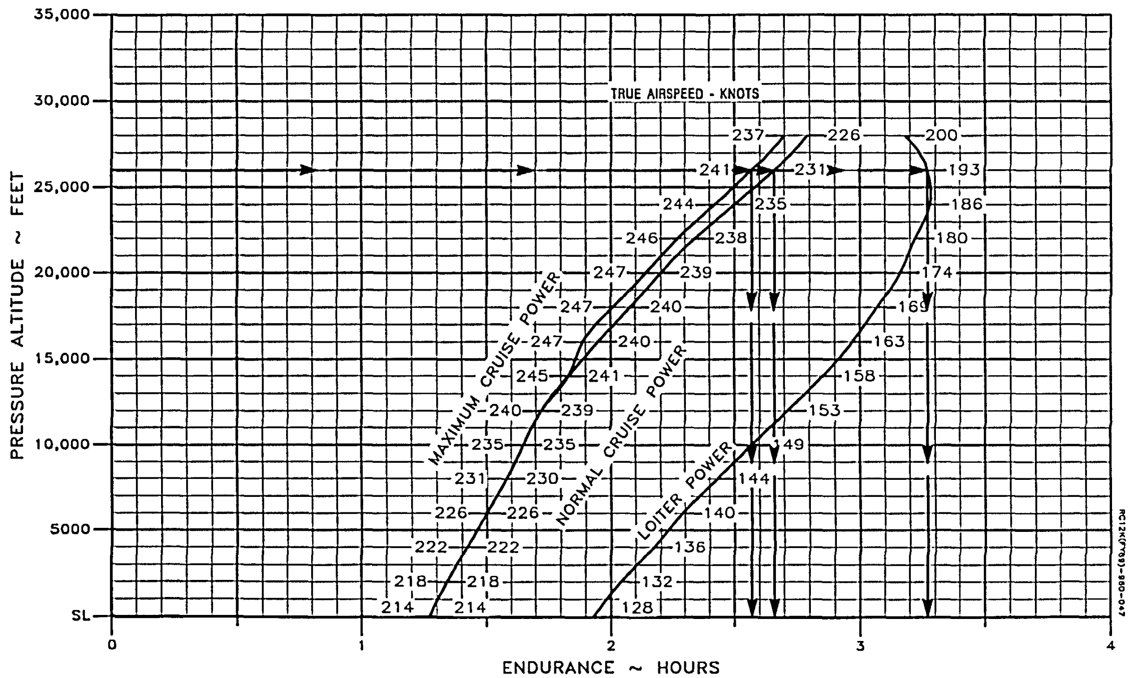


Figure 7-123. Endurance Profile - Full Main Tanks IR

RANGE PROFILE - FULL MAIN & AUX TANKS

STANDARD DAY (ISA)
ZERO WIND

ASSOCIATED CONDITIONS:
WEIGHT ....16,320 LBS BEFORE ENGINE START
FUEL ....AVIATION KEROSENE
FUEL DENSITY ....6.7 LBS/GAL
ICE VANES ....RETRACTED

NOTE: RANGE ALLOWS FOR START, TAXI, AND RUNUP, INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR S45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

EXAMPLE
PRESSURE ALTITUDE ....26,000 FT
RANGE @:
MAXIMUM CRUISE POWER..................929 NM
NORMAL CRUISE POWER....................932 NM
MAXIMUM RANGE POWER..................982 NY

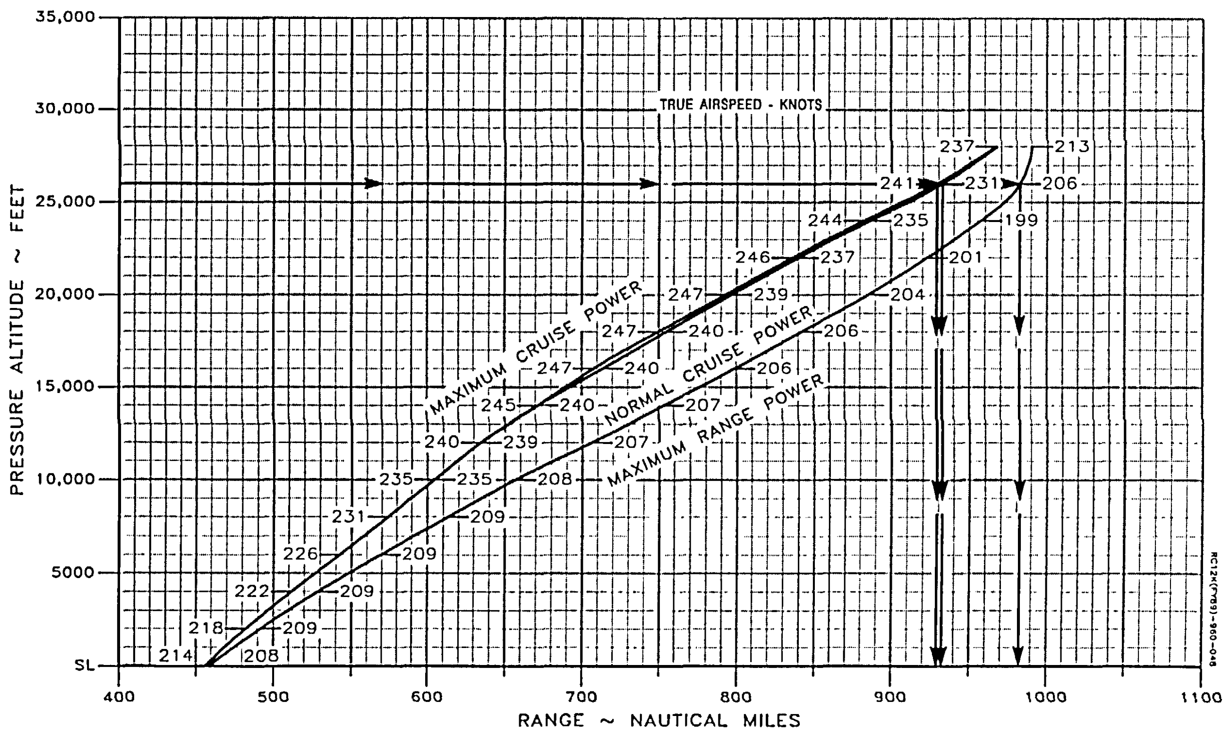


Figure 7-124. Range Profile - Full Main and Aux Tanks

ENDURANCE PROFILE - FULL MAIN & AUX TANKS

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS-
WEIGHT..................16,320 LBS BEFORE ENGINE START
FUEL ....AVIATION KEROSENE
FUEL DENSITY.......6.7 LBS/GAL
ICE ANES ....RETRACTED

NOTE: ENDURANCE ALLOWS FOR START, TAXI, AND RUNUP, INCLUDES CRUISE CLIMB AND DESCENT; AND ALLOWS FOR 45 MINUTES RESERVE FUEL AT MAXIMUM RANGE POWER.

☛ CA Reduce endurance by approximately 3% for Maximum Cruise Power and Normal Cruise Power. Reduce endurance by approximately 1% for Loiter Power.

EXAMPLE-
PRESSURE ALTITUDE ....26,000 FT
ENDURANCE @:
MAXIMUM CRUISE POWER.............3.97 HRS
NORMAL CRUISE POWER ....413 HRS
LOITER POWER ....5.16 HRS

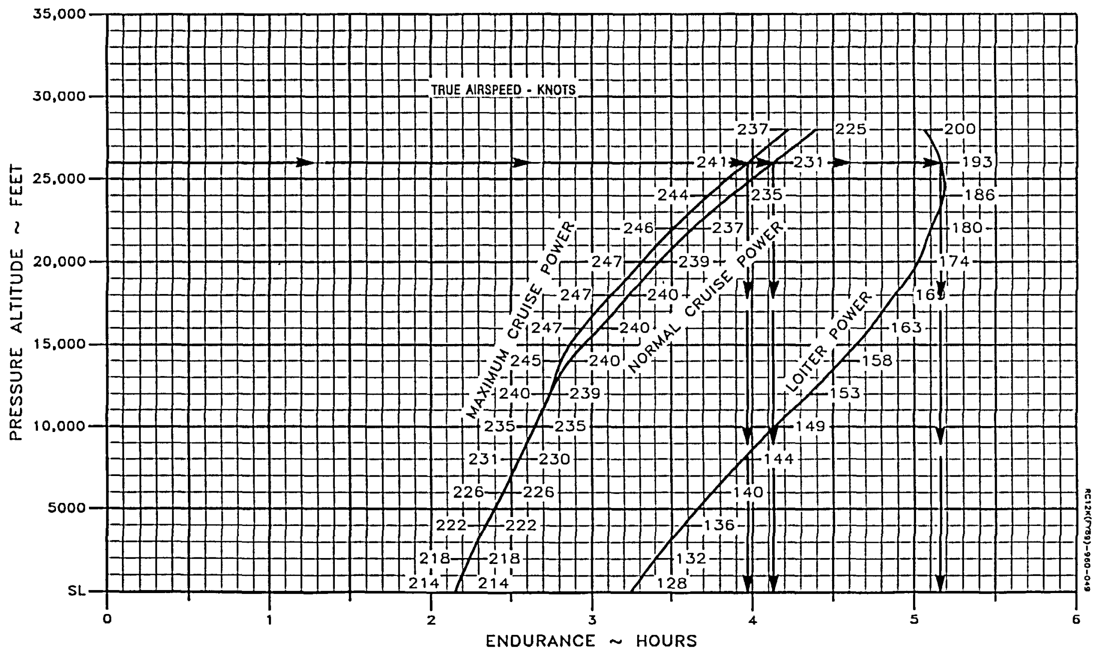


Figure 7-125. Endurance Profile - Full Main and Aux Tanks IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA -30°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-13	-15	83	623	623	151	146	83	623	623	156	150
2000	-17	-19	83	604	604	150	149	83	603	603	154	153
4000	-21	-23	83	586	586	148	152	83	585	585	153	156
6000	-25	-27	83	571	571	146	154	83	570	570	151	159
8000	-29	-31	83	561	561	144	156	83	560	560	149	162
10,000	-33	-35	83	552	552	141	158	83	550	550	147	164
12,000	-36	-39	83	543	543	138	159	83	542	542	145	167
14,000	-40	-43	83	536	536	135	161	83	535	535	143	170
16,000	-44	-47	83	531	531	132	162	83	529	529	140	172
18,000	-48	-51	83	527	527	128	163	83	526	526	138	175
20,000	-52	-55	83	526	526	124	163	83	523	523	135	177
22,000	-56	-59	---	---	---	---	---	78	491	491	126	172
24,000	-60	-63	---	---	---	---	---	71	451	451	112	159
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03637

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-126. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -30°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA -30°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-13	-15	83	622	622	159	153	83	622	622	162	156
2000	-17	-19	83	603	603	158	157	83	602	602	161	159
4000	-21	-23	83	585	585	157	160	83	584	584	160	163
6000	-24	-27	83	569	569	156	163	83	569	569	159	166
8000	-28	-31	83	559	559	154	166	83	558	558	157	170
10,000	-32	-35	83	550	550	152	169	83	549	549	155	173
12,000	-36	-39	83	541	541	150	172	83	541	541	153	176
14,000	-40	-43	83	534	534	148	175	83	533	533	151	179
16,000	-44	-47	83	528	528	146	179	83	528	528	149	183
18,000	-48	-51	83	525	525	144	181	83	524	524	147	186
20,000	-51	-55	83	522	522	141	184	83	521	521	145	189
22,000	-56	-59	79	494	494	135	182	79	495	495	140	189
24,000	-60	-63	72	456	456	127	178	73	459	459	133	186
26,000	-64	-67	65	415	415	115	168	66	419	419	125	181
28,000	-68	-70	57	372	372	97	149	59	379	379	115	174
29,000	-70	-5	---	---	---	---	---	55	359	359	110	169
31,000	-72	-9	---	---	---	---	---	49	322	322	96	155
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03638

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-126. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA-30°C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA -30° C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-13	-15	83	644	644	158	152	83	643	643	162	156
2000	-17	-19	83	624	624	156	155	83	623	623	161	159
4000	-21	-23	83	607	607	155	158	83	605	605	160	163
6000	-25	-27	83	594	594	153	161	83	593	593	158	166
8000	-28	-31	83	582	582	150	163	83	581	581	156	169
10,000	-32	-35	83	571	571	148	165	83	570	570	154	171
12,000	-36	-39	83	560	560	145	167	83	559	559	152	174
14,000	-40	-43	83	551	551	142	169	83	550	550	149	177
16,000	-44	-47	83	544	544	140	171	83	542	542	147	180
18,000	-48	-51	83	539	539	137	173	83	538	538	144	182
20,000	-52	-55	82	528	528	131	172	83	530	530	141	184
22,000	-56	-59	75	487	487	111	152	77	493	493	132	179
24,000	-60	-63	---	---	---	---	---	70	454	454	120	169
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT05590

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-127. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -30°C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA -30°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-13	-15	83	642	642	165	159	83	642	642	168	161
2000	-17	-19	83	623	623	164	163	83	622	622	167	165
4000	-20	-23	83	605	605	164	167	83	604	604	167	169
6000	-24	-27	83	592	592	162	170	83	591	591	165	173
8000	-28	-31	83	580	580	160	173	83	579	579	163	176
10,000	-32	-35	83	569	569	158	176	83	569	569	161	179
12,000	-36	-39	83	558	558	156	179	83	558	558	159	183
14,000	-40	-43	83	549	549	154	182	83	548	548	157	186
16,000	-44	-47	83	541	541	152	185	83	541	541	155	189
18,000	-47	-51	83	536	536	150	189	83	536	536	153	193
20,000	-51	-55	83	531	531	147	191	83	531	531	151	197
22,000	-55	-59	77	495	495	140	188	78	497	497	145	195
24,000	-59	-63	71	458	458	131	184	72	460	460	138	192
26,000	-64	-67	65	418	418	121	177	65	421	421	130	188
28,000	-68	-70	57	375	375	105	160	58	380	380	120	181
29,000	-70	-72	---	---	---	---	---	55	361	361	115	177
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055902

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-127. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -30°C (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA -20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-3	-5	83	626	626	150	148	83	625	625	155	152
2000	-7	-9	83	605	605	148	150	83	604	604	153	155
4000	-11	-13	83	588	588	147	153	83	587	587	152	158
6000	-15	-17	83	575	575	144	155	83	574	574	150	161
8000	-19	-21	83	564	564	141	157	83	563	563	148	163
10,000	-22	-25	83	554	554	139	159	83	553	553	145	166
12,000	-26	-29	83	545	545	136	160	83	544	544	143	168
14,000	-30	-33	83	538	538	132	161	83	537	537	141	171
16,000	-34	-37	83	532	532	129	163	83	531	531	139	174
18,000	-38	-41	83	529	529	125	163	83	527	527	136	176
20,000	-42	-47	---	---	---	---	---	79	502	502	128	172
22,000	-46	-49-	---	---	---	---	---	74	470	470	117	164
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03639

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-128. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -20°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA -20°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-3	-5	83	624	624	158	155	83	624	624	161	158
2000	-7	-9	83	603	603	157	159	83	603	603	160	162
4000	-11	-13	83	587	587	156	162	83	586	586	159	165
6000	-14	-17	83	573	573	154	165	83	573	573	157	168
8000	-18	-21	83	562	562	152	168	83	561	561	155	172
10,000	-22	-25	83	552	552	150	171	83	551	551	154	175
12,000	-26	-29	83	543	543	148	174	83	543	543	152	178
14,000	-30	-33	83	536	536	146	177	83	535	535	150	181
16,000	-34	-37	83	530	530	144	180	83	529	529	148	185
18,000	-38	-41	83	526	526	142	183	83	525	525	146	188
20,000	-42	-45	80	504	504	136	182	80	506	506	141	189
22,000	-46	-49	74	473	473	129	179	75	474	474	135	187
24,000	-50	-53	69	441	441	121	174	70	443	443	128	184
26,000	-54	-57	63	409	409	110	165	64	412	412	121	181
28,000	-58	-60	57	372	372	97	149	58	377	377	113	175
29,000	-60	-62	---	---	---	---	---	55	359	359	107	169
31,000	-64	-66	---	---	---	---	---	48	322	322	91	153
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03640

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-128. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -20°C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA -20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-3	-5	83	646	646	157	154	83	645	645	161	158
2000	-7	-9	83	628	628	155	157	83	627	627	160	162
4000	-11	-13	83	611	611	153	160	83	610	610	158	165
6000	-14	-17	83	597	597	151	162	83	596	596	156	167
8000	-18	-21	83	584	584	148	164	83	583	583	154	170
10,000	-22	-25	83	573	573	146	166	83	572	572	152	173
12,000	-26	-29	83	562	562	143	168	83	561	561	150	176
14,000	-30	-33	83	552	552	140	170	83	551	551	147	178
16,000	-34	-37	83	545	545	137	172	83	544	544	145	18'
18,000	-38	-41	82	530	530	131	170	82	533	533	141	182
20,000	-42	-45	76	499	499	117	158	78	504	504	134	179
22,000	-46	-49	---	---	---	---	---	72	471	471	124	172
24,000	-50	-53	---	---	---	---	---	67	438	438	109	158
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055903

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-129. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -20°C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA -20°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	-3	-5	83	645	645	164	161	83	644	644	167	164
2000	-6	-9	83	626	626	164	165	83	625	625	167	168
4000	-10	-13	83	609	609	162	168	83	609	609	165	171
6000	-14	-17	83	595	595	160	172	83	595	595	163	175
8000	-18	-21	83	582	582	158	175	83	582	582	1629	178
10,000	-22	-25	83	571	571	156	178	83	571	571	160	181
12,000	-26	-29	83	560	560	154	181	83	560	560	158	184
14,000	-30	-33	83	551	551	152	184	83	550	550	156	188
16,000	-33	-37	83	543	543	150	187	83	542	542	154	192
18,000	-37	-41	83	535	535	147	190	83	536	536	151	195
20,000	-41	-45	78	505	505	141	188	79	507	507	146	194
22,000	-45	-49	73	474	474	134	185	74	476	476	140	193
24,000	-50	-53	68	443	474	126	181	69	445	445	133	190
26,000	-54	-57	63	410	410	116	174	63	413	413	126	187
28,000	-58	-60	56	373	373	99	156	58	379	379	117	181
29,000	-60	-62	---	---	---	---	---	55	361	361	112	177
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055904

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-129. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -20°C (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA -10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	7	5	83	629	629	149	150	83	628	628	154	154
2000	3	1	83	611	611	147	152	83	610	610	153	157
4000	-1	-3	83	594	594	145	154	83	593	586	150	160
6000	-5	-7	83	579	579	142	156	83	578	578	148	162
8000	-9	-11	83	567	567	139	158	83	565	565	146	165
10,000	-12	-15	83	555	555	136	159	83	554	554	144	167
12,000	-16	-19	83	545	545	133	161	83	544	544	141	170
14,000	-20	-23	83	539	539	130	162	83	537	537	139	172
16,000	-24	-27	81	524	524	123	159	82	527	527	135	174
18,000	-29	-31	77	496	496	107	144	78	501	501	128	170
20,000	-32	-35	---	---	---	---	---	74	475	475	119	164
22,000	-37	-39	---	---	---	---	---	68	442	442	103	149
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03641

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-130. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -10°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA -10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	7	5	83	627	627	158	158	83	627	627	160	160
2000	3	1	83	609	609	156	161	83	608	608	159	164
4000	0	-3	83	592	592	154	164	83	591	591	158	167
6000	-4	-7	83	577	577	153	167	83	577	577	156	170
8000	-8	-11	83	565	565	151	170	83	564	564	154	173
10,000	-12	-15	83	553	553	149	173	83	552	552	152	177
12,000	-16	-19	83	543	543	147	176	83	543	543	150	180
14,000	-20	-23	83	536	536	145	179	83	536	536	148	183
16,000	-24	-27	83	529	529	142	181	82	531	531	146	186
18,000	-28	-31	79	503	503	136	180	79	504	504	141	186
20,000	-32	-35	75	477	477	130	178	75	479	479	136	186
22,000	-36	-39	70	447	447	122	174	70	449	449	129	183
24,000	-40	-43	64	416	416	112	166	65	419	419	122	180
26,000	-44	-47	58	384	384	97	151	60	389	389	115	176
28,000	-48	-50	---	---	---	---	---	55	360	360	106	169
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03642

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-130. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -10°C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA -10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	7	5	83	652	652	156	156	83	651	651	160	160
2000	3	1	83	633	633	154	159	83	632	632	159	164
4000	-1	-3	83	616	616	152	161	83	615	615	157	166
6000	-4	-7	83	600	600	149	163	83	599	599	155	169
8000	-8	-11	83	586	586	146	165	83	585	585	152	172
10,000	-12	-15	83	573	573	144	167	83	572	572	150	175
12,000	-16	-19	83	561	561	141	169	83	560	560	148	177
14,000	-20	-23	83	554	554	138	171	83	553	553	145	180
16,000	-24	-27	79	525	525	129	166	80	529	529	140	179
18,000	-28	-31	75	498	498	116	156	77	502	502	133	177
20,000	-32	-35	---	---	---	---	---	73	476	476	125	172
22,000	-36	-39	---	---	---	---	---	67	444	444	112	160
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055905

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-131. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -10°C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
SA -10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	7	5	83	651	651	164	164	83	650	650	167	166
2000	4	1	83	632	632	163	167	83	631	631	166	170
4000	0	-3	83	614	614	161	170	83	614	614	164	173
6000	-4	-7	83	598	598	159	173	83	598	598	162	177
8000	-8	-11	83	584	584	157	176	83	583	583	160	180
10,000	-12	-15	83	571	571	155	179	83	571	571	158	183
12,000	-16	-19	83	560	560	152	182	83	559	559	156	186
14,000	-20	-23	83	552	552	150	186	83	551	551	154	190
16,000	-23	-27	81	531	531	146	186	81	532	532	150	192
18,000	-27	-31	77	504	504	140	185	77	505	505	145	192
20,000	-31	-35	73	478	478	134	184	74	480	480	140	191
22,000	-36	-39	68	448	448	127	180	69	450	450	134	189
24,000	-40	-43	63	418	418	118	174	64	420	420	127	186
26,000	-44	-47	58	386	386	105	162	59	391	391	119	182
28,000	-48	-50	---	---	---	---	---	54	361	361	111	176
29,000	-50	-52	---	---	---	---	---	52	347	347	106	172
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055906

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-131. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA -10°C (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	83	629	629	148	151	83	628	628	153	156
2000	13	11	83	613	613	146	153	83	612	612	151	159
4000	9	7	83	597	597	143	155	83	596	596	149	161
6000	5	3	83	581	581	140	157	83	580	580	146	163
8000	1	-1	83	568	568	137	158	83	567	567	144	166
10,000	-2	-5	83	556	556	134	160	83	555	555	142	168
12,000	-6	-9	83	547	547	131	161	83	545	545	140	171
14,000	-11	-13	79	515	515	120	154	80	519	519	133	169
16,000	-14	-17	---	---	---	---	---	75	490	490	125	165
18,000	-18	-21	---	---	---	---	---	71	464	464	116	159
20,000	-23	-25	---	---	---	---	---	66	437	437	101	144
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-132. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA (Sheer 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	83	627	627	157	160	83	627	627	160	163
2000	13	11	83	611	611	155	163	83	611	611	158	166
4000	10	7	83	595	595	153	165	83	595	595	156	169
6000	6	3	83	580	580	151	168	83	579	579	154	172
8000	2	-1	83	566	566	149	171	83	566	566	153	175
10,000	-2	-5	83	554	554	147	174	83	553	553	151	178
12,000	-6	-9	83	544	544	145	178	83	544	544	149	182
14,000	-10	-13	80	522	522	140	178	81	523	523	145	183
16,000	-14	-17	76	493	493	134	176	76	495	495	140	182
18,000	-18	-21	72	468	468	128	174	72	470	470	134	181
20,000	-22	-25	68	443	443	121	170	68	445	445	129	180
22,000	-26	-29	63	416	416	112	164	64	419	419	122	178
24,000	-30	-33	59	388	388	100	153	60	393	393	116	175
26,000	-34	-37	---	---	---	---	---	55	366	366	107	169
28,000	-38	-40	---	---	---	---	---	51	339	339	97	159
29,000	-40	-42	---	---	---	---	---	48	324	324	89	150
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03644

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-132. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	17	15	83	652	652	152	157	83	651	651	159	162
2000	13	11	83	635	635	152	160	83	634	634	157	165
4000	9	7	83	618	618	150	162	83	617	617	155	168
6000	6	3	83	601	601	147	164	83	601	601	153	170
8000	2	-1	83	586	586	144	166	83	585	585	151	173
10,000	-2	-5	83	574	574	142	168	83	573	573	149	176
12,000	-6	-9	81	550	550	135	166	82	553	553	145	177
14,000	-10	-13	76	517	517	125	160	77	521	521	138	174
16,000	-15	-17	72	486	486	109	145	73	492	492	130	171
18,000	-18	-21	---	---	---	---	---	69	466	466	121	165
20,000	-22	-25	---	---	---	---	---	65	439	439	109	155
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055907

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-133. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	18	15	83	650	650	163	166	83	649	649	166	169
2000	14	11	83	633	633	161	169	83	633	633	164	172
4000	10	7	83	617	617	159	172	83	616	616	162	175
6000	6	3	83	600	600	157	175	83	599	599	161	178
8000	2	-1	83	585	585	155	178	83	584	584	159	182
10,000	-2	-5	83	572	572	153	181	83	572	572	157	185
12,000	-6	-9	82	554	554	150	183	83	555	555	154	188
14,000	-10	-13	78	523	523	144	182	78	525	525	149	187
16,000	-14	-17	74	495	495	138	181	74	496	496	143	187
18,000	-18	-21	70	469	469	132	179	71	471	471	138	187
20,000	-22	-25	67	444	444	126	177	67	446	446	133	186
22,000	-26	-29	62	417	417	117	171	63	420	420	127	184
24,000	-30	-33	58	390	390	106	162	59	394	394	120	181
26,000	-34	-37	---	---	---	---	---	55	368	368	113	176
28,000	-38	-40	---	---	---	---	---	50	340	340	102	168
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055908

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-133. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	27	25	83	634	634	146	152	83	633	633	152	157
2000	23	21	83	613	613	144	154	83	612	612	149	160
4000	19	17	83	594	594	141	156	83	593	593	147	162
6000	15	13	83	577	577	138	157	83	576	576	145	165
8000	12	9	83	566	566	135	159	83	564	564	143	167
10,000	7	5	80	543	543	128	156	81	546	546	138	167
12,000	3	1	76	512	512	118	149	77	516	516	131	165
14,000	0	-3	---	---	---	---	---	72	484	484	123	160
16,000	-5	-7	---	---	---	---	---	68	454	454	112	152
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-134. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +10°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	27	25	83	633	633	156	161	83	632	632	159	164
2000	24	21	83	611	611	154	164	83	611	611	157	167
4000	20	17	83	592	592	152	167	83	591	591	155	170
6000	16	13	83	575	575	150	170	83	575	575	153	174
8000	12	9	83	564	564	148	173	83	563	563	151	177
10,000	8	5	82	548	548	144	175	82	550	550	149	179
12,000	4	1	78	518	518	139	174	78	520	520	144	179
14,000	0	-3	73	487	487	132	171	74	489	489	138	178
16,000	-4	-7	69	458	458	125	168	70	460	460	132	177
18,000	-8	-11	65	431	431	118	164	65	433	433	127	175
20,000	-12	-15	60	405	405	109	157	61	408	408	120	173
22,000	-17	-19	56	380	380	96	145	58	384	384	113	169
24,000	-20	-23	---	---	---	---	---	54	361	361	106	164
26,000	-24	-27	---	---	---	---	---	50	337	337	96	156
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03646

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-134. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +10 °C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 10°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	23	25	83	656	656	153	159	83	655	655	158	164
2000	23	21	83	634	634	150	161	83	633	633	156	166
4000	20	17	83	614	614	148	163	83	613	613	154	169
6000	16	13	83	598	598	145	165	83	597	597	152	172
8000	12	9	82	580	580	141	166	83	582	582	149	174
10,000	8	5	77	544	544	131	160	78	547	547	142	171
12,000	3	1	73	513	513	122	153	74	517	517	135	169
14,000	0	-3	---	---	---	---	---	70	485	485	127	165
16,000	-4	-7	---	---	---	---	---	66	455	455	117	158
18,000	-9	-11	---	---	---	---	---	62	427	427	101	143
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT055909

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-135. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +10 °C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 10°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	28	25	83	654	654	162	167	83	653	653	165	170
2000	24	21	83	632	632	160	170	83	632	632	163	174
4000	20	17	83	613	613	158	173	83	612	612	161	177
6000	16	13	83	596	596	156	177	83	596	596	159	180
8000	12	9	83	584	584	154	180	83	583	583	157	183
10,000	8	5	78	549	549	148	178	79	551	551	152	183
12,000	4	1	75	520	520	142	178	76	521	521	147	183
14,000	0	-3	71	488	488	136	176	72	490	490	142	182
16,000	-4	-7	67	459	459	130	173	68	461	461	136	181
18,000	-8	-11	63	432	432	122	170	64	434	434	130	180
20,000	-12	-15	59	406	406	114	164	60	409	409	124	178
22,000	-16	-19	55	381	381	102	154	57	386	386	118	176
24,000	-20	-23	---	---	---	---	---	53	362	362	110	171
26,000	-24	-27	---	---	---	---	---	49	338	338	101	164
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559010

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-135. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +10 °C (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	83	636	636	145	153	83	635	635	150	158
2000	33	31	83	616	616	142	155	83	614	614	148	161
4000	29	27	83	596	596	139	157	83	595	595	146	163
6000	26	23	82	571	571	134	156	83	573	573	142	165
8000	21	19	78	540	540	126	152	83	543	543	136	163
10,000	17	15	74	508	508	115	144	82	512	512	130	161
12,000	13	11	---	---	---	---	---	71	480	480	122	156
14,000	9	7	---	---	---	---	---	65	446	446	109	145
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03647

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-136. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +20°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +20°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	83	634	634	154	163	83	634	634	157	166
2000	34	31	83	613	613	152	165	83	613	613	156	169
4000	30	27	83	594	594	150	168	83	594	594	154	172
6000	26	23	83	575	575	148	171	83	576	576	152	175
8000	22	19	79	545	545	143	170	83	546	546	147	175
10,000	18	15	76	514	514	137	169	76	516	516	142	175
12,000	14	11	71	483	483	131	167	72	485	485	137	175
14,000	10	7	66	450	450	123	162	67	452	452	130	172
16,000	6	3	61	421	421	114	157	62	424	424	124	169
18,000	1	-1	57	395	395	105	150	58	398	398	117	166
20,000	-2	-5	---	---	---	---	---	54	373	373	110	162
22,000	-6	-9	---	---	---	---	---	51	350	350	102	157
24,000	-10	-13	---	---	---	---	---	47	327	327	92	148
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03648

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-136. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +20 °C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 20°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	37	35	83	659	659	152	160	83	658	658	157	165
2000	33	31	83	636	636	148	161	83	637	637	263	168
4000	29	27	80	603	603	143	160	81	605	605	150	168
6000	25	23	77	572	572	136	158	78	574	574	145	167
8000	21	15	70	509	509	118	147	75	544	544	139	166
10,000	17	15	70	509	509	118	147	71	513	513	132	164
12,000	14	11	---	---	---	---	---	68	481	481	125	160
14,000	9	7	---	---	---	---	---	62	447	447	112	150
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559011

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-137. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +20°C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 20°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	38	35	83	657	657	161	169	83	656	656	164	172
2000	34	31	83	636	636	159	172	83	635	635	162	175
4000	30	27	81	606	606	155	173	82	607	607	158	177
6000	26	23	78	576	576	150	173	79	577	577	154	178
8000	22	19	75	546	546	146	173	76	547	547	150	178
10,000	18	15	72	515	515	140	173	73	517	517	145	179
12,000	14	11	69	484	484	134	171	69	486	486	140	178
14,000	10	7	64	451	451	126	167	64	454	454	134	176
16,000	6	3	59	422	422	118	162	60	425	425	127	174
18,000	2	-1	56	396	396	109	156	57	400	400	121	172
20,000	-3	-5	52	369	369	94	140	53	374	374	114	168
22,000	-6	-9	---	---	---	---	---	50	351	351	107	163
24,000	-10	-13	---	---	---	---	---	46	328	328	97	155
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559012

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-137. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +20 °C (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +30°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	45	79	624	624	139	149	80	625	625	146	156
2000	43	41	77	593	593	134	148	78	595	595	141	157
4000	39	37	75	563	563	127	146	75	565	565	137	156
6000	35	33	---	---	---	---	---	73	535	535	131	155
8000	31	29	---	---	---	---	---	69	505	505	124	152
10,000	27	25	---	---	---	---	---	66	473	473	116	147
12,000	23	21	---	---	---	---	---	62	441	441	103	136
14,000	---	---	---	---	---	---	---	---	---	---	---	---
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000'	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03649

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-138. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +30°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA + 30°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	45	80	626	626	151	161	81	626	626	154	165
2000	43	41	78	596	596	147	162	79	597	597	151	166
40000	0	37	76	566	566	143	163	76	567	567	147	168
6000	36	33	73	537	537	138	163	74	538	538	143	168
8000	32	29	70	507	507	133	162	71	509	509	139	168
10,000	28	25	67	476	476	127	160	67	478	478	133	168
12,000	24	21	63	444	444	120	157	63	447	447	128	166
14,000	19	17	59	416	416	112	152	60	418	418	122	164
16,000	15	13	54	386	386	100	142	55	389	389	114	160
18,000	12	9	---	---	---	---	---	50	358	358	104	152
20,000	7	5	---	---	---	---	---	46	333	333	95	144
22,000	3	1	---	---	---	---	---	43	314	314	82	131
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03650

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-138. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +30°C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 30°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	43	41	74	623	623	139	149	74	624	624	146	157
2000	43	41	72	593	593	134	149	73	595	595	143	158
4000	39	37	70	563	563	128	147	71	565	565	138	157
6000	35	33	---	---	---	---	---	68	536	536	133	157
8000	31	29	---	---	---	---	---	66	506	506	126	154
10,000	27	25	---	---	---	---	---	62	473	473	118	149
12,000	23	21	---	---	---	---	---	59	442	442	106	140
14,000	---	---	---	---	---	---	---	---	---	---	---	---
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559013

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-139. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +30°C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 30°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	47	47	75	625	625	152	163	75	626	626	156	167
2000	44	41	73	596	596	148	164	74	597	597	153	168
4000	40	37	71	567	567	144	165	72	568	568	149	170
6000	36	33	69	538	538	140	165	69	539	539	145	171
8000	32	29	66	508	508	135	164	67	509	509	141	171
10,000	28	25	63	477	477	129	163	64	478	478	136	171
12,000	24	21	60	445	445	123	160	61	448	448	131	170
14,000	20	17	57	416	416	115	156	58	419	419	125	168
16,000	15	13	52	386	386	104	147	53	390	390	118	164
18,000	12	9	---	---	---	---	---	48	359	359	108	157
20,000	7	5	---	---	---	---	---	45	333	333	99	150
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559014

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-

Figure 7-139. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +30 °C (Sheet 2 of 2) CA

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +37°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	71	598	598	127	139	72	599	599	136	148
2000	50	48	---	---	---	---	---	70	568	568	132	149
4000	46	44	---	---	---	---	---	68	538	538	128	148
6000	42	40	---	---	---	---	---	66	510	510	122	146
8000	38	36	---	---	---	---	---	63	481	481	114	142
10,000	34	32	---	---	---	---	---	59	448	448	101	131
12,000	---	---	---	---	---	---	---	---	---	---	---	---
14,000	---	---	---	---	---	---	---	---	---	---	---	---
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03651

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-140. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +37°C (Sheet 1 of 2) IR

ONE-ENGINE-INOPERATIVE MAXIMUM CRUISE POWER
1700 RPM
ISA +37°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	72	599	599	142	155	73	600	600	146	159
2000	50	48	70	569	569	139	156	71	570	570	144	161
4000	46	44	69	540	540	135	156	69	540	540	140	162
6000	42	40	67	511	511	131	156	67	513	513	136	163
8000	38	36	64	482	482	125	155	64	484	484	132	163
10,000	34	32	60	451	451	119	152	61	453	453	127	161
12,000	30	28	56	420	420	110	147	57	422	422	120	159
14,000	26	24	53	391	391	100	138	53	393	393	114	156
16,000	22	20	---	---	---	---	---	49	364	364	106	151
18,000	18	16	---	---	---	---	---	45	335	335	95	142
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT03652

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E. G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-140. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +37°C (Sheet 2 of 2) IR

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 37°C

WEIGHT ®			16,000 POUNDS					14,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	66	595	595	125	137	66	597	597	135	147
2000	50	48	---	---	---	---	---	65	567	567	132	148
4000	46	44	---	---	---	---	---	63	538	538	127	148
6000	42	40	---	---	---	---	---	62	510	510	123	147
8000	38	36	---	---	---	---	---	59	481	481	115	143
10,000	34	32	---	---	---	---	---	56	448	448	101	131
12,000	---	---	---	---	---	---	---	---	---	---	---	---
14,000	---	---	---	---	---	---	---	---	---	---	---	---
16,000	---	---	---	---	---	---	---	---	---	---	---	---
18,000	---	---	---	---	---	---	---	---	---	---	---	---
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559015

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% - 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-141. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +37 °C (Sheet 1 of 2) CA

ONE-ENGINE INOPERATIVE
MAXIMUM CRUISE POWER
1700 RPM
ISA + 37°C

WEIGHT ®			12,000 POUNDS					10,000 POUNDS				
PRESSURE ALTITUDE	IFAT	FAT	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS	TORQUE PER ENGINE	FUEL FLOW PER ENGINE	TOTAL FUEL FLOW	IAS	TAS
FEET	°C	°C	PERCENT	LBS/HR	LBS/HR	KTS	KTS	PERCENT	LBS/HR	LBS/HR	KTS	KTS
0	54	52	67	598	598	142	154	67	598	598	147	159
2000	50	48	65	568	568	139	156	66	569	569	144	161
4000	46	44	64	539	539	136	157	64	540	540	141	163
6000	42	40	62	512	512	132	158	63	513	513	138	165
8000	38	36	60	483	483	127	157	61	484	484	134	165
10,000	34	32	57	452	452	120	154	58	454	454	129	164
12,000	30	28	54	420	420	112	149	55	423	423	123	162
14,000	26	24	50	391	391	102	141	51	394	394	117	160
16,000	23	20	---	---	---	---	---	48	365	365	109	155
18,000	18	16	---	---	---	---	---	43	336	336	99	146
20,000	---	---	---	---	---	---	---	---	---	---	---	---
22,000	---	---	---	---	---	---	---	---	---	---	---	---
24,000	---	---	---	---	---	---	---	---	---	---	---	---
26,000	---	---	---	---	---	---	---	---	---	---	---	---
28,000	---	---	---	---	---	---	---	---	---	---	---	---
29,000	---	---	---	---	---	---	---	---	---	---	---	---
31,000	---	---	---	---	---	---	---	---	---	---	---	---
33,000	---	---	---	---	---	---	---	---	---	---	---	---
35,000	---	---	---	---	---	---	---	---	---	---	---	---

BT0559016

NOTE

During operations with ice vanes extended, torque will decrease approximately 7 percentage points (E.G., 67% 7 percentage points = 60%), fuel flow will decrease approximately 25 LBS/HR/ENG, and true airspeed will be reduced approximately 15 knots.

Figure 7-141. One Engine Inoperative Max Cruise Power at 1700 RPM - ISA +37 °C (Sheet 2 of 2) CA

TIME, FUEL, AND DISTANCE TO DESCEND

ASSOCIATED CONDITIONS:
POWER......................AS REQUIRED TO DESCEND AT 1500 FT/MIN
LANDING GEAR...........UP
FLAPS.........................UP

EXAMPLE:
INITIAL ALTITUDE ....25,000 FT
FINAL ALTITUDE ....5998 FT

TIME TO DESCEND (17-4) ....3 MIN
FUEL TO DESCEND (234-63) ....171 LBS
DISTANCE TO DESCEND (74-15).........59 NM

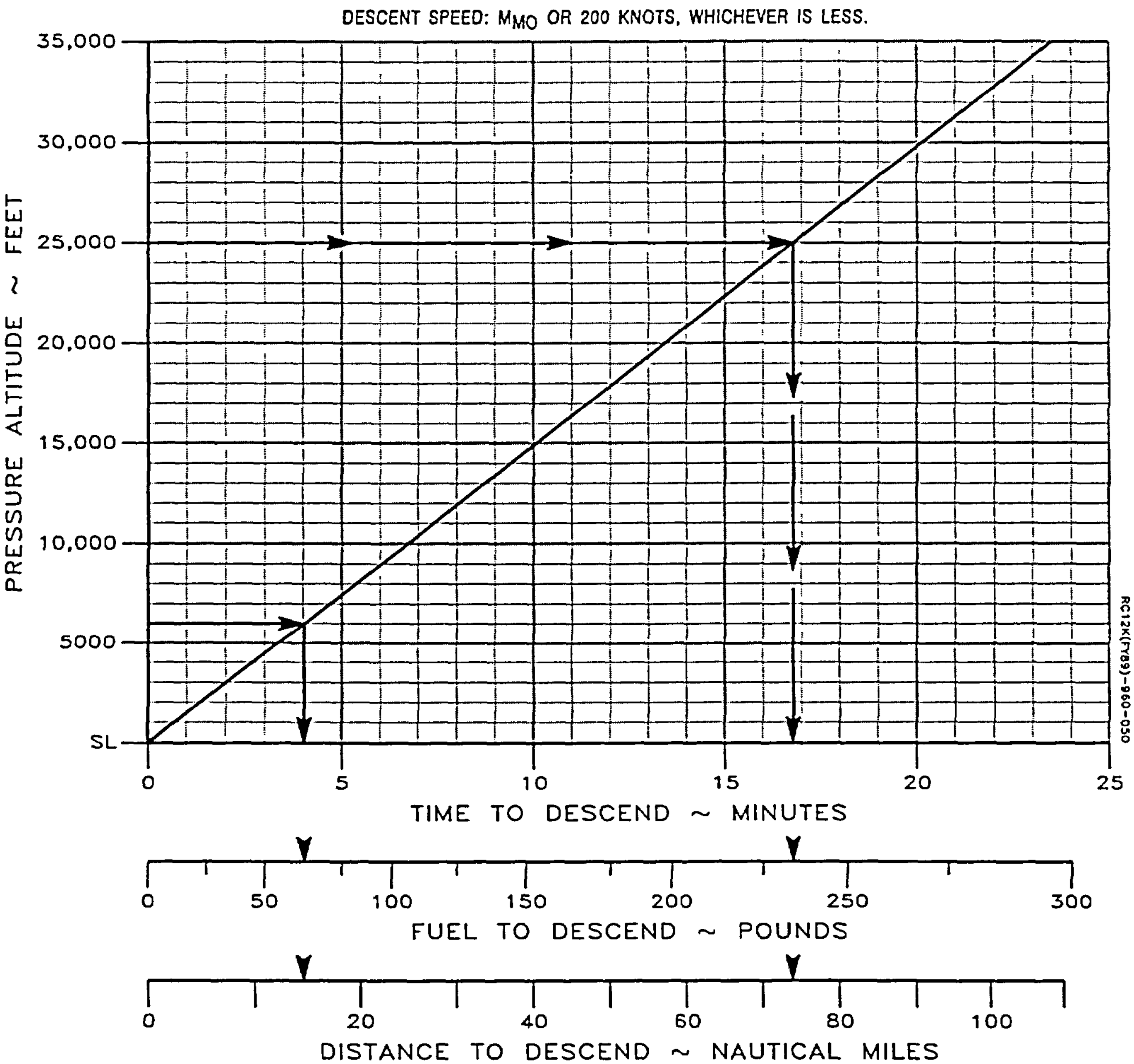


Figure 7-142. Time, Fuel, and Distance to Descend

CLIMB - BALKED LANDING

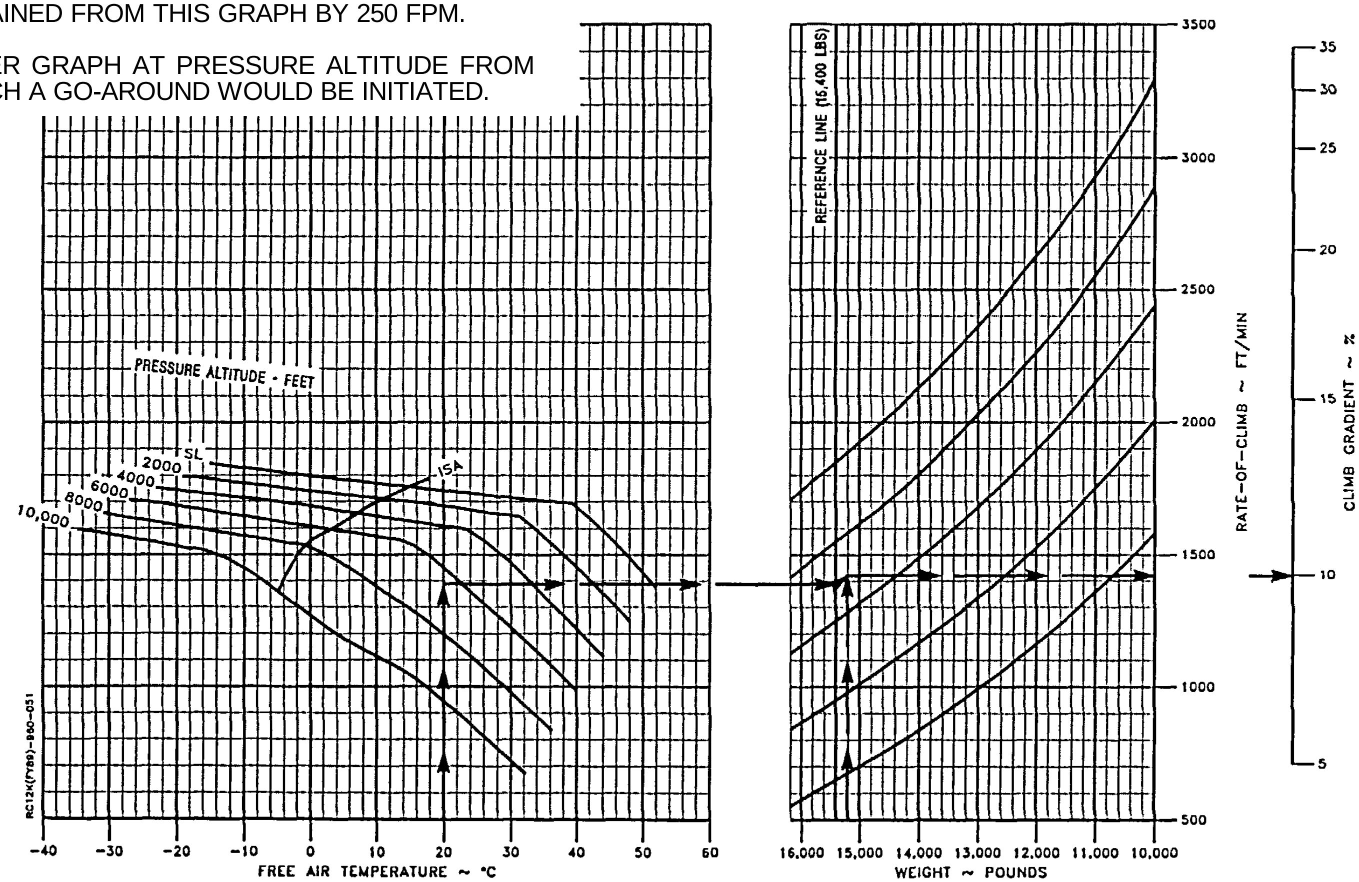
ASSOCIATED CONDITIONS:
POWER......................TAKEOFF
FLAPS.........................DOWN
LANDING GEAR..........DOWN

CLIMB SPEED: 111 KNOTS (ALL WEIGHTS)

EXAMPLE:
FAT.......................................20°C
PRESSURE ALTITUDE ....6400 FT
WEIGHT...............................15,204 LBS
RATE-OF-CLIMB...................1422 FT/MIN
CLIMB GRADIENT.................10.0 %

NOTES: 1. DURING OPERATION WITH ICE VANES EXTENDED, DECREASE THE RATE OF CLIMB OBTAINED FROM THIS GRAPH BY 250 FPM.

2. ENTER GRAPH AT PRESSURE ALTITUDE FROM WHICH A GO-AROUND WOULD BE INITIATED.



☛ CA Decrease the rate of climb obtained from this graph by approximately 130 feet per minute.

Figure 7-143. Climb - Balked Landing IR

NORMAL LANDING DISTANCE - FLAPS DOWN

ASSOCIATED CONDITIONS:
POWER..........................RETARDED TO MAINTAIN 500 FT/MIN ON FINAL APPROACH
RUNWAY.......................PAVED, DRY SURFACE
POWER LEVERS..........GROUND FINE AT TOUCHDOWN
BRAKING.......................MAXIMUM WITHOUT SLIDING TIRES
OBSTACLE HEIGHT....50 FT

APPROACH SPEED: 111 KNOTS (ALL WEIGHTS)

NOTES 1. THE WIND GRIDS INCLUDE FACTORS OF 50% FOR HEADWINDS AND 150% FOR TAILWINDS. COMPONENTS OF REPORTED WINDS MAY THEREFORE BE USED DIRECTLY IN THE GRIDS.
2. WEIGHT DOES NOT SIGNIFICANTLY AFFECT LANDING DISTANCE.

EXAMPLE'
FAT...C°20'
FIELD PRESSURE ALTITUDE.......5998 ....FT
RUNWAY GRADIENT.....................0.3% ....UP
HEADWIND COMPONENT............10 KTS
LANDING DISTANCE......................3437 ....FT

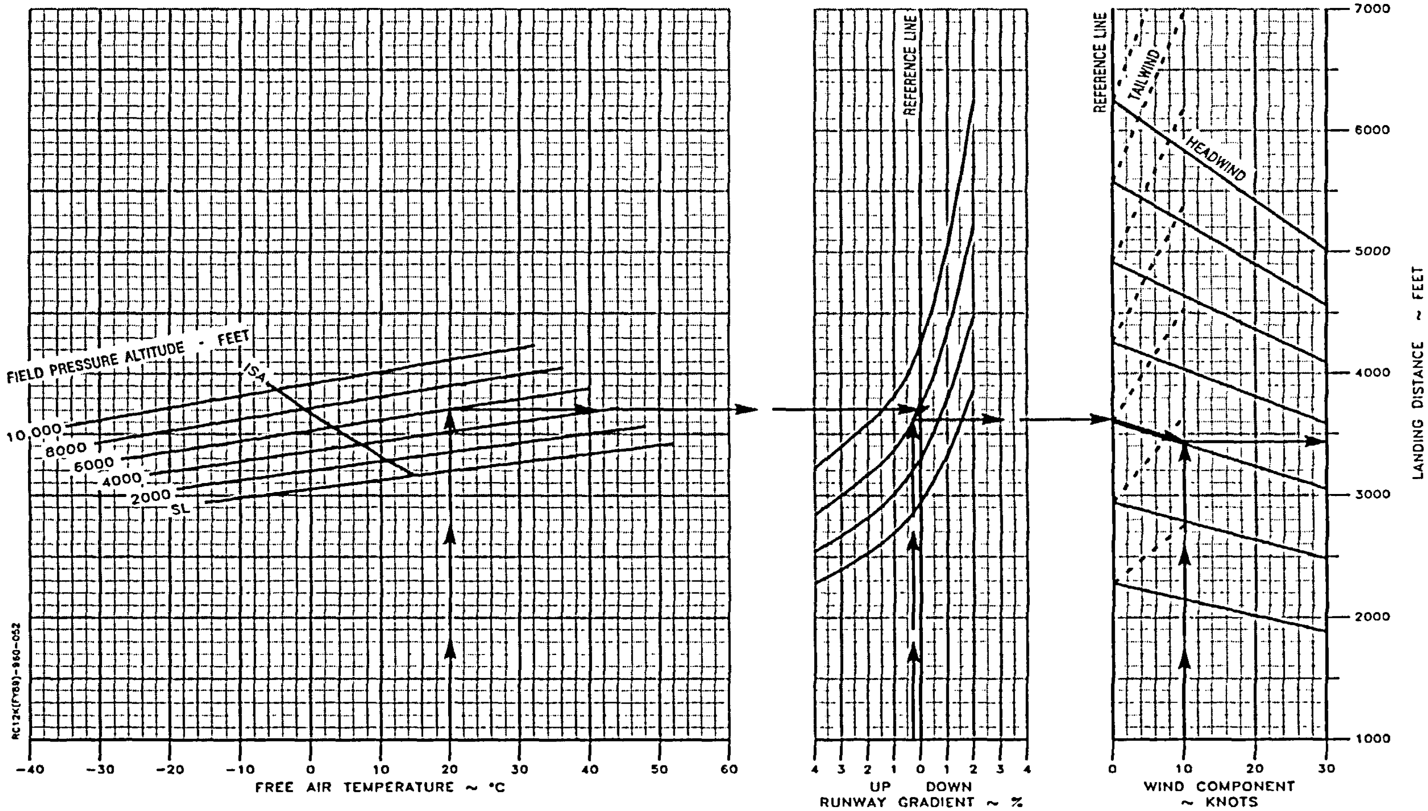


Figure 7-144. Normal Landing Distance - Flaps Down

LANDING DISTANCE - FLAPS UP

ASSOCIATED CONDITIONS:
POWER......................RETARDED TO MAINTAIN 500 FT/MIN ON FINAL APPROACH
RUNWAY....................PAVED, DRY SURFACE
APPROACH SPEED...KIAS AS TABULATED
POWER LEVERS........GROUND FINE AT TOUCH-DOWN
BRAKING....................MAXIMUM WITHOUT SLIDING TIRES
OBSTACLE HEIGHT...50 FT

WEIGHT	APPROACH SPEEDS
~POUNDS	~KNOTS
15,400	133
15.000	132
14,000	129
13.000	126
12,000	122
11,000	116
10,000	110

EXAMPLE:
FLAPS-DOWN NORMAL
LANDING DISTANCE.....................3437 FT
LANDING WEIGHT.........................5,20 4 LBS
FLAPS-UP LANDING DISTANCE...5196 FT
APPROACH SPEED.......................33 KTS

NOTES: 1. LANDING WITH FLAPS FULL DOWN IS NORMAL PROCEDURE. USE THE GRAPH BELOW WHEN IT IS NECESSARY TO LAND WITH FLAPS UP.

2. FLAPS-UP LANDINGS WITH TAILWIND OR PRESSURE ALTITUDES ABOVE 4000 FT MAY PRODUCE TIRE SPEEDS AND/OR BRAKE ENERGIES THAT EXCEED LIMITATIONS.

3. TO DETERMINE THE FLAPS-UP LANDING DISTANCE, READ FROM THE "NORMAL LANDING DISTANCE - FLAPS DOWN" GRAPH THE LANDING DISTANCE APPROPRIATE TO TEMPERATURE, ALTITUDE, RUNWAY GRADIENT, AND WIND. THEN ENTER THE GRAPH BELOW WITH THE DERIVED VALUE, AND READ THE FLAPS-UP LANDING DISTANCE.

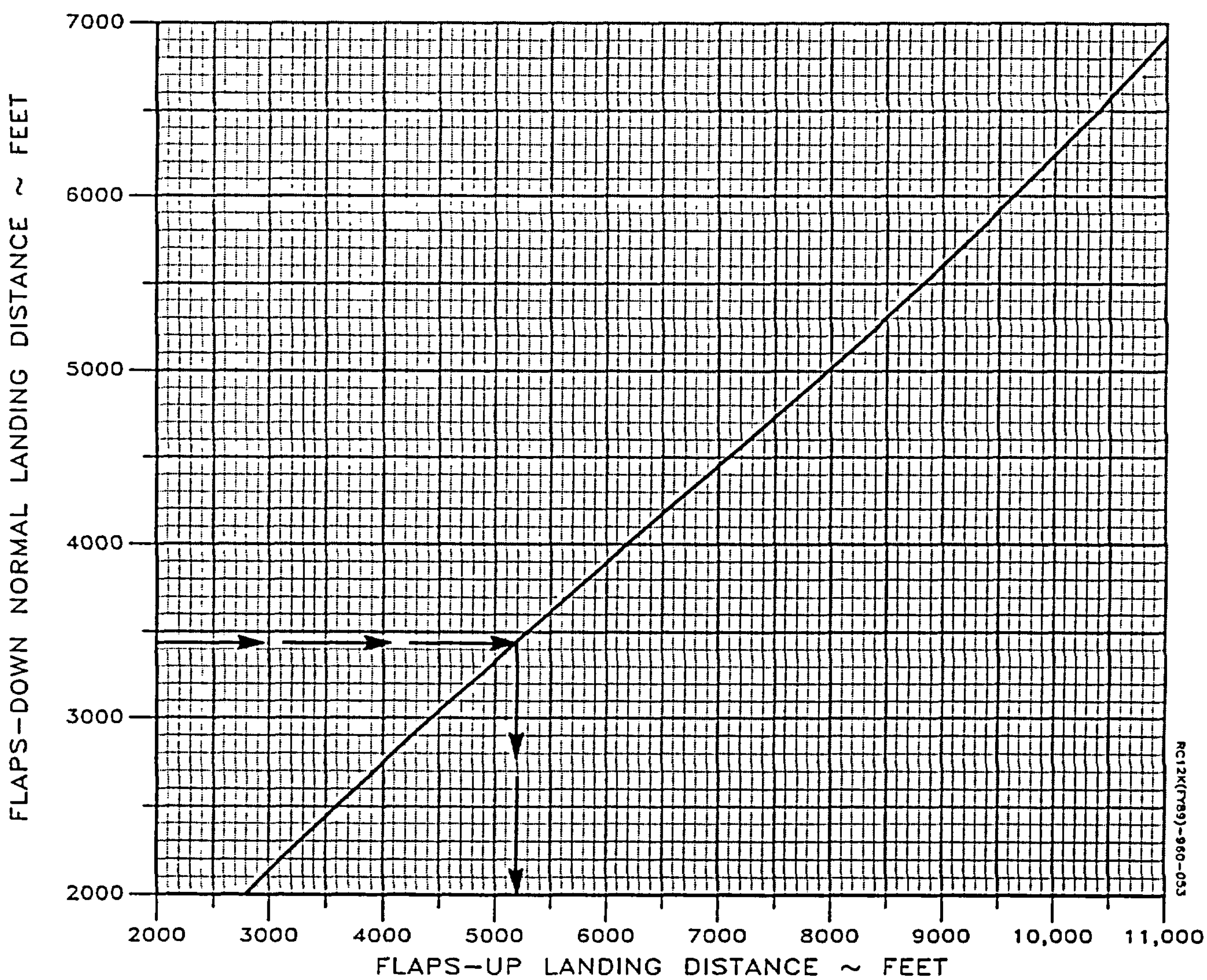


Figure 7-145. Normal Landing Distance - Flaps Up

LANDING DISTANCE - ONE ENGINE INOPERATIVE
FLAPS DOWN

APPROACH SPEED: 111 KNOTS (ALL WEIGHTS)

<u>ASSOCIATED CONDITIONS-</u>

POWER...RETARDED TO MAINTAIN 500 FT/MIN ON FINAL APPROACH
PROPELLER CONTROL'
INOPERATIVE ENGINE...............FEATHERED
RUNWAY......................................PAVED. DRY SURFACE
POWER LEVERS-
OPERATIVE ENGINE....................GROUND FINE AT TOUCHDOWN
BRAKING......................................MAXIMUM WITHOUT SLIDING TIRES
OBSTACLE HEIGHT.......................50 FT

<u>EXAMPLE:</u>

FLAPS-DOWN NORMAL LANDING DISTANCE..........................3437 FT
ONE-ENGINE-INOPERATIVE LANDING DISTANCE................4152 FT

NOTE. TO DETERMINE THE ONE-ENGINE-INOPERATIVE LANDING DISTANCE, READ FROM THE "NORMAL LANDING DISTANCE FLAPS DOWN" GRAPH THE LANDING DISTANCE APPROPRIATE TO TEMPERATURE, ALTITUDE, RUNWAY GRADIENT, AND WIND. THEN ENTER THE GRAPH BELOW WITH THE DERIVED VALUE, AND READ THE ONE-ENGINE-INOPERATIVE LANDING DISTANCE.

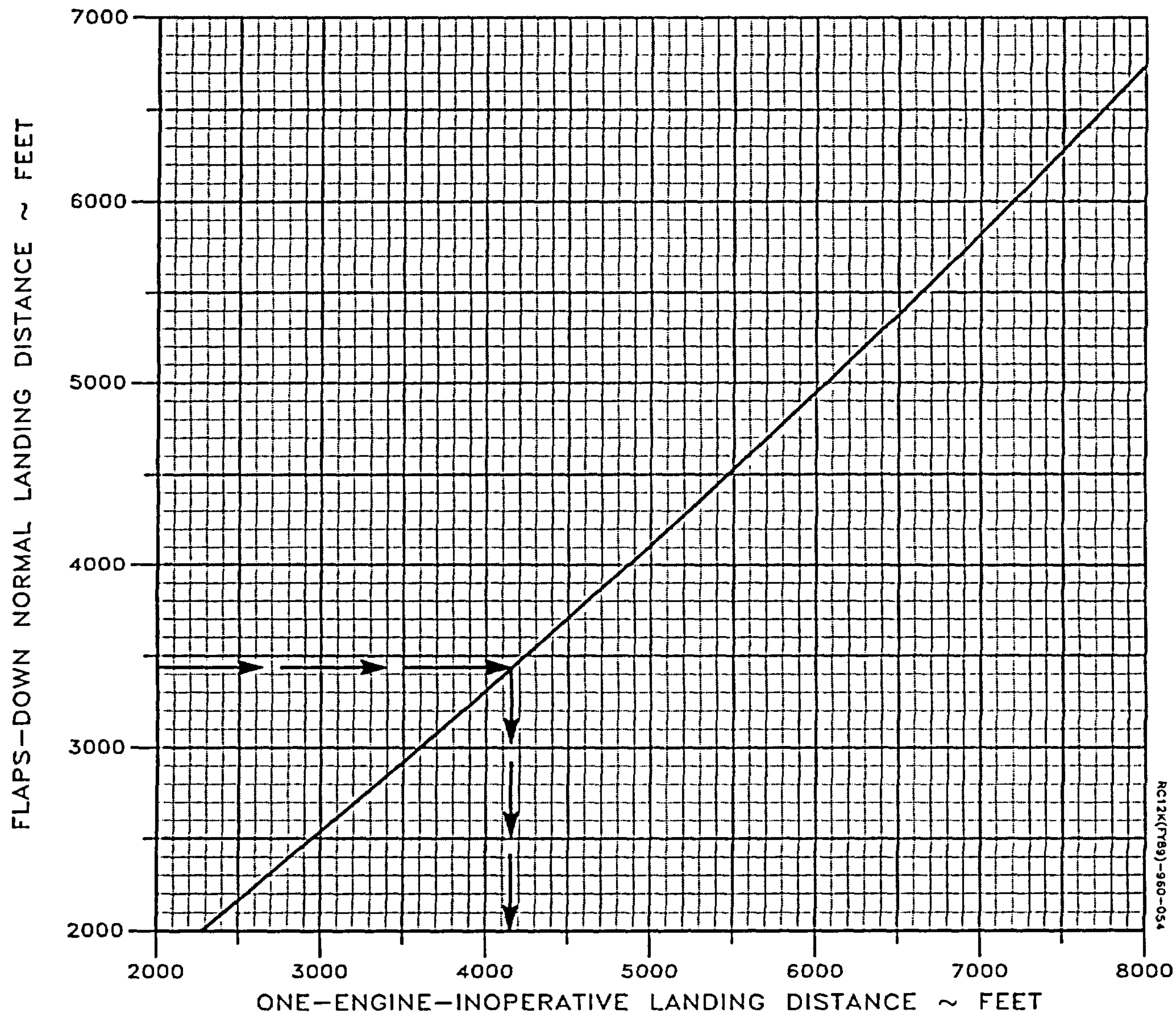


Figure 7-146. Landing Distance - One Engine Inoperative - Flaps Down

CHAPTER 8

NORMAL PROCEDURES

Section I. MISSION PLANNING

8-1. MISSION PLANNING.

Mission planning begins when the mission is assigned and extends to the preflight check of the aircraft. It includes, but is not limited to, checks of operating limits and restrictions; weight, balance, and loading; performance; publications; flight plan; and crew briefings. The pilot in command shall ensure compliance with the contents of this manual that are applicable to the mission.

8-2. AVIATION LIFE SUPPORT EQUIPMENT (ALSE).

All aviation life support equipment required for the mission shall be checked.

8-3. CREW DUTIES/RESPONSIBILITIES.

The minimum crew required to fly the aircraft is a pilot and a copilot.

a. Pilot. The pilot in command is responsible for all aspects of mission planning, preflight, and operation of the aircraft. He will assign duties and functions to all other crewmembers as required. Prior to, or during the preflight check, the pilot will brief the crew on items pertinent to the mission; e.g., performance data, monitoring of instruments, communications, emergency procedures, taxi, and loading operations.

b. Copilot. The copilot must be familiar with the pilot in command duties and will assist the pilot as directed.

8-4. CREW BRIEFING.

A crew briefing shall be conducted in accordance with Aircrew Coordination Training Requirements and Unit Standard Operating Procedures.

Section II. OPERATING PROCEDURES AND MANEUVERS

8-5. OPERATING PROCEDURES AND MANEUVERS.

This section deals with normal procedures and includes all steps necessary for safe and efficient operation of the aircraft from the time a preflight begins until the flight is completed and the aircraft is parked and secured. Unique feel, characteristics, and reaction of the aircraft during various phases of operation, and the techniques and procedures used for taxing, takeoff, climb, etc., are described, including precautions to be observed. Only the duties of the minimum crew necessary for the actual operation of the aircraft are included. For operation of avionics equipment, refer to the operating handbooks that accompany the aircraft loose tools.

8-6. SYMBOLS DEFINITION.

Items which apply only to night or only to instrument flying shall have an N or I respectively, immediately preceding the check to which it is pertinent. The symbol (O) shall be used to indicated "if installed." Those duties which are responsibility of the copilot, at the command of the pilot, will be indicated by a circle around the step number, i.e., (4) Circuit Breakers — In. The star symbol ★ indicates that an operational check is required. The asterisk symbol * indicates that performance of a step is mandatory for all thru-flights. The asterisk applies only to checks performed prior to takeoff. Placarded items appear in upper case.

8-7. CHECKLIST.

Normal procedures are given primarily in checklist form and are amplified as necessary in accompanying paragraph form when a detailed description of a procedure or maneuver is required. The condensed version of the amplified checklist is contained in the Operator's and Crewmember's Checklist, TM 1-1510-223-CL. To provide for easier cross referencing, the procedural steps are numbered to coincide with the corresponding numbered steps in this manual.

8-8. PREFLIGHT CHECK.

The pilot's walkaround and interior checks are outlined in the following procedures. The preflight check is not intended to be a detailed mechanical inspection. The steps that are essential for safe aircraft operation are included.

8-9. BEFORE EXTERIOR CHECK.

1. GPU — Connect as required.

* 2. Publications — Check DA Forms 2408-12, -13, -14, and -18, DD Form 365-4, locally required forms and publications, and availability of operator's manual (-10) and checklist (-CL).

★ 3. Oxygen system — Check that oxygen quantity is sufficient for the entire mission, that crew masks operate normally, that the diluter selector is set at 100%.

  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 mask — 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.

  h. Oxygen masks — Remove and store.

CAUTION

If high or gusty winds are present, and the flight controls are unlocked, control surfaces may be damaged by buffeting.

* 4. Flight controls — Unlock and check.

* 5. PARKING BRAKE — Set.

CAUTION

The elevator trim system shall not be forced past the limits which are shown on the PITCH TRIM indicator scale.

6. Elevator trim — Set to 0 (neutral).

CAUTION

Do not cycle LDG GEAR CONTR handle on the ground.

* 7. Gear — DN.

* 8. Keylock switch — ON.

* 9. Weather radar — OFF.

★ 10. Fuel pumps/crossfeed operation — Check as follows:

   a. FIRE PULL handles — Pull.

   b. STANDBY PUMP switches — ON.

   c. BATTERY switch — ON.

   d. #1 and #2 FUEL PRESS warning annunciators — Illuminated.

   e. FIRE PULL handles — In.

   f. #1 and #2 FUEL PRESS warning annunciators — Extinguished.

   g. STANDBY fuel pump switches — STANDBY PUMP.

   h. #1 and #2 FUEL PRESS warning annunciators — Illuminated.

   i. Crossfeed — Check system operation by activating switch momentarily left then right, noting that #1 and #2 FUEL PRESS warning annunciators extinguish and that the FUEL CROSSFEED advisory light illuminates as switch is energized.

CAUTION

During ground operation, the ice vanes shall be extended to minimize foreign object damage (FOD) to the engine.

* 11. ICE VANE CONTROL switches — Set as follows:

   a. ICE VANE POWER SELECT switches (2) — STBY.

   b. ICE VANE CONTROL switches (2) — OFF.

* 12. BATTERY switch — ON.

* 13. Lighting and anti-ice/deice systems — Check as required. Check shall include position lights, recognition lights, landing/taxi light, wing ice lights, beacons, emergency lights, pitot tubes, heated fuel vents, stall warning vane, true airspeed temperature probe, and interior lights, then off. Check ice vanes retracted.

NOTE

The EMERGENCY lights override switch should be placed in the TEST position and the emergency lights (5) checked for illumination and intensity. A dim light indicates a weak battery pack. At the completion of the check, the switch must be cycled from the TEST position to the OFF/RESET position and then placed in AUTO.

* 14. FUEL gages — Check fuel quantity and gage operation.

15. HYD FLUID SENSOR TEST switch — Depress. Check HYD FLUID LOW annunciator light illuminates after approximately 2 seconds, and extinguishes after approximately 6 seconds.

★ 16. Engine fire protection system — Check as follows:

   a. ENG FIRE TEST switches — Hold switches to DET position, check that FIRE PULL handle warning annunciators, and MASTER WARNING annunciators illuminate.

   b. ENG FIRE TEST switches — Hold switches to EXT position, check that SQUIB OK and EXTGH DISCH annunciators, and MASTER CAUTION annunciators illuminate.

NOTE

If MASTER WARNING is cancelled between tests, it may not re-illuminate.

★ 17. Stall and gear warning system — Check as follows:

   a. STALL WARN TEST switch — TEST. Check that warning horn sounds.

   b. LDG GEAR WARN TEST switch — TEST. Check that warning horn sounds and that the LDG GEAR CONTR handle warning lights illuminate.

18. GPU — Check connected and DC voltage if steps 19 through 25 are to be performed.

★ 19. Overhead control panel switches — Set as required.

a. Aircraft #1 and #2 INVERTER switches — ON.

b. AUTO PLT POWER switch — ON.

c. AVIONICS MASTER POWER switch — EXT PWR.

d. #1 and #2 EFIS POWER switches — ON.

e. ATT push-button selector switch (display controller) — Press as required.

f. Autopilot EFIS 1/2 SWITCH — 1.

★ 20. Mission control panel switches and circuit breakers — Check and set as required:

a. Mission control panel circuit breakers — Check in.

b. ANT ORIDE switch — AUTO ROTATE.

c. MISSION CONTROL switch — OFF.

d. RADIO ALT switch — ON.

e. TDOA SYSTEM switch — OFF.

f. TDOA BIT switch — OFF.

g. DATA LINK HV switch — OFF.

h. DATA LINK ANT SEL switch — AUTO.

i. BUS CROSS TIE switch — As required.

j. #2 3-phase INV switch — RESET/ON.

k. #1 3-phase INV switch — RESET/ON.

l. EXT PWR switch — OFF.

m. AC meter switch — As required.

n. ASE SILENT switch — OFF.

o. ELINT switches — OFF.

★ 21. INS Alignment — Align as required.

a. Mode switch (MFD) — Depress to select FPLN page.

b. NAV SETUP (R5) — Depress.

c. INS SETUP (R5) — Depress.

d. INS mode selector — ALIGN. Text at L1 will be blank until selector is placed in STBY or ALIGN. The 1. LAST ALIGN and 2. LAST KNOWN will appear.

e. Present position — Enter by one of these methods.

(1) To accept LAST ALIGN coordinates, SKPD 1, then depress L1.

(2) To accept LAST KNOWN coordinates, SKPD 2, then depress L1.

(3) SKPD in alignment coordinates, then depress L1.

(4) If using the Data Transfer System, load the present position by depressing SETUP DATA (L5) in the desired data set on DATA TRANSFER page.

NOTE

When L1 is depressed INS LOADING will appear at the top of the MFD and L1 text changes to ALIGN = X.DD.MM.SS Y.DDD.MM.SS and ALIGN STATE 9. It takes 6 to 9 minutes program to load. Complete the EFIS/automatic flight control system checks while waiting.

★ 22. Pilot's and copilot's EFIS TEST switches — Depress. Verify the following indications:

NOTE

For this test to be valid, the AUTO PLT POWER switch and the RADIO ALTIMETER switch must be ON.

a. EADI:

(1) Radio Altimeter — Slews to 100 +/- 10 feet.

(2) DH replaced with dashes.

(3) Marker beacon symbology appears.

(4) HDG and ATT annunciators appear.

(5) ATT FAIL annunciator appears in the center.

(6) Pitch and roll command cue (artificial horizon) — out of view.

(7) Runaway cue drops from center.

(8) GS and localizer off flags (Red X) appear.

(9) TEST will appear in the upper left corner to indicate that the flight director mode selector lamp is good.

b. EHSI.

(1) DTRK, NM, GSPD, and HDG replaces with dashes.

(2) HDG FAIL annunciator appears.

(3) Course indicator and glideslope off flags appear.

c. AP disconnect horn sounds after 5-7 seconds.

NOTE

Preflight test of the composite mode will cause the same results as the above tests, except digital heading readouts will be replaced with a red FAIL indication, and expanded localizer scale and pointer will be removed.

A localizer frequency must be tuned on both NAV receivers to enunciate ILS comparitor monitor.

EFIS test is inhibited during glideslope capture.

★ 23. Automatic flight control system — Check as follows:

a. Altitude alerter — Check as follows:

NOTE

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

(1) Altitude preselector — Set to more than 1000 feet above altitude set on the pilots' altimeter. Pilot's altimeter altitude alert annunciator should be extinguished.

(2) Pilot's altimeter barometric knob — Slowly increase pilot's altimeter setting.

(3) Altitude alerter annunciator and horn — Verify that altitude alerter annunciator on pilot's altimeter illuminates and altitude alerter horn sounds when pilot's altimeter reading is approximately 1000 feet from value set on altitude select controller.

(4) Pilot's altimeter — Reset to field elevation.

(5) Altitude preselector — Reset to field elevation.

(6) Pilot's altimeter barometric set knob — Slowly increase pilot's altimeter setting.

(7) Altitude alerter annunciator and horn — Verify that altitude alerter annunciator on pilot's altimeter illuminates and altitude horn sounds when altimeter reading is approximately 250 feet from value set on altitude alert controller.

(8) Pilot's altimeter — Reset to field elevation.

b. Flight director — Check as follows:

(1) SBY push-button switch - indicator (flight director mode selector) - Depress for at least 5 to 8 seconds and verify the following indications:

(a) Flight director mode selector — Annunciators illuminate.

(b) Autopilot controller — Annunciators illuminate.

(c) Altitude select controller — All 8's illuminate.

(d) Pilot's altimeter altitude alerter annunciator — Illuminates.

(e) EADI — FD FAIL (amber) will be annunciated.

(2) After SBY push-button switch-indicator has been held depressed for 5 to 8 seconds verify that:

(a) AP TRIM annunciator — Illuminates.

(b) Autopilot disconnect horn — Sounds.

(3) SBY push-button switch-indicator — Release.

(4) FD and ATT annunciators on the EADI — Check extinguished.

c. Autopilot — Check as follows:

(1) Autopilot trim annunciators — Check extinguished.

(2) TURN knob — Center.

(3) ELEV TRIM switch — Check ON.

NOTE

The control wheel must be held at mid-travel due to ballast in the elevator. The autopilot will disconnect during pitch wheel check due to the heavy nose down force if the control wheel is not off the forward stop.

(4) Control wheel — Move to mid-travel.

(5) AP ENGAGE switch-indicator (autopilot controller) — Depress to engage autopilot and yaw damper. Check that AP ENGAGE and YD ENGAGE switch-indicators on autopilot controller and remote annunciators on instrument panel are illuminated.

d. Autopilot overpower check — Check as follows:

(1) Rudder pedals — Overpower slowly.

(2) Control wheel — Overpower in both directions.

WARNING

If the autopilot or yaw damper disengages during the overpower test, the system is considered non-operative and should not be used. The elevator trim system must not be forced beyond the limits which are indicated on the elevator trim indicator.

e. Elevator trim follow-up — Check as follows:

(1) Control wheel — Move aft of mid-travel. Trim wheel should run nose down after approximately 3 seconds. TRIM DN annunciator (autopilot controller) should illuminate after approximately 6 to 8 seconds, and AP TRIM annunciator (instrument panel) should illuminate after approximately 15 seconds.

(2) Control wheel — Move forward of mid-travel. Trim wheel should run nose up after approximately 3 seconds. TRIM UP annunciator (autopilot controller) should illuminate after approximately 6 to 8 seconds, and AP TRIM annunciator (instrument panel) should illuminate after approximately 15 seconds.

f. AP & YD/TRIM DISC switch (control wheel) — Depress to first level. Check that autopilot and yaw damper disengage, AP ENGAGE and YD ENGAGE switch-indicators on the autopilot controller and remote annunciators above the EADIs flash 5 times.

g. Control wheel — Hold to mid-travel.

h. AP ENGAGE SWITCH — RE-ENGAGE.

i. Turn knob — Check that elevator control trim wheel follows in each applied direction, then center.

j. Pitch wheel — Check that trim responds to pitch wheel movements (UP TRIM and DN TRIM annunciators may illuminate).

k. Heading marker — Center and engage HDG. Check that control wheel follows a turn in each direction.

l. GO AROUND button (left power lever) — Depress. Check that AP disengages and FD commands a wings level, 7 degree nose up attitude. Check GA annunciator on EADI illuminates. Yaw damper should automatically engage and YD ENGAGE switch-annunciator should be illuminated on the autopilot controller and the remote annunciators above the EADIs should be illuminated.

m. RUDDER BOOST/YAW CONTROL TEST switch (pedestal extension) — TEST. Check the RUDDER BOOST annunciator above the EADIs illuminates, yaw damper disengages, TD ENGAGE switch-indicator on the autopilot controller extinguishes, and the YD ENGAGE remote annunciators above the EADIs flash 5 times.

WARNING

If the SBY annunciator on the flight director mode selector does not illuminate within 10 seconds after the avionics master switch is turned on, the autopilot has failed self-test and is considered inoperative and should not be used.

CAUTION

Do not force the elevator trim system beyond the limits which are indicator.

n. YD ENGAGE push-button switch-indicator (autopilot controller) — Depress while holding rudder boost/yaw control switch in TEST. Yaw damper should not engage.

o. RUDDER BOOST/YAW CONTROL TEST switch — RUDDER BOOST. Check RUDDER BOOST annunciator extinguished.

p. Electric elevator trim — Check.

(1) ELEV TRIM switch — ON.

WARNING

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

(2) Pilot and copilot trim switches — Check individual element for no movement of trim, then check proper operation of both elements.

(3) Pilot trim switches — Check that pilot switches override copilot switches while trimming in the opposite directions, and trim moves in the direction commanded by the pilot.

(4) Pilot or copilot trim switches — Check trim disconnects while activating pilot or copilot trim disconnect switches.

(5) ELEV TRIM switch — OFF, then ON (ELEV TRIM OFF annunciator extinguishes).

★ 24. ASE/ACS BIT checks — Perform as required.

a. UTIL on MFD — Depress.

b. SYSTEM BIT (R1) — Depress.

NOTE

Before conducting the INS BIT ensure mode selector is in ALIGN and align state 8 or lower, but before mode selector is placed in NAV.

c. INS BIT — Perform as follows:

(1) INS — Select on EHSI by depressing INS/TCN on display controller.

(2) INS — Select on single needle bearing source selector switch on display controller.

(3) INS BIT (R2) — Depress.

(4) Check indications as follows:

(a) MFD — INS BATT, INS FAIL, and WAYPOINT ALERT CWA annunciators (3) illuminate.

(b) EHSI — INS needle 30 degrees right of lubber line and course deviation bar displaced right followed by INS needle centering and course deviation bar displaced left. Check WPT alert annunciator illuminated.

(c) Aircraft caution/advisory annunciator panel — Amber INS annunciator light illuminated.

(d) INS mode controller — Green READY light and red BATT light illuminated.

(e) Mission annunciator panel — Green INS UPDATE annunciator and amber NO INS UPDATE annunciator light illuminated.

(f) After 15 seconds the text COMPLETE or any active ACTION or MALFUNCTION codes will be displayed. If any action or malfunction code is displayed they may have been cleared by the BIT test. The only way to ensure they are cleared is to conduct another BIT and the text COMPLETE appears.

★ 25. ASE/ACS Programming — Program as required.

a. Waypoint list — build as follows:

(1) Mode switch B — Depress to select FPLN page.

(2) WPT LIST (R4) — Depress. WPT numbers 10-59 are shown. The WPT select window surrounds a WPT line.

(3) Waypoint string (line number), WPT ID, and LAT/LONG (coordinates) — Enter into scratch pad.

(4) ADD/SEL (R1) — Depress to load WPT into system.

(5) If using the DTS when the desired data set is boxed on the DATA TRANSFER page — Load waypoint list using the data transfer system by depressing NAV DATA (L2).

b. Flight plan — Build as follows:

(1) WPT numbers — Enter into a scratchpad in order of desired use (up to nine) or box desired WPT's and PREV (R2) or NEXT (R3) and depress LOAD SCRATCH PAD (L5).

(2) ROUTES (R5) — Depress.

(3) Route — Select 1st, 2nd, or 3rd to enter WPT numbers by depressing the appropriate line button to store the WPTs.

(4) Routes to use as the active FPLN — Select and depress the adjacent line button to box it.

(5) NEW FPLN (L1) — Depress to activate the FPLN.

c. TACAN list — Build as follows:

(1) Mode switch B — Depress to select FPLN page.

(2) TACAN LIST (R5) line selection button — Depress.

(3) TACAN station information (list number, ID, channel number, latitude/longitude, and station elevation) — Enter into scratchpad.

(4) ADD/SEL (R1) line selection button — Depress to load into system or load TACAN list using the DTS by depressing NAV DATA (L1) on the DATA TRANSFER page.

(5) TACAN stations to be used for updating — Select and enter into scratchpad.

(6) TACAN SELECT (R4) line selector button — Depress.

d. Pattern steering mode — Program as follows:

(1) Mode switch B — Depress to select FPLN page.

(2) NAV SETUP (R5) line selection button — Depress.

(3) True bearing — Enter into scratchpad.

(4) BEARING (L1) line selection button — Depress.

(5) Leg length in NM — Enter into scratchpad.

(6) LEG LENGTH (L2) line selection button — Depress.

(7) TURN DIRECTION (L3) line selection button — Depress to select LEFT or RIGHT.

(8) Offset distance in NM — Enter into scratchpad.

(9) OFFSET (L4) line selection button — Depress.

e. Waypoint move mode — Program as follows:

(1) True bearing — Enter into scratchpad.

(2) BEARING (R1) line selection button — Depress.

(3) Range in NM — Enter into scratchpad.

(4) RANGE (R2) line selection button — Depress.

★ 26. Avionics — Check as follows:

a. VHF communication radios (#1 and #2) — Press TEST and observe the following:

(1) Normal — Dashes displayed in active display and 00 in preset display.

(2) Fault — "DIAG" in active display and a two digit fault code in preset display.

b. VHF navigation receivers (#1 and #2) — Test as follows:

(1) VOR self test/marker beacon test:

(a) Tuning knob (NAV control unit) — Select a VOR frequency.

(b) VOR/localizer push-button selector switch (display controller) — Select VOR 1 or VOR 2.

(c) Single needle bearing pointer source selector switch (display controller) — VOR 1.

(d) Double needle bearing pointer source selector switch (display controller) — VOR 2.

(e) Course knob (EHSI) — Rotate until pointer indicates 0 degrees.

(f) TEST button (NAV control unit) — Depress. Normal test will show dashes in the active window and 00 in the preset window. A fault will show DIAG in active display and a two digit fault code in the preset display.

(g) NAV flag on the EHSI — Will come into view. After two seconds, the flag will go out of view, the EHSI course deviation bar will center, and a TO indication will appear. The bearing pointers will indicate a 0 magnetic bearing. The VIR-32 will return to normal after 15 seconds.

(h) EHSI — Check for three marker beacon indications (I, O, M illuminates) and listen for a 30 Hz tone on B audio channel of intercom box.

(2) ILS self test (NAV 1 and NAV 2):

(a) Tuning knobs (NAV control unit) — Select a localizer frequency.

(b) TEST switch (NAV control unit) — Depress.

(c) NAV and GS flags on EHSI — Will come into view. After 3 seconds, the flags will go out of view, the EHSI course deviation bar will deflect 2/3 full scale, and the glideslope pointer will deflect 1-1/4 dot right and down on the glideslope and localizer pointer.

(d) VIR-32 — Will return to normal after 15 seconds.

(3) ADF receiver test:

(a) Power and mode switch — ADF.

(b) Tuning knobs (control head) — Tune a nearby NDB, compass locator, or broadcast station.

(c) EFIS display controller — Select ADF on single needle pointer bearing source selector switch.

(d) TEST switch — Depress. Bearing pointer will rotate 90 degrees from previous indication. Release TEST switch and verify bearing pointer returns to previous indications.

(4) TACAN/DME indicator system — Will conduct a self-test for 3 seconds after power-up. After 3 seconds, check for SELF TEST PASS or SELF TEST FAIL (with a fail message number).

(5) Transponder (APX-100):

(a) Mode selector — STBY.

(b) Warm-up — Allow two minutes.

(c) Mode 1 and mode 3/A codes — Set.

(d) Lamp indicators — Press to test.

(e) Antenna switch — Select to TOP.

(f) Mode selector — NORM.

(g) Modes 1, 2, 3/A and C — Hold to TEST and observe GO light.

(h) Antenna switch — Select BOT and repeat step (g).

(i) Antenna switch — Select DIV and repeat step (g).

(j) Mode 4 — Hold to TEST and observe GO light (if code has been set in external computer).

27. BATTERY switch — As required.

28. Toilet — Check condition.

29. Emergency equipment — Check that all required emergency equipment is available and that fire extinguishers and first-aid kits have current inspection date.

(O) 30. Parachutes — Check.

8-10. FUEL SAMPLE AND OIL CHECK.

NOTE

Fuel and oil quantity check may be performed prior to exterior check. During warm weather open fuel cap slowly to prevent being sprayed by fuel under thermal pressure.

* 1. Fuel sample — Check collective fuel sample from all drains for possible contamination. Thru-flight check is only required if aircraft has been refueled.

8-11. EXTERIOR CHECK.

a. Left Wing Area. Check as follows (fig. 8-1):

1. Left wing — Check.

* a. General condition — check.

b. Flaps — Check for full retraction (approximately 0.25 inch play) and skin damage, such as buckling, splitting, distortion, or dents.

c. Fuel sump drains — Check for leaks.

d. Aileron and movable trim tab — Check security and trim tab rig.

e. Outboard wing fuel vent (in aileron cove) — Check free of obstruction.

f. Static wicks (4) — Check security and condition.

g. Wing pod, navigation lights, deice boots, and antennas — Check condition.

h. Recognition light — Check condition.

i. Outboard antennas — Check condition.

* j. Main tank fuel and cap — Check fuel level visually, condition of seal, and cap tight and properly installed.

k. Outboard deice boot — Check for secure bonding, cracks, loose patches, stall strip, and condition.

l. Stall warning vane — Check freedom of movement.

* m. Tiedown — Released.

n. Inboard dipole antenna sets — Check for security and cracks at mounting points. Check bonding secure, boots free of cuts and cracks.

o. Wing ice light — Check condition.

p. AC GPU access door — Secured.

q. Recessed and heated fuel vents — Check free of obstructions.

r. Inverter inlet and exhaust louvers — Check free of obstructions.

2. Left main landing gear — Check.

* a. Tires — Check condition.

b. Brake assembly — Check. Also, check brake deice assembly and bleed air hose for condition and security.

* c. Shock strut — Check for signs of leakage, minimum strut extension (5.5 inches), and that left and right strut extension is approximately equal.

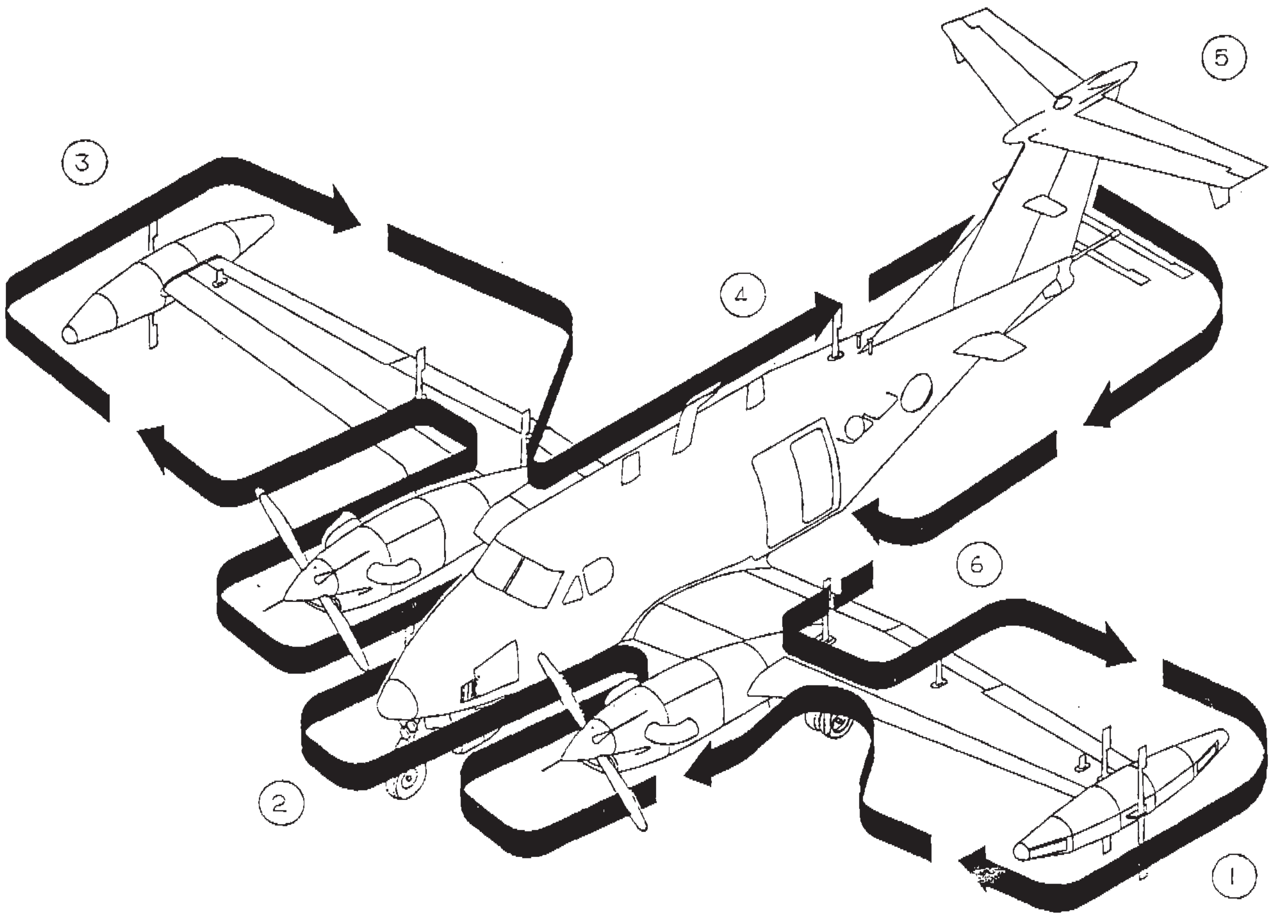
d. Torque links — Check condition.

e. Safety switch — Check condition, wire, and security.

f. Wheel, well, doors, and linkage — Check for signs of leaks, broken wires, security, and condition.

* g. Fuel sump drains (forward) — Check for leaks.

★* 3. Fire extinguisher gage pressure — Check pressure within limits (Chapter 2).



AREA 1. LEFT WING LANDING GEAR, ENGINE, NACELLE, AND PROPELLER
AREA 2. NOSE SECTION
AREA 3. RIGHT WING LANDING GEAR, ENGINE, NACELLE, AND PROPELLER
AREA 4. FUSELAGE, RIGHT SIDE
AREA 5. EMPENNAGE
AREA 6. FUSELAGE, LEFT SIDE

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Figure 8-1. Exterior Inspection

4. Left engine and propeller — Check.

CAUTION

A cold oil check is unreliable. Oil should be checked within 10 minutes after stopping engine. If more than 10 minutes have elapsed, motor engine for 40 seconds, then recheck. If more than 10 hours have elapsed, run engine for 2 minutes, then recheck. Add oil as required. Do not overfill.

* a. Engine oil — Check oil level, add as required, and oil cap secured.

b. Engine compartment, left side — Check for fuel and oil leaks, security of cap, and condition. Check door secure.

c. Left upper cowl locks — Locked.

d. Left exhaust stack — Check for cracks and free of obstruction.

e. Propeller blades and spinner — Check blade condition, security of spinner, and free propeller rotation.

f. Engine air inlets and ice vane — Check free of obstruction and ice vane extended.

g. Right upper cowl locks — Locked.

h. Right exhaust stack — Check for cracks and free of obstructions.

i. Engine compartment, right side — Check for fuel and oil leaks, and condition. Check door secure.

5. Left wing center section — Check.

* a. Auxiliary tank fuel, cap, and sight gage — Check fuel level visually, condition of seal, and cap tight and properly installed.

b. Heat exchanger inlet and outlet — Check for cracks and free of obstructions.

c. Deice boot — Check.

* d. Auxiliary tank fuel sump drain — Check for leaks.

e. Hydraulic reservoir vent and pump seal drain — Check vent clear of obstructions, and that no excessive fluid is present.

f. Monopole antenna — Check condition.

6. Fuselage underside — Check.

* a. General condition — Check for skin damage.

b. Antennas — Check security, and condition.

b. *Nose Section.* Check as follows:

1. Nose section — Check.

* a. General condition — Check.

b. Outside air temperature probe — Check condition.

c. Avionics door, left side — Check secure.

d. Air conditioner exhaust — Check free of obstruction.

e. Data link antenna radome — Check condition.

f. Wheel well condition — Check for signs of leaks, broken wires, and condition.

g. Doors and linkage — Check.

h. Nose gear turning stop — Check condition.

* i. Shock strut — Check for signs of leakage and 3.0 inches minimum extension.

j. Torque links — Check condition.

* k. Tire — Check condition.

l. Shimmy damper and linkage — Check.

m. Landing and taxi lights — Check for security and condition.

n. Pitot tubes — Check free of obstruction.

o. Radome — Check condition.

p. Windshields and wipers — Check.

q. Air conditioner inlet — Check free of obstructions.

r. Dipole antenna set — Check for security and cracks at mounting points, bonding secure, and free of cuts and cracks.

s. Avionics door, right side — Check secure.

c. *Right Wing Area.* Check as follows:

1. Right wing center section — Check.

* a. Auxiliary tank fuel, cap, and sight gage — Check fuel level visually, condition of seal, and cap tight and properly installed.

b. Battery access panel — Secure.

c. Battery exhaust louvers — Check free of obstructions.

d. Heat exchanger outlet and inlet — Check for cracks and free of obstruction.

e. Deice boot — Check.

f. Battery compartment drain — Check free of obstruction.

g. Battery ram air intake — Check free of obstruction.

h. TAS probe — Check condition and free of obstructions.

* i. Auxiliary tank fuel sump drain — Check for leaks.

j. Monopole antenna — Check.

2. Right engine and propeller — Check.

CAUTION

A cold oil check is unreliable. Oil should be checked within 10 minutes after stopping engine. If more than 10 minutes have elapsed, motor engine for 40 seconds, then recheck. If more than 10 hours have elapsed, run engine for 2 minutes, then recheck. Add oil as required. Do not overfill.

* a. Engine oil — Check oil level, add as required, and oil cap secure.

b. Engine compartment, left side — Check for fuel and oil leaks, security of oil cap, and condition. Check door secure.

c. Left upper cowl locks — Locked.

d. Left exhaust stack — Check for cracks and free of obstruction.

e. Propeller blades and spinner — Check blade condition, security of spinner, and free propeller rotation.

f. Engine air inlets and ice vane — Check free of obstruction and ice vane extended.

g. Right upper cowl locks — Locked.

h. Right exhaust stack — Check for cracks and free of obstruction.

i. Engine compartment, right side — Check for fuel and oil leaks, and condition. Check door secure.

3. Right main landing gear — Check.

* a. Tires — Check condition.

b. Brake assembly — Check. Also check brake deice assembly and bleed air hose for condition and security.

* c. Shock strut — Check for signs of leakage and minimum strut extension (5.5 inches) and that left and right strut extension is approximately equal.

d. Torque links — Check condition.

e. Safety switch — Check condition, wire, and security.

f. Wheel well, doors, and linkage — Check for signs of leaks, broken wires, security and condition.

* g. Fuel sump drains (forward) — Check for leaks.

★* 4. Fire extinguisher gage pressure — Check pressure within limits (Chapter 2).

5. Right wing — Check.

* a. General condition — Check.

b. Recessed and heated fuel vents — Check free of obstructions.

c. Inverter inlet and exhaust louvers — Check free of obstructions.

d. DC GPU access door — Secured.

e. Inboard dipole antenna sets — Check for security and cracks at mounting points, bonding secure, free of cuts and cracks.

f. Wing ice light — Check condition.

g. Outboard deice boot — Check for secure bonding, cracks, loose patches, stall strip, and condition.

* h. Tiedown — Released.

* i. Main tank fuel and cap — Check fuel level visually, condition of seal, and cap tight and properly installed.

j. Outboard antennas — Check condition.

k. Recognition light — Check condition.

l. Wing pod, navigation lights, deice boots and antennas — Check condition.

m. Static wicks (4) — Check security and condition.

n. Aileron and trim tab — Check security and condition.

o. Outboard wing fuel vent (in aileron cove) — Check free of obstruction.

* p. Fuel sump drains — Check for leaks.

q. Flaps — Check for full retraction (approximately 0.25 inch play) and skin damage, such as buckling, splitting, distortion, or dents.

r. Chaff dispenser — Check number of chaff cartridges in payload module and for security and safety pin removed.

d. Fuselage Right Side. Check as follows:

1. Fuselage right side — Check.

* a. General condition — Check.

b. Emergency light — Check condition.

c. M-130 test cap — Secure.

d. Flare/chaff dispenser — Check number of flares/chaff cartridges in payload module and for security.

e. Beacon — Check condition.

f. Fuselage underside antennas — Check condition.

g. Deleted.

h. Tailcone access door — Check secured.

i. Static ports — Check clear of obstructions.

j. P-band antenna — Check condition.

k. Oxygen filler door — Check secured.

l. APR-44 antennas — Check condition.

m. Emergency locator transmitter antenna — Check condition.

n. Stabilon and static wick — Check condition.

e. Empennage. Check as follows:

WARNING

If the possibility of ice accumulation on the horizontal stabilizer or elevator exists, takeoff will not be attempted.

1. Empennage — Check.

* a. General condition — Check.

* b. Vertical stabilizer, rudder, and trim tab — Check condition.

c. Horizontal stabilizer, taillets, elevator, and trim tab — Check condition.

d. Deice boots — Check condition.

e. Elevator trim tab — Verify 0 (neutral) position.

NOTE

Any difference between the indicated position on the trim tab position indicator and the actual position of the elevator trim tab signifies and unairworthy condition and must be corrected prior to flight.

The elevator trim tab 0 (neutral) position is determined by observing that the trailing edge of the elevator trim tab aligns with the trailing edge of the elevator, while the elevator is resting against the downstops.

f. Static wicks (16) — Check installed.

g. Position and beacon lights — Check condition.

h. Navigation antennas — Check security and condition.

i. Rotating boom dipole antennas — Check condition and position.

j. Data link antenna radome — Check condition.

f. Fuselage Left Side. Check as follows.

1. Fuselage left side — Check.

* a. General condition — Check.

b. Stabilon and static wick — Check condition.

c. P-band — Check condition.

d. Static ports — Check clear of obstruction.

e. ELT — ARMED.

f. Deleted.

g. APR-44 antennas — Check condition.

h. Emergency light — Check condition.

i. Cabin door — Check seal and condition.

j. Fuselage top side — Check general condition and antennas.

* k. Chocks and tiedowns — Check removed.

8-12. *INTERIOR CHECK.

1. Cargo/loose equipment — Check secured.

★ 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) 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.

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. Flare/chaff dispenser preflight test — Completed.

6. COMSEC keys — Loaded as required.

7. Crew briefing — As required.

8-13. BEFORE STARTING ENGINES.

* 1. Oxygen system — Set as required.

2. Circuit breakers — Check in.

* 3. Overhead panel — Check and set.

a. Light dimming controls — As required.

b. Cockpit lights (3) — As required.

c. CABIN AIR MODE SELECT switch — OFF.

d. ENG INLET LIP HEAT switches — OFF.

e. ICE VANE POWER SELECT switches (2) — MAIN.

f. ICE VANE CONTROL switches (2) — ON.

g. ICE & RAIN switches — Off.

h. Exterior light switches — As required.

i. #1 and #2 EFIS POWER switches — Off.

j. AVIONICS MASTER POWER switch — As required.

k. AUTO PLT POWER switch — Off.

l. #1 and #2 INVERTER switches — As required.

m. Environmental switches — As required.

n. AUTOFEATHER switch — OFF.

o. #1 AUTO IGNITION switch — Off.

p. #1 ENG START switch — OFF.

q. BATTERY switch — As required.

r. GENERATOR switches (2) — OFF.

s. #2 ENG START switch — OFF.

t. #2 AUTO IGNITION switch — Off.

*4. Fuel panel switches — Check.

a. STANDBY PUMP switches (2) — Off.

b. AUX XFER SWITCHES (2) — AUTO.

c. CROSSFEED switch — OFF.

5. Magnetic compass — Check for fluid, heading, and current correction card.

CAUTION

Movement of the POWER levers below the flight idle gate with the engines not operating may result in bending and damage to control linkage.

*6. Pedestal controls — Set.

a. POWER levers — IDLE.

b. PROP levers — FEATHER.

c. CONDITION levers — FUEL CUTOFF.

d. Flaps — As required.

*7. Pedestal extension switches — Set.

a. Avionics — As required.

b. RUDDER BOOST switch — On.

c. ELEV TRIM switch — On.

8. LANDING GEAR ALTERNATE EXTENSION pump handle — Stowed.

9. Free air temperature gage — Check. Note current reading.

10. Pilot's instrument panel — Check and set.

a. MIC switch — HEADSET.

b. GYRO switch — SLAVE.

c. SYM GEN REV switch — NORMAL.

d. Display controller — As required.

e. Flight instruments — Check instruments for protective glass, warning flags, and static readings.

f. PROP SYN switch — OFF.

g. Engine instruments — Check instruments for protective glass and static readings

11. Copilot's instrument panel — Check and set.

a. Flight instruments — Check instruments for protective glass, warning flags, and static readings.

b. MIC switch — HEADSET.

c. GYRO switch — SLAVE.

d. SYM GEN REV switch — NORMAL.

e. Display controller — As required.

★12. Mission control panel switches and circut breakers — As required.

a. ELINT power — OFF.

b. ELINT battery — OFF.

c. ANT ORIDE switch — AUTO.

d. MISSION CONTROL switch — OFF.

e. TDOA SYSTEM switch — OFF.

f. TDOA BIT switch — OFF.

g. DATA LINK HV switch — OFF.

h. DATA LINK ANT SEL switch — AUTO.

i. ANT STEERING selector switch — AUTO.

13. Subpanels — Check and set.

a. ENG FIRE TEST switches (2) — OFF.

b. CABIN PRESS DUMP switch — OFF.

c. Pressurization controls — As required.

d. LANDING, TAXI, and RECOG light switches — OFF.

e. LDG GEAR CONTR switch — Recheck DN.

f. CABIN LIGHTS switch — As required.

g. PILOTS STATIC AIR SOURCE — NORMAL.

CAUTION

Do not use alternate static source during takeoff and landing except in an emergency. Pilot's instruments will show a variation in airspeed and altitude.

14. AC and DC GPU — As required.

* 15. BATTERY switch — ON.

16. DC power — Check (22 VDC minimum for battery, 28 VDC maximum for GPU starts).

17. Annunciator panels — Test as follows:

a. Deleted.

b. ANNUNCIATOR TEST switch — Hold to TEST position. Check that the annunciator panels, FIRE PULL handle annunciators, ANT AZIMUTH indicator, MASTER CAUTION, and MASTER WARNING annunciators are illuminated.

c. MASTER CAUTION and MASTER WARNING annunciators — Press and release. Both annunciators should extinguish.

8-14. *FIRST ENGINE START (BATTERY START).

NOTE

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

Starting procedures are identical for both engines.

(1.) INS — OFF.

2. Exterior lights switches — As required.

3. Deleted.

4. Propeller area — Clear.

5. ENG START switch — START-IGNITION. IGN ON annunciator should illuminate and FUEL PRESS annunciator should extinguish.

NOTE

False fuel flow indications may be observed with the starter engaged and the CONDITION lever in FUEL CUTOFF.

CAUTION

If ignition does not occur within 10 seconds after moving CONDITION lever to LOW IDLE, initiate Abort Start 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.

6. CONDITION lever (after N_1 RPM passes 13% minimum) — LOW IDLE.

CAUTION

Monitor TGT to avoid a hot start. If there is a rapid rise in TGT, be prepared to abort the start before limits are exceeded. During starting, the maximum allowable TGT is 1000° C for 5 seconds. If this limit is exceeded, initiate Abort Start procedure and discontinue start. Enter the peak temperature and duration on DA Form 2408-13.

7. TGT and N_1 — Monitor (TGT 1000˚ C Maximum).

8. Oil pressure — Check (60 PSI minimum).

9. ENG START switch — OFF after TGT peaks.

10. CONDITION lever — HIGH IDLE. Monitor TGT as CONDITION lever is advanced.

11. Generator switch (operating engine) — RESET, then ON.

8-15. *SECOND ENGINE START (BATTERY START).

1. Generator load — Verify less than 50%.

2. Propeller area — Clear.

3. ENG START switch — START-IGNITION. IGN ON annunciator should illuminate and FUEL PRESS annunciator should extinguish.

4. CONDITION lever (after N_1 RPM passes 13% minimum) — LOW IDLE.

5. TGT and N_1 — Monitor (TGT 1000˚ C maximum).

6. Oil pressure — Check (60 PSI minimum).

7. ENG START switch — OFF after TGT peaks.

8. CONDITION levers — HIGH IDLE. Monitor TGT as CONDITION lever is advanced.

9. Deleted.

10. PROP levers — HIGH RPM.

11. Deleted.

12. INVERTER switches — ON, check INVERTER annunciators off.

13. Current limiters — Check as follows:

    a. BATTERY CHARGE annunciator — Check on. BATTERY CHARGE annunciator should extinguish within 5 minutes following a normal engine start on the battery.

    b. #1 and #2 INV annunciators — Check extinguished. This procedure checks both the 400 and 500 ampere current limiters that tie aircraft bus systems together.

    c. Check for generator voltage on BATT VOLT/AMP meter.

14. GENERATOR switch — Second switch RESET, then ON.

NOTE

To reset beacon light, turn off for approximately 5 seconds, then DAY or NIGHT. When voltage drops below approximately 20 VOLTS, the beacon light may become inoperative.

15. BEACON lights switch — Reset, then ON.

8-16. ABORT START PROCEDURE.

1. CONDITION lever — FUEL CUTOFF.

2. ENG START switch — STARTER ONLY.

3. TGT — Monitor for drop in temperature.

4. ENG START switch — OFF.

8-17. ENGINE CLEARING PROCEDURE.

1. CONDITION lever — FUEL CUTOFF.

2. ENG START switch — OFF (15 minutes minimum).

3. ENG START switch — STARTER ONLY.

4. ENG START switch — OFF.

8-18. *FIRST ENGINE START (GPU START).

When making a ground power unit (GPU) start, the left engine should be started first due to the GPU receptacle being adjacent to the right engine. If only one engine is started utilizing the GPU, revert to the battery start procedure for the second engine start.

★* (1.) INS mode selector switch — OFF or NAV as appropriate. After placing mode switch to NAV (state 5 or less):

   a. FPLN — Depress.

   b. NAV SETUP (R5) — Depress.

   c. INS SETUP (R5) — Depress.

   d. AUTOMIXING (R3) — Select TACAN, DL, or GPS.

   e. ROLL LIMIT (R2) — Select ON or OFF, as desired.

   f. LEG CHANGE (L3) — Select MAN or AUTO, as desired

NOTE

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

2. Exterior light switches — As required.
3. Deleted.
4. Propeller area — Clear.
5. ENG START switch — START-IGNITION IGN ON annunciator should illuminate and FUEL PRESS annunciator should extinguish.

NOTE

False fuel flow indication may be observed with the starter engaged and the CONDITION lever in FUEL CUTOFF.

CAUTION

If ignition does not occur within 10 seconds after moving CONDITION lever to LOW IDLE, initiate Abort Start 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).

6. CONDITION lever (after N_1, RPM passes 13% minimum) - LOW IDLE.

CAUTION

Monitor TGT to avoid a hot start. If there is a rapid rise in TGT, be prepared to abort the start before limits are exceeded. During engine start, the maximum allowable TGT is 1000˚ C for 5 seconds. If this limit is exceeded, initiate Abort Start procedure and discontinue start. Enter the peak temperature and duration on DA Form 2408-13.

7. TGT and N_1 — Monitor (TGT 1000˚ C maximum).
8. Oil pressure — Check (60 PSI minimum).
9. ENG START switch — Off after TGT peaks.
10. Deleted.
11. DC GPU disconnect — As required. If second engine is to be started using the operating engine's generator, use the Battery Start Procedure (Second Engine).
12. Generator switch — RESET then ON, for second engine battery start.

8-19. *SECOND ENGINE START (GPU START).

1. Propeller area — Clear.
2. ENG START switch — START-IGNITION. IGN ON annunciator should illuminate and FUEL PRESS annunciator should extinguish.
3. CONDITION lever (after N_1 RPM passes 13% minimum) — LOW IDLE.
4. TGT and N_1 — Monitor (TGT 1000˚ C maximum).
5. Oil pressure — Check (60 PSI minimum).
6. ENG START switch — OFF after TGT peaks.
7. AC and DC GPU units — Disconnect (check aircraft external power and mission external power annunciators extinguished).
8. CONDITION levers — HIGH IDLE.
9. PROP levers — HIGH RPM.
10. #1 and #2 INVERTER switches — ON. Check INVERTER annunciators extinguished.
11. GENERATOR switch (1) — Reset, then ON.
12. Current limiters — Check as follows:
    a. BATTERY CHARGE annunciator — Check on. BATTERY CHARGE annunciator should extinguish within 5 minutes following a normal engine start.
    b. #1 and #2 INV annunciators — Check extinguished. This procedure checks both 400 and 500 ampere current limiters that tie aircraft bus system together.
    c. Check for Generator voltage on BATT VOLT/AMP meter.
13. GENERATOR switch — Second switch reset, then on.

NOTE

To reset beacon light, turn OFF approximately 5 seconds, then ON. When voltage drops below approximately 20 volts, the beacon light may become inoperative.

14. BEACON lights switch — Reset, then on.

8-20. BEFORE TAXIING.

* 1. BRAKE DEICE switch — Check and set as required. Ensure both bleed air valves are open.

* 2. CABIN AIR MODE and TEMP controls — Set as desired.

NOTE

For maximum cooling on the ground, turn the PNEU & ENVIRO BLEED AIR valve switches to PNEU ONLY position. Verify airflow is present from aft cockpit eyeball outlets to ensure sufficient cooling for mission equipment.

★ 3. AC/DC Power — Check for:

a. AC frequency — 394 to 406 Hz.

b. AC voltage — 104 to 124 VAC.

c. DC voltage — 28 to 28.5 VDC.

* 4. AUTO PLT POWER switch — ON.

* 5. AVIONICS MASTER POWER switch — ON.

* 6. #1 and #2 EFIS POWER switches — ON.

★* (7.) Mission control panel switches — Set as required. For mission flight, set as follows:

a. MISSION CONTROL switch — AUTO.

b. TDOA SYSTEM switch — ON.

c. DAT LINK HV switch — STBY.

d. ELINT BATTERY switch — ON.

e. ELINT POWER switch — ON.

★ (8.) INS — Perform stored heading alignment, if required.

NOTE

Perform only if a stored heading shutdown was completed and the aircraft has not been moved. Only one stored heading alignment can be done between full alignments.

a. #1 and #2 3Ø inverters — RESET/ON.

b. BUS CROSS TIE switch — AUTO.

c. INS mode switch — NAV.

d. INS SETUP page — Enter alignment coordinates.

e. After reaching align state zero select automixing mode.

9. Weather radar — STDBY.

10. Flaps — Check.

11. Altimeters — Set and check.

8-21. *TAXIING.

Taxi speed can be effectively controlled by the use of power application and the use of the variable pitch propellers in the ground fine range with the PROP levers retarded to the FEATHER detent.

1. PROP levers — As required.

2. Brakes — Check.

3. Flight instruments — Check for normal operation.

8-22. ENGINE RUNUP.

★ (1.) Mission control panel switches — After receiving clearance from IPF, set as instructed:

a. ANT SEL switch — As required.

b. ANT STEERING switch — As required.

c. DATA LINK HV switch — ON.

d. ELINT power switch (mission status panel) — ON.

e. Mission equipment caution/advisory annunciator panel — Check for no power fault lights.

f. ANT SEL switch and ANT STEERING switches — Set AUTO when cleared by IPF.

2. Propeller feathering — Check by pulling PROP levers aft past the detent to FEATHER. Check that each propeller feathers, then advance levers to the HIGH RPM position.

★ 3. Autofeather/auto ignition — Check as follows:

a. AUTO IGNITION switches — ARM.

b. POWER levers — Approximately 25% torque.

c. AUTOFEATHER switch — Hold to TEST (both AUTOFEATHER annunciators illuminated).

d. POWER levers — Retard individually.

(1) At 13% to 19% torque — Opposite AUTOFEATHER annunciator extinguished, IGN ON annunciator illuminated.

(2) At 7% to 13% torque — Both AUTOFEATHER annunciators extinguished (propeller starts to feather).

NOTE

The POWER lever may have to be lifted and pulled towards the ground fine gate in order to attain the 7% to 13% torque.

AUTOFEATHER annunciators will illuminate and extinguish with each fluctuation of torque as the propeller feathers.

(3) Return POWER lever to approximately 25% torque.

e. Repeat above procedure with other engine.

f. AUTOFEATHER switch — ARM.

g. AUTO IGNITION switches — OFF.

★ 4. Overspeed governors and rudder boost — Check as follows:

a. Deleted.

b. Deleted.

c. Deleted.

d. Deleted.

e. Deleted.

f. Yaw damper — ENGAGE. Observe YD ENG annunciator illuminated.

g. PROP GOVERNOR TEST switch — Hold to PROP GOVERNOR TEST position.

h. Left POWER lever — Increase until propeller stabilizes at 1540 to 1580 RPM.

i. Release PROP GOVERNOR TEST switch — Observe that propeller RPM increases.

j. Continue advancing left POWER lever — At approximately 50% torque differential, YD ENG annunciator should extinguish, and left rudder pedal should start to move forward. Increasing engine power should result in increased rudder pedal travel. (Observe torque and TGT limits.)

k. Slowly retard left POWER lever — Rudder pedal travel should decrease with decreasing power. At approximately 50% torque differential, YD ENG annunciator may flicker as rudder boost system disengages.

l. Re-engage yaw damper, and repeat steps g through k with other engine.

★ 5. Primary governors — Check as follows:

a. POWER levers — Set as 1500 RPM.

b. Exercise propeller — Move to feather detent, check propeller RPM 1150 +/-50, then return to HIGH RPM.

6. Deleted.

7. Deleted.

★ 8. Engine anti-ice — Check as follows:

a. ENGINE INLET HEAT SWITCHES (2) — ON. Check #1 and #2 LIP HEAT amber caution advisory annunciator lights illuminated. After lip heats warm check that the amber caution advisory lights extinguish and the #1 and #2 LIP HEAT ON green advisory annunciators illuminate.

b. ENGINE INLET HEAT SWITCHES (2) — OFF. Check that the #1 and #2 LIP HEAT ON green advisory annunciators extinguish and the #1 and #2 LIP HEAT amber caution advisory lights illuminate. After the lip heat cools check that the amber advisory LIP HEAT LIGHTS have extinguished.

★ 9. Anti-ice and deice systems — Check as follows:

a. WINDSHIELD anti-ice switches (2) — NORMAL then HIGH. Check PILOT and COPILOT (individually) for loadmeter rise, then OFF.

b. AUTO PROP anti-ice switch — ON (momentarily). Check for PROP AMP meter shows indication and the overhead DC % LOAD meter shows a rise.

c. MANUAL PROP anti-ice switch — ON. (momentarily). Check for loadmeter rise.

d. SURFACE deice switch — SINGLE CYCLE AUTO. Check for drop in pneumatic pressure and wing deice boot inflation, and after 6 seconds for a second drop in pressure.

e. SURFACE deice switch — MANUAL. Check that surface boots inflate and remain inflated while switch is held in MANUAL. Release switch and check that the boots deflate.

f. ANTENNA deice switch — SINGLE CYCLE AUTO. Check for a drop in pneumatic pressure and antenna deice boot inflation.

g. ANTENNA deice switch — MANUAL. Check that boots inflated, and remain inflated, then OFF.

h. RADOME anti-ice switch — ON. Check for loadmeter rise and pneumatic pressure drop, then off.

★ 10. Pneumatics/vacuum/pressurization — Check as follows:

a. PNEUMATIC PRESSURE gage/GYRO SUCTION gage — Check in green arcs.

b. CABIN ALT controller — Set 500 feet lower than field pressure altitude.

c. Cabin pressurization RATE control — Set to maximum.

d. ENVIRO & PNEU BLEED AIR valve switches (2) — ENVIRO & PNEU off.

e. Pneumatic pressure gage/gyro suction gage — Check. Pressure should drop to zero.

f. BL AIR FAIL OFF annunciators (2) — Check illuminated.

g. BL AIR FAIL annunciators (2) — Check illuminated.

h. CABIN PRESS switch — TEST (hold).

i. LEFT PNEU & ENVIRO BLEED AIR valve switch — ON.

j. L BL AIR OFF annunciator — Check extinguished.

k. L and R BL AIR FAIL annunciators — Check extinguished.

l. PNEUMATIC PRESSURE gage/GYRO SUCTION gage — Check in green arc.

m. CABIN CLIMB indicator — Check for descent indication within approximately 10 - 15 seconds, then release test switch.

n. LEFT PNEU & ENVIRO BLEED AIR valve switch — Off.

o. Repeat steps i. through n. using the right bleed air valve.

p. CABIN PRESS switch — Set to pressure position (center).

q. CABIN ALT controller — Reset as required.

r. Cabin pressurization RATE control — Reset as required.

s. PNEU & ENVIRO BLEED AIR valve switches (2) — ON.

CAUTION

If windshield anti-ice is needed prior to takeoff, use NORMAL setting for a minimum of 15 minutes prior to selecting HIGH temperature to provide adequate preheating and minimize effects of thermal shock.

11. Windshield anti-ice — As required.

WARNING

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

CAUTION

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

NOTE

The weather radar system should be test before each flight on which the system is to be used.

★ 12. Weather radar — Test and set as required:

a. RADAR mode selector switch — SBY.

b. LSS mode selector switch — SBY.

c. WX push-button selector switch (display controller) — Depress. Observe that EHSI displays partial compass heading arc.

WARNING

The radar transmitter is radiating X band microwave energy when in the test (TST) mode.

d. RADAR mode selector switch — TST. Observe that WX mode annunciator on EHSI remains in STBY.

e. Range switches (radar control panel) — Depress both switches simultaneously. Observe that WX mode annunciator on EHSI changes from STBY to TEST, and that magenta, red, yellow, and green are displayed. A green noise band will appear at the upper arc range marking.

f. RADAR mode selector switch — SBY, then as required.

g. Range switches (radar control panel) 50 NM or greater.

h. LSS mode selector switch — CLR TST.

i. EHSI — Verify that a white lightning rate symbol appears at approximately 25 NM at 45 degrees right of center and a magenta lightning alert symbol is displayed at maximum selected range at 45 degrees right of center.

NOTE

While the aircraft's weight is on the wheels, the weather radar system is forced into the standby mode. This is a safety feature that prevents the radar from transmitting on the ground to eliminate the microwave radiation hazard.

8-23. * BEFORE TAKEOFF.

(1.) AUTOFEATHER switch — ARM.

(2.) PNEU & ENVIRO BLEED AIR valves (2) — As required.

CAUTION

Pitot heat should not be used for more than 15 minutes while the aircraft is on the ground. Overheating may damage the heating elements.

(3.) ICE & RAIN switches — As required. As a minimum, PITOT, STALL WARN, and FUEL VENT switches shall be ON.

(4.) Fuel panel — Check fuel quantity and switch positions.

5. Flight and engine instruments — Check for normal indications and EFIS display controller is set to desired setting.

(6.) CABIN CONTROLLER — Set.

7. Annunciator panels — Check (note indications).

8. Flaps — As required.

9. Trim — Set.

(10.) ASE/ACS — Set.

(11.) Avionics — Set.

12. Flight controls — Check.

★ 13. Departure briefing — Complete.

8-24. * LINE UP.

(1.) Engine anti-ice — As required.

(2.) Engine AUTO IGNITION switches — ARM.

3. PROP levers — HIGH RPM.

4. Altitude alerter — Check. Set as required.

5. Transponder — As required.

6. Lights — As required.

NOTE

Landing lights may be used for takeoff to assist in avoiding bird strikes and to make the aircraft more visible while operating in congested areas.

8-25. TAKEOFF.

To aid in planning the takeoff and to obtain maximum aircraft performance, make full use of the information affecting takeoff shown in Chapter 7. The data shown is achieved by setting brakes, setting static takeoff power, and then releasing brakes. Normal takeoff may be modified by starting the takeoff roll prior to attaining takeoff power. This will result in a smoother takeoff, but will invalidate all subsequent field performance data.

a. Normal Takeoff. After the Line Up check is complete, smoothly apply power to the setting determined from the appropriate Static Takeoff Power at 1700 RPM chart. Release brakes and maintain directional control with nose-wheel steering and rudder, while maintaining wings level with ailerons. The pilot should retain a light hold on the power levers through the takeoff and be ready to initiate abort procedures if required. The copilot should ensure that the AUTOFEATHER advisory lights are illuminated and monitor engine torque during the takeoff roll. As the aircraft accelerates, engine torque will increase, but should not exceed engine limits (torque or TGT). As the copilot calls V_1, the pilot will remove his hand from the POWER levers. The copilot will call rotate at V_1, and the pilot will commence a smooth, positive aircraft rotation to an indicated pitch attitude of 7°. When two positive climb indications are observed, the landing gear will be retracted.

b. Crosswind Takeoff. Position the aileron control into the wind at the start of the takeoff roll to maintain a wings level attitude. Under strong crosswind conditions, leading with upwind power at the beginning of the takeoff roll will assist in maintaining directional control. As the nosewheel comes off the ground, the rudder is used as necessary to prevent turning (crabbing) into the wind. Rotate in a positive manner to keep from side-skipping as weight is lifted from the shock struts. To prevent damage to the landing gear, in the event that the aircraft were to settle back onto the runway, remain in slipping flight until well clear of the ground, then crab into the wind to continue a straight flight path.

c. Minimum Run Takeoff. Not applicable.

d. Obstacle Clearance Climb. Follow procedure as outlined for a normal takeoff, as described in Chapter 7.

8-26. 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.

With both engines operating, the aircraft will rapidly accelerate through V_2. Allow the aircraft to continue accelerating to the two engine climb speed, or the cruise climb schedule, as applicable. Retract the flaps when safely airborne. The procedural steps are as follows:

1. Gear — UP.

2. Flaps — UP.

3. Landing lights — OFF.

CAUTION

Turn windshield anti-ice on to normal when passing 10,000 feet AGL or prior to entering the freezing level (whichever comes first). Leave on until no longer required during descent for landing. High temperature may be selected as required after a minimum warm-up period of 15 minutes.

4. Windshield anti-ice — As required.

8-27. CLIMB.

Cruise climb is performed at a speed which provides a good rate-of-climb. Propellers should be kept at 1700 RPM. Lower propeller RPMs will reduce the amount of cabin noise, but will degrade the aircraft climb performance. The following chart may be used as an airspeed schedule.

NOTE

To increase visibility and safety when operating in high density traffic areas, a climb speed of 160 KIAS to 10,000 feet MSL may be used.

SL to 10,000	135 KIAS
10,000 to 20,000 FEET	130 KIAS
20,000 to 25,000 FEET	125 KIAS
25,000 to 35,000 FEET	120 KIAS

NOTE

The maximum rate of climb performance is obtained by setting maximum continuous power and maintaining two-engine climb speed.

1. Climb power — Set.
2. Propeller synchronization — As required.
3. Yaw damper — ENGAGE (required above 17,000 ft).
4. BRAKE DEICE switch — As required.
5. ICE VANE CONTROL switches — As required.
6. STANDBY PUMP switches — As required (refer to Chapter 5).
7. Cabin pressurization — Check. Adjust rate control knob so that cabin rate-of-climb equals one third of aircraft rate-of-climb.
8. Wings and center section — Check for security and no fuel/oil leaks.
9. Flare/chaff dispenser safety pin — Remove, as required.
10. ASE — As required.
11. Radio altimeter — As required.

8-28. CRUISE.

Refer to Chapter 7 for airspeed, power settings, and fuel flow information. The following procedures are to be used for Cruise configuration:

1. Power — Set.
2. ICE & RAIN switches — As required.
3. AUTOFEATHER — As required.
4. Auxiliary fuel gages — Monitor.
5. Altimeters — Check.
6. Engine instrument indications — Noted.
7. RECOG lights — As required.

8-29. DESCENT.

Descent from cruising altitude should normally be made by letting down at cruise airspeed with reduced power (Refer to Chapter 7 for performance data).

NOTE

Cabin altitude and rate-of-climb controller should be adjusted prior to starting descent.

If required to descend at a low airspeed (e.g., to conserve airspace or minimize turbulence), approach flaps and landing gear may be extended to increase the rate and angle of descent while maintaining the slower airspeed.

8-30. DESCENT-ARRIVAL.

Refer to Chapter 7 for performance data. Perform the following checks prior to the final descent for landing:

WARNING

V_{mo} may be easily exceeded when descending from high altitude. The pilot should frequently cross check the airspeed to avoid exceeding $V_{mo.}$ Exceeding V_{mo} could result in structural failure and loss of airframe integrity.

1. CABIN CONTROLLER — Set.
2. ICE & RAIN switches — As required.
3. Windshield anti-ice — As required.

CAUTION

Set windshield anti-ice to NORMAL or HIGH as required well before descent into icing conditions or into warm moist air to aid in defogging. Turn off windshield anti-ice when descent is completed to lower altitudes and when heating is no longer required. This will preclude possible wind screen distortions.

4. RECOG lights — On.
5. Altimeters — Set to current altimeter setting.
6. Radio altimeter — ON.
7. ASE — As required.
8. Flare/chaff dispenser safety pin — Insert.
9. Avionics and EFIS display controller — Set and check. Ensure EFIS displays match procedure to be flown.

★ 10. Arrival briefing — Complete.

8-31. BEFORE LANDING.

1. PROP SYN switch — As required.
2. PROP levers — As required.
3. Flaps (below 197 KIAS) — APPROACH.
4. Gear (below 179 KIAS) — DN.
5. Landing lights — As required.
6. AUTOFEATHER switch — ARM.
7. ICE VANE CONTROL switches — As required.
8. BRAKE DEICE switch — As required.
9. ANT STOWED annunciator light — Check illuminated.

8-32. LANDING.

CAUTION

The maximum demonstrated crosswind component is 20 knots at 90°. Landing the aircraft in a crab will impose side loads on the landing gear and should be recorded on DA Form 2408-13.

a. Normal Landing. Refer to Chapter 7 for performance data. When landing is assured:

1. Autopilot and yaw damper — Disengage.
2. GEAR DOWN annunciators — Check.
3. PROP levers — HIGH RPM.

b. Crosswind Landing. Refer to Chapter 7 for recommended V_{ref} speeds. Use the crab into the wind method to correct for drift during final approach. The crab is changed to a slip (aileron into wind and top rudder) to correct for drift during flare and touchdown. After landing, position ailerons as required to correct for crosswind effect. For crosswind exceeding the published limits, a combination slip and crab method at touchdown should be used.

c. Soft Field Landing. Not applicable.

8-33. TOUCH AND GO/STOP AND GO LANDING.

When a touch and go landing is to be performed, the following procedures shall be used:

1. PROP levers — HIGH RPM.
2. Flaps — As required.
3. Trim — Set.
4. Power stabilized — Check 25% minimum.
5. Takeoff power — Set.

8-34. GO-AROUND.

When a go-around is commenced prior to the LANDING check, use power as required to climb to, or maintain, the desired altitude and airspeed. If the go-around is started after the LANDING check has been performed, apply maximum allowable power, retract the flaps to APPROACH, and simultaneously increase pitch attitude to stop the descent. Retract the landing gear after ensuring that the aircraft will not touch the ground. Accelerate to two engine climb airspeed, retracting flaps fully after attaining V_{ref}.

1. Power — Maximum allowable.
2. Deleted.
3. Gear — UP.
4. Flaps — UP.
5. Landing lights — OFF.
6. Climb power — Set.
7. BRAKE DEICE switch — Off.

8-35. AFTER LANDING.

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

1. Deleted.
2. PROP levers — Retard to FEATHER detent.
3. ICE VANE CONTROL switches — ON.
4. Engine AUTO IGNITION switches — Off.
5. ICE & RAIN switches — Off.
6. Flaps — UP.
7. Radar/transponder — As required.
8. Lights — As required.

★ 9. Mission control panel switches — Set as follows:

a. ELINT power switch (mission status panel) — OFF.

b. ELINT battery switch (mission status panel) — OFF.

c. DATA LINK HV switch — STBY (2 minutes, then OFF).

d. TDOA SYSTEM switch — OFF.

e. MISSION CONTROL ORIDE switch — OFF.

8-36. ENGINE SHUTDOWN.

NOTE

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

1. PARKING BRAKE — Set.
2. LANDING/TAXI lights — OFF.
3. INS — OFF.
4. Mission equipment — Set and check as follows;

   a. #1 and #2 INV switches — OFF.

   b. BUS CROSS TIE switch — OFF.

   c. KG-45 switch — ZEROIZE.
5. CABIN AIR MODE switch — OFF.
6. FWD and AFT VENT BLOWER switches — AUTO.
7. AUTOFEATHER switch — OFF.
8. Inverter switches (2) — Off.
9. AUTO PLT POWER switch — Off.
10. #1 and #2 EFIS POWER switches — Off.
11. BRAKE DEICE switch — Off.
12. Battery condition — Check.
13. TGT — Check stabilized for 1 minute prior to shutdown.
14. POWER levers — Flight IDLE.
15. PROP levers — FEATHER.

CAUTION

Monitor TGT during shutdown, if sustained combustion is observed, proceed immediately to Abort Start Procedure.

16. CONDITION levers — FUEL CUTOFF.
17. Oxygen system — OFF.

WARNING

Do not turn exterior lights off until propeller's rotation has stopped.

18. COCKPIT LIGHTS switches — OFF.
19. AVIONICS MASTER POWER switch — Off.
20. EXTERIOR LTS — Off.
21. MASTER SWITCH — OFF.
22. Keylock switch — As required.

8-37. BEFORE LEAVING AIRCRAFT.

NOTE

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

1. Wheels — Chocked.
2. PARKING BRAKE — As required.
3. Flight controls — Locked.
4. STANDBY PUMP switches — Off.
5. COMSEC — Zeroize as required.
6. Windows — As required.
7. Emergency exit lock — As required.
8. Aft cabin lights — OFF.
9. Door light — OFF.
10. Walk-around inspection — Complete.
11. Aircraft forms — Complete.
12. Aircraft — Check secured.

Section III. INSTRUMENT FLIGHT

8-38. GENERAL.

This aircraft is qualified for operation under instrument flight meteorological conditions. Handling characteristics, stability characteristics, and range are the same during instrument flight conditions as when under visual flight conditions.

8-39. INSTRUMENT FLIGHT PROCEDURES.

Refer to FM 1-240; DOD FLIP; AR 95-1; and procedures described in this manual or applicable foreign regulations.

8-40. INSTRUMENT TAKEOFF.

NOTE

If the GO AROUND button is depressed to set a 7 degree takeoff command, the yaw damper will engage.

Complete the normal checks prescribed in this chapter. Follow takeoff procedures dictated by local conditions.

8-41. AUTOPILOT COUPLED APPROACHES.

The recommended airspeed for autopilot coupled approaches is 130 KIAS.

Section IV. FLIGHT CHARACTERISTICS

8-42. STALLS.

A prestall warning in the form of light buffeting may be felt when approaching a stall. An aural warning is also provided by the warning horn. The warning horn will begin to sound approximately 5 to 19 knots above power off stall speed, depending on aircraft configuration, altitude, and power. If correct stall recovery technique is used, very little altitude will be lost during the stall recovery. For the purpose of this section, the term Power On means that both engines and propellers of the aircraft are operating normally and are responsive to pilot control. The term Power Off means that both engines are operating at idle power. During practice, enter power off stalls from normal glides. Enter power on stalls by smoothly increasing pitch attitude to a climb attitude obviously impossible for the aircraft to maintain, and hold that attitude until the stall occurs.

a. Power On Stalls. The power on stall attitude is very steep and unless this high pitch attitude is maintained, the aircraft will generally settle or mush instead of stall. It is difficult to stall the aircraft inadvertently in any normal maneuver. A light buffet precedes the stall, and the first indication of approaching stall is generally a decrease in control effectiveness, accompanied by a tone from the stall warning horn. The stall itself is characterized by a rolling tendency if the aircraft is allowed to yaw. The proper use of rudder will minimize the tendency to roll. A slight pitching tendency will develop if the aircraft is held in the stall, resulting in the nose dropping slightly, then pitching up toward the horizon; this cycle is repeated until recovery is made. Control is regained very quickly with little altitude loss, providing the nose is not lowered excessively. Begin recovery with forward movement of the control wheel and a gradual return to level flight. The roll tendency caused by yaw is more pronounced in power on stalls, as is the pitching tendency.

b. Power Off Stalls. The rolling tendency is considerably less pronounced in power off stalls (in any configuration), and is more easily prevented or corrected by adequate rudder and aileron control, respectively. The nose will generally drop straight through with some tendency to pitch up again if recovery is not made immediately. The Stall Speed graph (fig. 8-2) shows the indicated power off stall speeds with aircraft in various configurations. Altitude loss during a full stall may be as high as 1270 feet.

c. Accelerated Stalls. The aircraft gives noticeable stall warning in the form of buffeting when the stall occurs. The stall warning and buffet can be demonstrated in turns by applying excessive back pressure on the control wheel.

8-43. SPINS.

Intentional spins are prohibited. If a spin is inadvertently entered use the following recovery procedure:

WARNING

Spin demonstrations have not been conducted. The recovery technique is based on the best available information.

The first three actions should be performed as nearly simultaneously as possible.

1. POWER levers — IDLE.
2. Apply full rudder opposite direction of spin rotation.
3. Simultaneously with rudder application, push control wheel forward and neutralize ailerons.

4. When rotation stops, neutralize rudder.

WARNING

Do not pull out of the resulting dive too abruptly as this could cause excessive wing loads and a possible secondary stall.

5. Pull out of dive by exerting a smooth, steady back pressure on control wheel, avoiding an accelerated stall and excessive aircraft stresses.

8-44. MANEUVERING FLIGHT.

Maneuvering speed (V_a) is the maximum speed at which abrupt full control inputs can be applied without exceeding the design load on the aircraft as shown in Chapter 5. The data is based on 16,200 pounds and there are no additional restrictions below this weight. There are no unusual characteristics under accelerated flight.

8-45. FLIGHT CONTROLS.

The aircraft is stable under all normal flight conditions. Aileron, elevator, rudder, and trim tab controls function effectively throughout all normal flight conditions. Elevator control forces are relatively light in the extreme aft CG (center of gravity) condition, progressing to moderately high with CG at the forward limit. Extending and retracting the landing gear causes only slight changes in control pressure. Control pressures, resulting from changes in power settings or the repositioning of the wing flaps are not excessive in the landing configuration at the most forward CG. The minimum speed at which the aircraft can be fully trimmed is 106 KIAS (gear and flaps down, propellers at high RPM). Control forces produced by changes in speed, power setting, wing flap position and landing gear position are light and can be overcome with one hand on the control wheel. Trim tabs permit the pilot to reduce these forces to zero. During single engine operation, the rudder boost system aids in relieving the relatively high rudder pressures resulting from the large variation in power.

8-46. LEVEL FLIGHT CHARACTERISTICS.

All flight characteristics are conventional throughout the level flight speed range.

STALL SPEEDS - POWER IDLE

NOTES:
1. ALTITUDE LOSS EXPERIENCED WHILE CONDUCTING STALLS IN ACCORDANCE WITH FAR 23.201 WAS 1270 FEET.
2. MAXIMUM NOSE-DOWN PITCH ATTITUDE AND ALTITUDE LOSS DURING RECOVERY FROM ONE-ENGINE-INOPERATIVE STALL PER FAR 23.205 ARE APPROXIMATELY 26° AND 1030 FEET RESPECTIVELY.
3. A NORMAL STALL RECOVERY TECHNIQUE MAY BE USED. THE BEST PROCEDURE IS A BRISK FORWARD WHEEL MOVEMENT TO A NOSE DOWN ATTITUDE. LEVEL THE AIRPLANE AFTER AIRSPEED HAS INCREASED APPROXIMATELY 25 KNOTS ABOVE STALL.
4. LANDING GEAR POSITION HAS NO EFFECT ON STALL SPEED.

EXAMPLE:

WEIGHT . . . . 11,000 LBS
FLAPS . . . . APPROACH
ANGLE OF BANK . . . 30°
STALL SPEED . . . . . . 78.9 KIAS

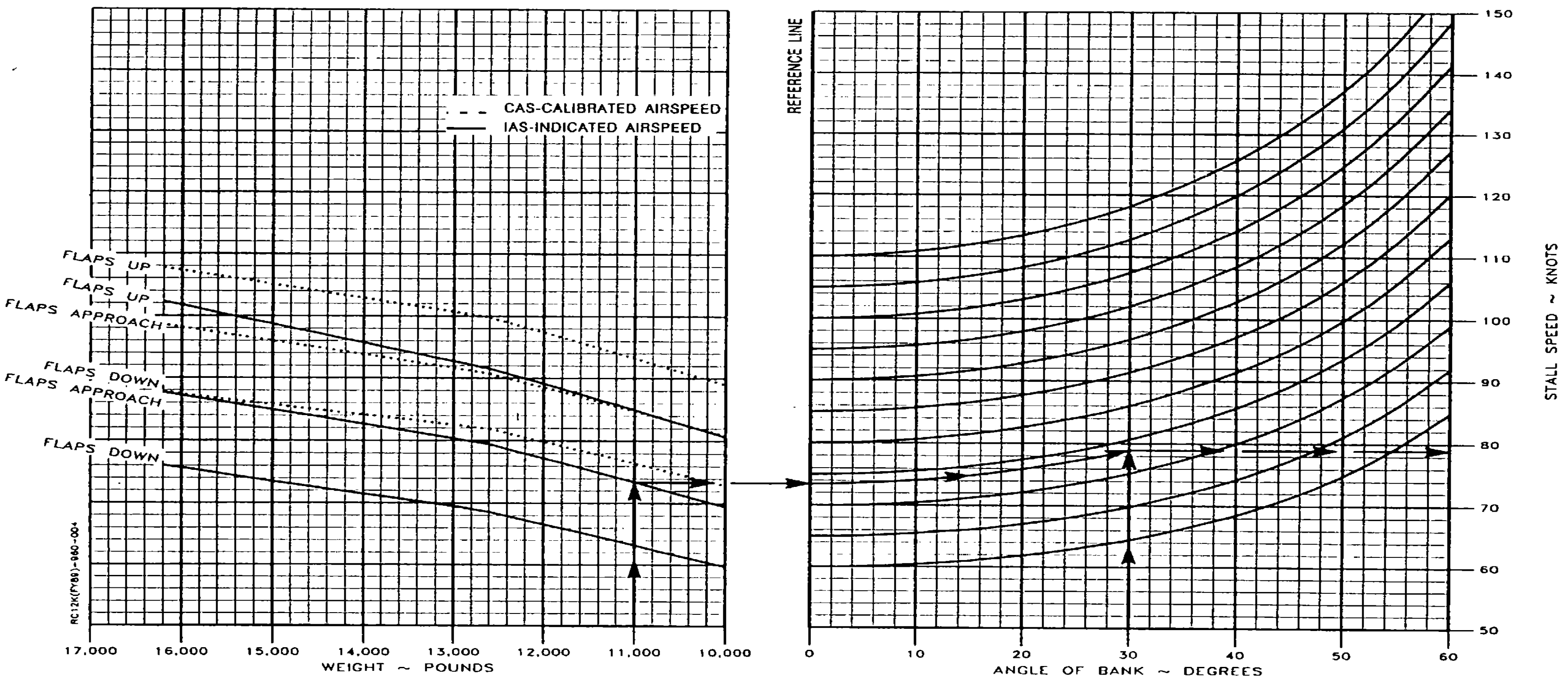

Figure 8-2. Stall Speeds - Power Idle

Section V. ADVERSE ENVIRONMENTAL CONDITIONS

8-47. INTRODUCTION.

The purpose of this section is to inform the pilot of the special precautions and procedures to be followed during the various weather conditions that may be encountered in flight This section is primarily narrative, only those checklists that cover specific procedures characteristic of weather operations are included. The checklist in Section II provides for adverse environmental operations.

8-48. COLD WEATHER OPERATIONS.

WARNING

To ensure adequate bleed air pressure to the deice boots, do not simultaneously actuate the surface and antenna deice systems in the manual mode.

CAUTION

Operation of the surface deice system in ambient temperatures below -40 ° C can cause permanent damage to the deice boots.

NOTE

Under conditions where one bleed air source is inoperative, sufficient bleed air pressure for deice boot inflation may not be available. Prior to deice boot inflation, check the regulated bleed air pressure gage for a minimum of 16 PSI. If insufficient pressure exists, increasing engine N, and/or decreasing aircraft altitude will increase bleed air pressure.

Operational difficulties mav be encountered during extremely cold weather, unless proper steps are taken prior to, or immediately after flight All personnel should understand and be fully aware of the necessary procedures and precautions involved.

a. Preparation For Flight. Accumulations of snow, ice, or frost on aircraft surfaces will adversely affect takeoff distance, climb performance, and stall speed to a dangerous degree. Such accumulations must be removed before flight In addition to the normal exterior checks, following the removal of ice, snow, or frost, inspect wing and empennage surfaces to verify that these remain sufficiently cleared. Also, move all control surfaces to confirm full freedom of movement Ensure that tires are not frozen to wheel chocks or to the ground. Use ground heaters, anti-ice solution, or brake deice to free frozen tires. When heat is applied to release tires, the temperature should not exceed 71° C (160° F). Refer Chapter 2 for anti-icing, deicing, and defrosting treatment.

b. Engine Starting. When starting engines on ramps covered with ice, PROP levers should be in the FEATHER position to prevent the tires from sliding.

c. Warm-up and Ground Test. Warm-up procedures and ground test are the same as those outlined in Section II.

d. Taxiing. Whenever possible, taxiing in deep snow, light weight dry snow, or slush should be avoided, particularly in colder FAT conditions. If it is necessary to taxi through snow or slush, do not set the parking brake when stopped If possible, do not park the aircraft in snow or slush deep enough to reach the brake assemblies. Chocks or sandbags should be used to prevent the aircraft from rolling while parked. Before attempting to taxi, activate the brake deice system, ensure that the bleed air valves are open and that the condition levers are in HIGH IDLE An outside observer should visually check wheel rotation to ensure brake assemblies have been deiced.

e. Before Takeoff.

(*1*) If icing conditions are expected, activate all anti-ice systems before takeoff, allowing sufficient time for the equipment to become effective.

(*2*) If the possibility of ice accumulation on the horizontal stabilizer or elevator exists, takeoff will not be attempted.

f. Takeoff. Takeoff procedures for cold weather operations are the same as for normal takeoff. Taking off with temperature at or below freezing, with water, slush, or snow on the runway, can cause ice to accumulate on the landing gear and can throw ice into the wheel well areas. Such takeoffs shall be made with brake deice on and with the ice vanes extended. Before flight into icing conditions, the pilot and copilot WINDSHIELD anti-ice switches should be set to the NORMAL position.

g. During Flight.

(1) After takeoff from a runway covered with snow or slush, it may be advisable to leave brake deice ON to dislodge ice accumulated from the spray of slush or

water. Monitor BRAKE DEICE ON ammunciator for automatic termination of system operation and then turn the switch OFF. During flight, trim tabs and controls should also be exercised periodically to prevent freeing. Ensure that anti-icing systems are activated before entering icing conditions. Do not activate the surface deice system until ice has accumulated at least 0.5 INCH The propeller deice system operates effectively as an anti-ice system and it may be operated continuously in flight If propeller imbalance due to ice does occur, it may be relieved by increasing RPM briefly, then returning to desired setting.

Ice vanes must be extended when opening in visible moisture or when freedom from visible moisture cannot be assured, at +5°C FAT or less. Ice vanes are designed as an anti-ice system, not a deice system. After the engine air inlet screens are blocked, lowering the ice vanes will not rectify the condition

(2) Stalling airspeeds should be expected to increase when ice has accumulated on the aircraft causing distortion of the wing airfoil. For the same reason, stall warning devices are not accurate and should not be relied upon. Keep a comfortable margin of airspeed above the normal stall airspeed. Maintain a minimum of 140 KNOTS during sustained icing conditions to prevent ice accumulation on unprotected surfaces of the wing. In the event of windshield icing, reduce airspeed to 226 KNOTS or below.

h. Descent. Use normal procedures in Section II. Brake deicing should be considered if moisture was encountered during previous ground operations or in flight, in icing conditions with gear extended.

i. Landing. Landing on an icy runway should be attempted only when absolutely necessary and should not be attempted unless the wind is within 10° of runway heading. Application of brakes without skidding the tires on ice is very difficult, due to the sensitive brakes. In order not to impair pilot visibility, reverse thrust should be used with caution when landing on a runway covered with snow or standing water. Use procedures in Section II for normal landing.

j. Engine Shutdown. Use normal procedures in Section II.

k. Before Leaving Aircraft. When the aircraft is parked outside on ice or in a fluctuating freeze-thaw temperature condition the following procedures should be followed in addition to the normal procedures in Section II. After wheel chocks are in place, release the brakes to prevent freezing. Fill fuel tanks to minimize condensation, remove any accumulation of dirt and ice from the landing gear shock struts, and install protective covers to guard against possible collection of snow and ice.

8-49. DESERT OPERATION AND HOT WEATHER OPERATION.

Dust, sand, and high temperatures encountered during desert operation can sharply reduce the operational life of the aircraft and its equipment The abrasive characteristics of dust and sand upon turbine blades and moving parts of the aircraft and the destructive effect of heat upon the aircraft instruments will necessitate many hours of maintenance if basic preventive measures are not followed In flight, the hazards of dust and sand will be difficult to escape, since dust clouds over a desert may be found at altitudes up to 10,000 feet During hot weather operations, the principal difficulties encountered are high turbine gas temperatures (TGT) during engine starting, over-heating of brakes, and longer takeoff and landing distances due to the higher density altitudes encountered In areas where high humidity is encountered, electrical equipment (such as communication equipment and instruments) will be subject to malfunction by corrosion fungi, and moisture absorption by nonmetallic materials.

a. Preparation For Flight. Check the position of the aircraft in relation to other aircraft Propeller blown sand can damage nearby aircraft Check that the landing gear shock struts are free of dust and sand. Check instrument panel and general interior for dust and sand accumulation Open main entrance door and cockpit vent storm windows to ventilate the aircraft

b. Engine Starting. Use normal procedures in Section IL Engine starting under conditions of high ambient temperatures may produce a higher than normal TGT during the start. The TGT should be closely monitored when the CONDITION lever is moved to the LOW IDLE position If overtemperature tendencies are encountered, the CONDITION lever should be moved to IDLE CUTOFF position periodically during acceleration of gas generator RPM (N_1). Be prepared to abort the start before temperature limitations are exceeded.

c. Warm-Up Ground Tests. Use normal procedures in Section II.

d. Taxing. Use normal procedures in Section II. When practical, avoid taxiing over sandy terrain to minimize propeller damage and engine deterioration that results from impingement of sand and gravel. During hot weather operation, use minimum braking action to prevent brake overheating.

e. Takeoff. Use normal procedures in Section II. Avoid taking off in the wake of another aircraft if the nutway surface is sandy or dusty.

f. During Flight. Use normal procedures in Section II.

g. Descent. Use normal procedures in Section II.

h. Landing. Use normal procedures in Section II.

i. Engine Shutdown. Use normal procedures in Section II.

CAUTION

During hot weather, if fuel tanks are completely filled. fuel expansion may cause overflow, thereby creating a fire hazard.

j. Before Leaving Aircraft. Use normal procedures in Section II. Take extreme care to prevent sand or dust from entering the fuel and oil system during servicing. During hot weather, release the brake immediately after installing wheel chocks to prevent brake disc warpage.

8-50. TURBULENCE AND THUNDERSTORM OPERATION.

CAUTION

Due to the comparatively light wing loading, control in severe turbulence and thunderstorms is critical. Since turbulence imposes heavy loads on the aircraft structure, make all necessary changes in aircraft attitude with the least amount of control pressures to avoid excessive loads on the aircraft's structure.

Thunderstorms and areas of severe turbulence should be avoided. If such areas are to be penetrated, it will be necessary to counter rapid changes in attitude and accept major indicated altitude variations. Penetration should be of an altitude which provides adequate maneuvering margins as a loss or gain of several thousand feet of altitude may be expected. The recommended penetration speed in severe turbulence is 150 KIAS. Constant pitch attitude and constant power settings are vital to proper flight technique. Establish recommended penetration speed and proper attitude prior to entering turbulent air to minimize most difficulties. False indications by the pressure instruments due to barometric pressure variations within the storm make them unreliable. Maintaining a pre-established attitude will result in a fairly constant airspeed. Turn cockpit and cabin lights on to minimize the blinding effects of lighting. Do not use autopilot altitude hold. Maintain constant power settings and pitch attitude regardless of airspeed or altitude indications. Concentrate on maintaining a level attitude by reference to the flight director/attitude indicator. Maintain original heading. Maker no turns unless absolutely necessary.

8-51. ICE AND RAIN (TYPICAL).

WARNING

While in icing conditions, if there is an unexplained 30% increase of torque needed to maintain airspeed in level flight, a cumulative total of two or more inches of ice accumulation on the wing, an unexplained decrease of 15 knots IAS, or an unexplained deviation between pilot's and copilot's airspeed indicators, the icing environment should be exited as soon as practicable. Ice accumulation on the pitot tube assemblies could cause a complete loss of airspeed indication.

a. Typical Ice. The following conditions indicate a possible accumulation of ice on the pitot tube assemblies and unprotected airplane surfaces. If any of these conditions are observed, the icing environment should be exited as soon as practicable.

(1) Total ice accumulation of two inches or more on the wing surfaces. Determination of ice thickness can be accomplished by summing the estimated ice thickness on the wing prior to each pneumatic boot deice cycle (e.g. four cycles of minimum recommended ½-inch accumulation.

(2) A 30 percent increase in torque per engine required to maintain a desired airspeed in level flight (not to exceed 85 percent torque) when operating at recommended holding/loiter speed.

(3) A decrease in indicated airspeed of 15 knots after entering the icing condition (not slower than 1.4 power off stall speed) if maintaining original power setting in level flight. This can be determined by comparing pre-icing condition entry speed to the indicated speed after a surface and antenna deice cycle is completed.

(4) Any variations from normal indicated airspeed between the pilot's and copilot's airspeed indicators.

Icing occurs because of supercooled water vapor such as fog, clouds or rain. The most severe icing occurs on aircraft surfaces in visible moisture or precipitation with a true outside air temperature between -5°C and +l°C. However, under some circumstances, dangerous icing conditions may be encountered with temperatures below -10°C. The surface of the aircraft must be at a temperature of freezing or below for it to stick. If severe icing conditions are encountered, ascend or descend to altitudes where these conditions do not prevail. If flight into icing conditions is unavoidable, proper use of aircraft anti-icing and deicing systems may minimize the problems encountered. Approximately 15 minutes prior to flight into temperature conditions which could produce frost or icing conditions, the pilot and co-pilot windshield anti-ice switches should be set at normaI or high temperature position (after preheating) as necessary to eliminate windshield ice. Stalling airspeeds should be expected to increase when ice has accumulated on the aircraft causing distortion of the wing airfoil. For the same reason, stall warning devices are not accurate and should not be relied upon. Keep a comfortable margin of airspeed above the normal stall airspeed with ice on the aircraft. Maintaina minimum of 140 knots during sustained icing conditions to prevent ice accumulation on unprotected surfaces of the wing. In the event of windshield icing, reduce airspeed to 226 knots or below.

b. Rain. Rain presents no particular problems other than restricted visibility and occasional incorrect airspeed indications.

c. Taxing. Extreme care must be exercised when taxiing on ice or slippery runways. Excessive use of either brakes or power may result in an uncontrollable skid

d. Takeoff. Extreme care must be exercised during takeoff from ice or slippery runways. Excessive use of either brakes or power may result in an uncontrollable skid

e. Climb. Keep aircraft attitude as flat as possible and climb with higher airspeed than usual, so that the lower surfaces of the aircraft will not be iced by flight at a high angle of attack

f. Cruise Flight.

(1) Prevention of ice formation. Prevention of ice formation is far more effective and satisfactory than attempts to dislodge the ice after it has formed. If icing conditions are inadvertently encountered, turn on the anti-icing systems prior to the first sign of ice formation.

(2) Deicer boots. Do not operate deicer boots continously. Allow at least 0.5 inch of ice on the wing deicer boots or 0.25 inch on the antenna deicer boots before activating to remove the ice. Continued flight in severe icing conditions should not be attempted. If ice forms on the wing area aft of the deicer boots, climb or descend to an altitude where conditions are less severe.

g. Landing. Extreme care must be exercised when landing on ice or slippery runways. Excessive use of either brakes or power may result in an uncontrollable skid Ice accumulation on the aircraft will result in higher stalling airspeeds due to the change in aerodynamic characteristics and increased weight of the aircraft due to ice buildup. Approach and landing airspeeds must be increased accordingly.

NOTE

When operating on wet or icy runways, refer to stopping distance factors shown in Chapter 7.

8-51A. ICING (SEVERE).

a. The following weather conditions may be conducive to severe in-flight icing:

(1) Visible rain at temperatures below zero degrees Celsius ambient air temperature.

(2) Droplets that splash or splatter on impact at temperatures below zero degrees Celsius ambient air temperature.

b. The following procedures for exiting a severe icing enviromnent are applicable to all flight phases from takeoff to landing.

(1) Monitor the ambient air temperature. While severe icing may form at temperatures as cold as -18 degrees Celsius, increased vigilance is warranted at temperatures around freezing with visible moisture present

(2) Upon observing the visual cues specified in the limitations section of the airplane flight manual (Military Operations Manual) for the identification of severe icing conditions (reference paragraph 5-33A), accomplish the following:

(a) Immediately request priority handling from air traffic control to facilitate a route or an altitude change to exit the severe icing conditions in order to avoid extended exposure to flight conditions more severe than those for which the airplane has been certificated.

(b) Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.

(c) Do not engage the autopilot.

(d) If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.

(e) If an unusual roll response or uncommanded roll control movement is observed reduce the angle-of-attack.

(f) Do not extend flaps during extended operation in icing conditions. Operations with flaps extended can result in a reduced angle-of-attack, with the possibility of ice forming on the upper surface further aft on the wing than normal, possibly aft of the protected area.

(g) If the flaps are extended, do not retract them until the airframe is clear of ice.

(h) Report these weather conditions to air traffic control.

Section V. CREW DUTIES

8-52. DEPARTURE BRIEFING.

NOTE

The RC-12N aircraft incorporates advanced technologies in regard to ASE/ACS and EFIS systems. Aviators should conduct thorough crew briefings prior to departures and arrivals to ensure that systems are set and understood.

The following is a guide that should be used as applicable in accomplishing the required crew briefing prior to takeoff. However, if the crew has operated together previously (thru-flight), and the pilot is certain that the copilot understands all items of the briefing, he may omit the briefing by stating “standard briefing” when the briefing is called for during the BEFORE TAKEOFF CHECK.

1. ATC clearance — Review.
   a. Routing.
   b. Initial altitude.
2. Departure procedure — Review.
   a. SID.
   b. ASE/ACS/EFIS — Set.
   c. Noise abatement procedure.
   d. VFR departure route.
3. Copilot duties — Review.
   a. Adjust takeoff power.
   b. Monitor engine instruments.
   c. Ensure AUTOFEATHER lights illuminated.
   d. Call V_1, ROTATE.
   e. Call out engine malfunctions.
   f. Tune/identify all nav/comm radios.
   g. Make all radio calls.
   h. Adjust transponder and radar as required.
   i. Complete flight log during flight. Note altitudes and headings. Note departure time.
4. TOLD — Review.
   a. Static power.
   b. V_1.
   c. V_r.
   d. V_2.

8-53. ARRIVAL BRIEFING.

NOTE

The RC-12N aircraft incorporates advanced technologies in regard to ASE/ACS and EFIS systems. Aviators should conduct thorough crew briefings prior to departures and arrivals to ensure that systems are set and understood.

The following is a guide that should be used as applicable in accomplishing the required crew briefing prior to landing. However, if the crew has operated together previously (thru-flight) and the pilot is certain that the copilot understands all items of the briefing, he may omit the briefing by stating “standard briefing” when the briefing is called for during the DESCENT-ARRIVAL CHECK.

1. Weather/altimeter setting.
2. Airfield/facilities — Review.
   a. Field elevation.
   b. Runway length.
   c. Runway condition.
3. Approach procedure — Review.
   a. Approach plan/profile.
   b. ASE/ACS/EFIS — Set.
   c. Altitude restrictions.
   d. Missed approach.
      (1) Point.
      (2) Time.
      (3) intentions.

e. Decision height or MDA.

f. Lost communications.

4. Backup approach/frequencies.

5. Copilot duties — Review.

a. Nav/comm set-up.

b. Monitor altitude and airspeeds.

c. Monitor approach.

d. Call out visual/field in sight.

6. Landing performance data — Review.

a. Approach speed.

b. Runway required.

CHAPTER 9

EMERGENCY PROCEDURES

Section I. AIRCRAFT SYSTEMS

9-1. GENERAL.

This section describes the aircraft systems emergencies that may reasonably be expected to occur and presents the procedures to be followed. Emergency procedures are given in checklist from when applicable. A condensed version of these procedures is contained in the Operator's and Crewmember's Checklist, TM 1-1510-223-CL. Emergency operations of avionics equipment are covered when appropriate in Chapter 3, Avionics, and are repeated in this section only if safety of flight is affected.

9-2. IMMEDIATE ACTION EMERGENCY CHECKS.

Immediate action emergency items are underlined for your reference and shall be committed to memory.

NOTE

The urgency of certain emergencies requires immediate action by the pilot. The most important single consideration is aircraft control. All procedures are subordinate to this requirement.

9-3. DEFINITION OF LANDING TERMS.

The term LAND AS SOON AS POSSIBLE is defined as executing a landing at the nearest suitable landing area without delay. The term LAND AS SOON AS PRACTICABLE is defined as executing a landing at the nearest suitable airfield.

9-4. EMERGENCY EXITS AND EQUIPMENT.

Emergency exits and equipment are shown in figure 9-1.

9-5. EMERGENCY ENTRANCE.

Entry may be made through the cabin emergency hatch. The hatch may be released by pulling on its flush-mounted, pull-out handle, placarded EMERGENCY EXIT - PULL HANDLE TO RELEASE. The hatch is of the nonhinged, plug type, which removes completely from the frame when the latches are released. After the latches are released, the hatch may be pushed in.

9-6. ENGINE MALFUNCTION.

a. Flight Characteristics Under Partial Power Conditions. There are no unusual flight characteristics during single engine operation as long as airspeed is maintained at or above minimum control speed (V_{mca}). The capability of the aircraft to climb or maintain level flight depends on configuration, gross weight, altitude, and free air temperature. Performance and aircraft control will improve by feathering the propeller of the inoperative engine, retracting the landing gear and flaps, and establishing the single engine best rate-of-climb speed (V_{yse}).

b. Engine Malfunction prior to or at V_1 (Abort). If an engine should fail, or the crew determine that an abort is warranted prior to the aircraft achieving V_1, utilize the following procedures:

1. <u>POWER levers — GROUND FINE.</u>
2. <u>Braking — As required.</u>
3. Reverse thrust — As required.

If insufficient runway remains for stopping, perform the following:

(4) CONDITION levers — FUEL CUTOFF.

(5) FIRE PULL handles — Pull.

(6) MASTER SWITCH — OFF.

Single engine reversing should be used only with extreme caution.

c. Engine Failure after V_1. If engine failure occurs after V_1, continue the takeoff. Directional control can readily be maintained with rudder. Do not retard the throttle of the inoperative engine, until the propeller has stopped rotating. To do so will deactivate the autofeather system, and the propeller may not feather. As the copilot calls "rotate", smoothly raise the nose of the aircraft to an indicated pitch attitude of 7°. After takeoff, verify two positive climb indications, then raise the landing gear.

Continue the climb at V_2. Do not retract the flaps if they are set to APPROACH for takeoff. Level the aircraft at an altitude of 500 feet above the airport field elevation. Accelerate to V_{enr}, then raise the flaps, if extended. After flap retraction is complete, reduce power on the operating engine to maximum continuous and continue the climb at V_{enr}.

Field performance data, as obtained from Chapter 7, is predicted on no power adjustments from the point of brake release to the power reduction at 500 feet. The Static Power Setting Chart in Chapter 7 permits a power

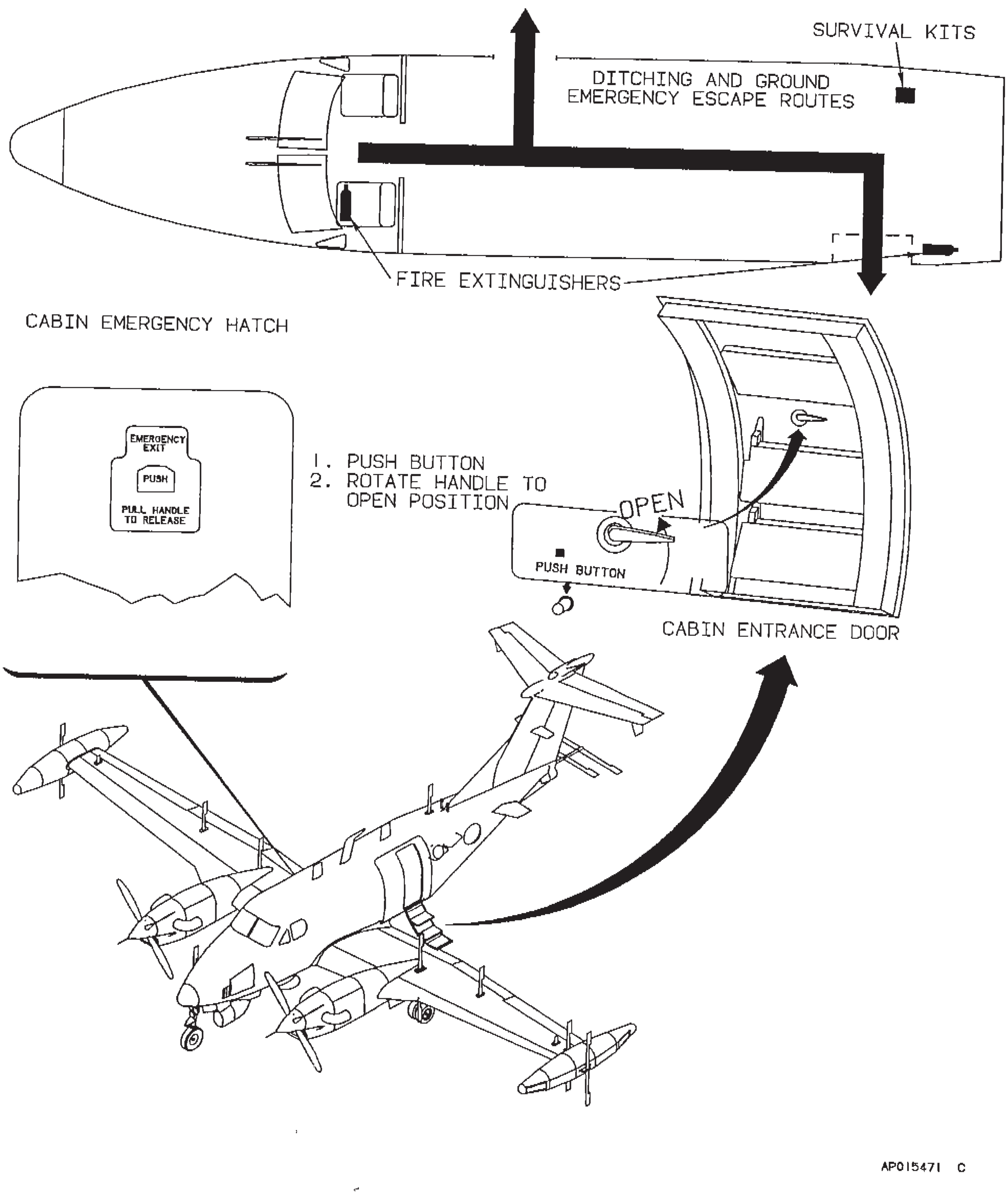

Figure 9-1. Emergency Exits and Equipment

setting that allows for normal torque increase during the takeoff roll and the ensuring climb. The static power is determined so that at some point during the climb to 500 feet, the torque or TGT will reach red line. (The TGT limit will only be reached on a minimum performance engine. A better than minimum engine will exhibit a positive TGT margin under these conditions.) Setting of a static power greater than that presented in Chapter 7 will result in an engine limit being exceeded prior to the aircraft reaching 500 feet, necessitating an unscheduled power adjustment. Setting of a static power less than that presented in Chapter 7 will result in insufficient power available and failure of the aircraft to attain scheduled performance.

1. Power — Maximum allowable.
2. Gear — UP (two positive climb indications).
3. Propeller — Verify feathered.
4. Flaps — UP after V_{enr} (130 KIAS).
5. Landing lights — OFF.
6. Engine cleanup — Perform.
7. Land as soon as practicable.

NOTE

Holding up to 5 degrees of bank and (1/2 ball width) toward the operating engine will assist in maintaining directional control and will improve aircraft performance.

d. Engine Malfunction During Flight. If an engine malfunctions during flight, perform the following:

1. Autopilot/Yaw Damp — Disengage.
2. Power — As required.
3. Dead engine — Identify.
4. POWER lever (dead engine) — IDLE.
5. PROP lever (dead engine) — FEATHER.
6. Gear — As required.
7. Flaps — As required.
8. Engine Cleanup — Perform.
9. Power — Set for single engine cruise.
10. Land as soon as practicable.

e. Engine Malfunction During Final Approach. If an engine malfunctions during final approach (after LANDING CHECK) the propeller should not be manually feathered unless time and altitude permit or conditions require it. Continue approach using the following procedure:

1. Power — As required.
2. Gear — DN.

f. Engine Malfunction (Second Engine). If the second engine fails, the airspeed to fly will depend upon whether or not a restart will be attempted, and whether or not the restart attempt will be accomplished with or without starter assist. If no restart is to be attempted, use maximum glide speed from figure 9-2. Perform the following procedure if the second engine fails during cruise flight.

1. Airspeed — As required.
2. POWER lever — IDLE.
3. PROP lever — As required.
4. Conduct engine restart procedure.

9-7. ENGINE SHUTDOWN IN FLIGHT.

If it becomes necessary to shut an engine down during flight, perform the following:

1. POWER lever — IDLE.
2. PROP lever — FEATHER.
3. CONDITION lever — FUEL CUTOFF.
4. Engine cleanup — Perform.

9-8. ENGINE CLEANUP.

The cleanup procedure to be used after engine malfunction, shutdown, or an unsuccessful restart is as follows:

1. CONDITION lever — FUEL CUTOFF.
2. Engine AUTO IGNITION switch — Off.
3. AUTOFEATHER switch — OFF.
4. GENERATOR switch — OFF.
5. Mission control switches — As required.
6. PROP SYNC switch — OFF.
7. BRAKE DEICE switch — Off.

9-9. ENGINE RESTART DURING FLIGHT (NO STARTER ASSIST).

CAUTION

The pilot should determine the reason for engine failure before attempting an airstart. Do not attempt an airstart if N_1 indicates zero.

CAUTION

Do not attempt engine airstarts above 25,000 ft. As engine accelerates to idle speed, it may become necessary to move the condition lever into FUEL CUTOFF in order to avoid an overtemperature condition.

1. POWER lever — IDLE.
2. PROP lever — HIGH RPM.
3. CONDITION lever — FUEL CUTOFF.
4. FIRE PULL handle — (PUSH TO EXTINGUISH annunciator extinguished).
5. Engine anti-ice — Off.
6. GENERATOR switch (inoperative engine) — OFF.
7. Airspeed — As required (140 knots propeller windmilling, 190 knots propeller feathered).
8. Altitude — Below 25,000 feet.
9. Engine N_1 — Monitor (10% minimum, propeller feathered).

NOTE

N_1 may be increased by increasing airspeed.

10. AUTO IGNITION switch — ARM.
11. CONDITION lever — LOW IDLE.
12. Power — As required (after TGT peaks).
13. GENERATOR switch — RESET, then ON.
14. Engine cleanup — Perform if engine start was unsuccessful.
15. PROP SYNC switch — As required.
16. Electrical equipment — As required.
17. CONDITION lever — HIGH IDLE.
18. Cabin air mode switch — As required.

9-10. ENGINE RESTART DURING FLIGHT (USING STARTER).

WARNING

Airstarts using the starter assist procedures will momentarily cause the loss of all electronic flight instrument system (EFIS) data. The engine restart during flight (no starter assist procedure), or turning EFIS power off prior to a starter assisted restart, should normally be performed.

Engine restarts should only be attempted below 25,000 feet. If a restart is attempted, perform the following:

CAUTION

The pilot should determine the reason for engine failure before attempting an airstart. Do not attempt an airstart if N_1 indicates zero.

Do not attempt engine airstarts above 25,000 feet. During engine acceleration to idle speed, it may become necessary to move the CONDITION lever into FUEL CUTOFF in order to avoid an overtemperature condition.

1. CABIN AIR MODE SELECT switch — OFF.
2. FWD VENT BLOWER switch — AUTO.
3. AUTO PLT POWER switch — Off.
4. EFIS POWER switches (2) — OFF (if conditions permit).

NOTE

If EFIS power is turned off, aircraft attitude should be maintained by using outside visual references or the air driven standby attitude indicator and turn-and-slip indicator.

5. Radar — SBY or OFF.
6. POWER lever — IDLE.
7. PROP lever — Low RPM.
8. CONDITION lever — FUEL CUTOFF.
9. FIRE PULL handle — Push in (to extinguish annunciator).

NOTE

If conditions permit, reduce power on the operative engine to obtain a TGT of 700˚C or less to reduce the possibility of exceeding TGT limit. Reduce electrical load to minimum consistent with flight conditions.

False fuel flow indications may be observed with the starter engaged and the CONDITION lever in FUEL CUTOFF.

10. ENG START switch — START-IGNITION. Check IGN ON annunciator illuminated.
11. CONDITION lever — LOW IDLE.

12. ENG START switch — OFF after TGT peaks.
13. CONDITION lever — HIGH IDLE.
14. PROP lever — As required.
15. POWER lever — As required.
16. Engine cleanup — Perform if engine start was unsuccessful.
17. GENERATOR switch — RESET, then ON.
18. Engine AUTO IGNITION — As required.
19. PROP SYNC switch — As required.
20. Electrical equipment — As required.
21. Cabin air mode switch — As required.

9-11. MAXIMUM GUIDE.

In the event of failure of both engines, maximum gliding distance is obtained by feathering both propellers to reduce propeller drag and by maintaining the appropriate airspeed with the gear and flaps up. Figure 9-2 gives the approximate gliding distances in relation to altitude. The procedure to follow in the event of failure of both engines is as follows:

1. Gear — UP.
2. Flaps — UP.

WARNING

Determine that procedures for restarting first and second failed engines are ineffective before feathering second engine propeller.

3. PROP levers — FEATHERED.
4. Airspeed — As required (fig. 9-2).

9-12. SINGLE-ENGINE DESCENT/ARRIVAL.

Perform the following procedure prior to the final descent for landing:

1. CABIN CONTROLLER — Set.
2. ICE & RAIN switches — As required.
3. RECOG lights — On.

NOTE

Set windshield anti-ice to NORMAL as required well before descent into icing conditions or into warm moist air to aid in defogging. Turn off windshield anti-ice when descent is completed to lower altitudes and when heating is no longer required. This will preclude possible wind screen distortions.

4. Windshield anti-ice — As required.
5. Radio altimeter — As required.
6. Altimeters — Set to current altimeter setting.
7. ASE — As required.
8. Flare/chaff dispenser safety pin — Insert.
9. ★ Arrival briefing — Complete.

NOTE

When landing with one engine inoperative, maintain airspeed at a minimum of Vyse until landing is assured. A go-around after flaps are fully extended may not be possible.

9-13. SINGLE-ENGINE BEFORE LANDING.

1. PROP lever — HIGH RPM.
2. Flaps — As required.
3. Gear — DN.
4. Landing lights — As required.
5. Yaw damp — Off.
6. BRAKE DEICE switch — Off.

9-14. SINGLE-ENGINE LANDING CHECK.

Perform the following procedure during final approach to runway.

1. Autopilot/yaw damp — Disengage.
2. GEAR DOWN lights — Check.
3. PROP lever (operative engine) — HIGH RPM.

NOTE

To ensure constant reversing characteristics, the propeller control must be in the HIGH RPM position.

4. Flaps — As required.

9-15. SINGLE-ENGINE GO-AROUND.

The decision to go around must be made as early as possible. Elevator forces at the start of a go around are very high, and a considerable amount of rudder control will also be required at low airspeeds. Retrim as required. If rudder application is insufficient, or applied too slowly, directional control cannot be maintained. If control difficulties are experienced, reduce power on the operating engine. Insure that the aircraft will not touch the ground

MAXIMUM GLIDE DISTANCE

STANDARD DAY (ISA)

ASSOCIATED CONDITIONS:

POWER . . . . BOTH ENGINES INOPERATIVE
PROPELLERS . . . . FEATHERED
LANDING GEAR . . UP
FLAPS . . . . UP (0%)
AIRSPEED . . . . IAS AS TABULATED
WIND . . . . ZERO KNOTS

WEIGHT ~ POUNDS	BEST GLIDE SPEED ~ KNOTS
16,200	125
15,000	120
14,000	116
13,000	111
12,000	106
11,000	101
10,000	96

EXAMPLE:

HEIGHT ABOVE TERRAIN . . . . 12,000 FT
WEIGHT . . . . 13,500 LBS
MAXIMUM GLIDE DISTANCE . . 19.8 NM
BEST GLIDE SPEED . . . . 114 KIAS

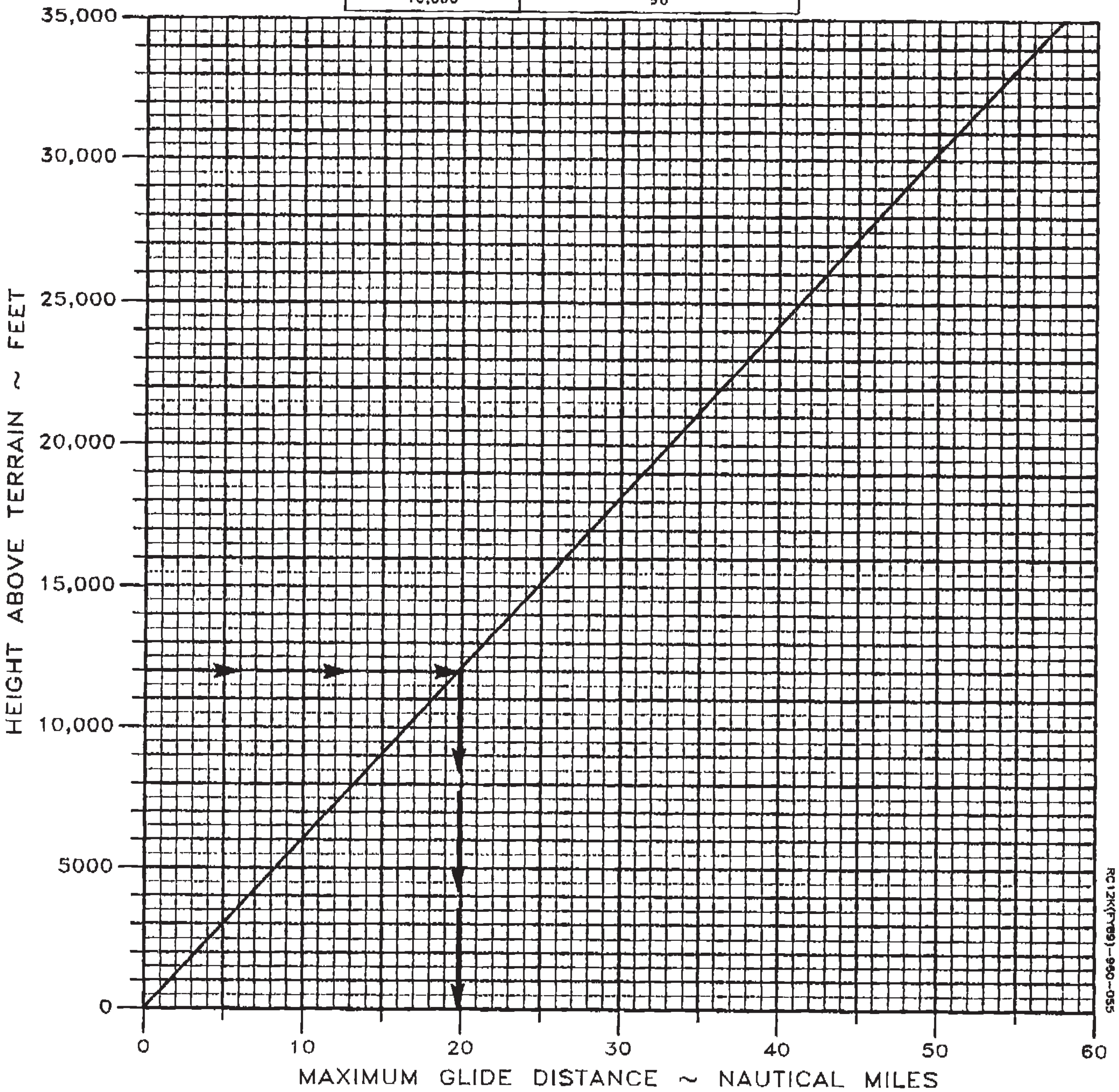

Figure 9-2. Maximum Glide Distance

before retracting the landing gear. Retract the flaps only as safe airspeed permits (APPROACH position until V_{ref}), then up. Perform single-engine go-around as follows:

1. Power — Maximum allowable.
2. Landing gear — UP.
3. Flaps — UP.
4. Airspeed — V_{yse}.
5. LANDING lights — OFF.

9-16. TWO ENGINES INOPERATIVE/OFF AIRFIELD LANDING.

NOTE

With propellers feathered, there is less drag and the aircraft will have a tendency to overshoot the planned touchdown point.

NOTE

When landing on rough terrain or unprepared surfaces, the landing gear will absorb landing energy during touchdown, if extended.

Select landing gear up or down as best suits the conditions of the landing site. If gear-up, follow gear-up landing procedure. If gear-down, make a normal touchdown and use brakes as required.

9-17. LOW OIL PRESSURE.

In the event of a low oil pressure indication, perform procedures as applicable:

1. Oil pressure below 90 PSI and above 60 PSI: Torque — As required (54% maximum).
2. Oil pressure below 60 PSI: Perform engine shutdown, or land as soon as practicable using minimum power to ensure safe arrival.

9-18. CHIP DETECTOR WARNING ANNUNCIATOR ILLUMINATED.

If the L CHIP DETECTOR or R CHIP DETECTOR warning annunciator illuminates, and safe single engine flight can be maintained.

1. Perform engine shutdown.
2. Land as soon as practicable.

9-19. DUCT OVERTEMP CAUTION ANNUNCIATOR ILLUMINATED.

Ensure the cabin floor outlets are open and unobstructed, then perform the following steps in sequence until the annunciator is extinguished. Allow approximately 30 seconds after each adjustment for the system temperature to stabilize. The overtemperature condition is considered corrected at any point during the procedure that the annunciator extinguishes.

(1) CABIN AIR control — In.

(2) CABIN AIR MODE SELECT switch — AUTO.

(3) CABIN AIR TEMP CONTROL — DECREASE.

(4) FWD VENT BLOWER switch — HIGH.

(5) CABIN AIR MODE switch — MAN COOL.

(6) CABIN AIR MANUAL TEMP switch — DECREASE (hold).

(7) LEFT ENVIRO & PNEU BLEED AIR valve switch — PNEU ONLY.

(8) Light still illuminated after 30 seconds: LEFT ENVIRO & PNEU BLEED AIR valve switch — ON.

(9) RIGHT ENVIRO & PNEU BLEED AIR valve switch — PNEU ONLY.

(10) Light still illuminated after 30 seconds: RIGHT ENVIRO & PNEU BLEED AIR valve switch — ON.

NOTE

If the DUCT OVERTEMP annunciator has not extinguished after completing the above procedure, the warning system has malfunctioned.

9-20. ENGINE ANTI-ICE FAILURE.

Ice vane failure is indicated by the illumination of the amber #1 or #2 VANE FAIL caution annunciator lights. If the ice vanes fail to operate, perform the following:

(1) ICE VANE POWER SELECT switch — STBY.

2. VANE FAIL annunciator — Check extinguished.

9-21. ENGINE BLEED AIR SYSTEM MALFUNCTION.

a. BL AIR FAIL Annunciator Illuminated. Steady illumination of the warning annunciator in flight indicates a possible ruptured bleed air line aft of the engine firewall. The annunciator will remain illuminated for the remainder of flight. Perform the following:

NOTE

BLEED AIR FAIL annunciators may momentarily illuminate during simultaneous surface deice and brake deice operation at low N_1 speed.

(1) BRAKE DEICE switch — Off.

(2) TGT and torque — Monitor (note readings).

(3) ENVIRO & PNEU BLEED AIR valve switch (affected side) — Off.

NOTE

Brake deice on the affected side will not be available with bleed air valve switch off.

(4.) Cabin pressurization — Check.

b. Excessive Differential Pressure. If cabin differential pressure exceeds 6.5 PSI, perform the following:

(1.) Cabin altitude and rate-of-climb controller — Select higher setting.

If condition persists:

(2.) LEFT ENVIRO & PNEU BLEED AIR valve switch — PNEU ONLY (L BL AIR OFF annunciator illuminated).

If condition still persists:

(3.) RIGHT ENVIRO & PNEU BLEED AIR valve switch — PNEU ONLY (R BL AIR OFF annunciator illuminated).

If condition still persists:

4. Descend immediately.

If unable to descend:

5. Oxygen masks — On and 100%.

(6.) CABIN PRESS switch — DUMP.

(7.) ENVIRO & PNEU BLEED AIR valve switches — ON, if cabin heating is required.

9-22. LOSS OF PRESSURIZATION (ABOVE 10,000 FEET).

If cabin pressurization is lost when operating above 10,000 feet or the ALT WARN warning annunciator illuminates, perform the following:

1. <u>Crew oxygen masks — On and 100%.</u>
2. Descend as required.

NOTE

Proper EFIS operation has been demonstrated at cabin altitudes of up to 12,500 feet.

9-23. CABIN DOOR CAUTION ANNUNCIATOR ILLUMINATED.

Remain clear of cabin door and perform the following:

(1.) ENVIRO & PNEU BLEED AIR valve switches — PNEU ONLY.

2. Descend below 14,000 feet as soon as practicable.
3. Oxygen — As required.

9-24. PROPELLER FAILURE (OVER 1802 RPM).

If an overspeed condition occurs that cannot be controlled with the propeller lever, or by reducing power, perform the following:

1. <u>POWER lever (affected engine) — IDLE.</u>
2. <u>PROP lever — FEATHER.</u>
3. CONDITION lever — As required.

(4.) Engine cleanup — As required.

9-25. FIRE.

a. Engine Fire. The following procedures shall be taken in the event of engine fire.

(1) Engine/nacelle fire during start or ground operations. If engine/nacelle fire is identified during start or ground operation, perform the following:

1. <u>PROP levers — FEATHER.</u>
2. <u>CONDITION levers — FUEL CUTOFF.</u>
3. <u>FIRE PULL handle — Pull.</u>

CAUTION

If fire extinguisher has been used to extinguish an engine fire, do not attempt to restart, until maintenance personnel have inspected the aircraft and released it for flight.

4. <u>PUSH TO EXTINGUISH switch — Push.</u>
5. <u>MASTER SWITCH — OFF.</u>

(2) Engine fire in flight (FIRE PULL handle light illuminated). If an engine fire is suspected in flight, perform the following:

1. <u>POWER lever — IDLE.</u>
2. If FIRE PULL handle light is extinguished: Advance power.
3. <u>If FIRE PULL handle light is still illuminated: Engine fire in flight procedures (identified) — Perform.</u>

(3) Engine fire in flight (identified). If an engine fire occurs in flight, perform the following:

CAUTION

Due to the possibilities of fire warning malfunctions, the fire should be visually identified before the engine is secured and the extinguisher actuated.

1. <u>POWER lever — IDLE.</u>
2. <u>PROP lever — FEATHER.</u>

3. CONDITION lever — FUEL CUTOFF.
4. FIRE PULL handle — Pull.
5. Fire extinguisher — Actuate as required.
6. Engine cleanup — Perform.

b. Fuselage Fire. If a fuselage fire occurs, perform the following:

1. Fight the fire.
2. Land as soon as possible if fire continues.

c. Wing Fire. There is little that can be done to control a wing fire except to shut off fuel and electrical systems that may be contributing to the fire, or which could aggravate it. Diving and slipping the aircraft away from the burning wing may help. If a wing fire occurs, perform the following:

1. Perform engine shutdown on affected side.
2. Land as soon as possible.

d. Electrical Fire. Upon noting the existence or indications of an electrical fire, turn off all affected electrical circuits, if known. If electrical fire source is unknown, perform the following:

1. Crew oxygen — On and 100%.
2. MASTER SWITCH — OFF (visual conditions only).
3. All nonessential electrical equipment — Off.

NOTE

With loss of DC electrical power, the aircraft will depressurize. All electrical instruments, with the exception of PROP, RPM, N_1 RPM, and TGT gages will be inoperative.

4. BATTERY switch — ON.
5. GENERATOR switches (individually) — RESET, then ON.
6. Circuit breakers — Check for indication of defective circuit.

CAUTION

As each electrical switch is returned to ON, note loadmeter reading and check for evidence of fire.

7. Essential electrical equipment — On (individually until fire source is isolated).
8. Land as soon as practicable.

e. Smoke and fume Elimination. To eliminate smoke and fumes from the aircraft, perform the following:

1. Crew oxygen — On and 100%.
2. ENVIRO & PNEU BLEED AIR valve switches — PNEU ONLY.
3. FWD VENT BLOWER switch — AUTO.
4. AFT VENT BLOWER switch — Off.
5. CABIN AIR MODE SELECT switch — OFF.
6. If smoke and fumes are not eliminated: CABIN PRESS switch — DUMP.

NOTE

Opening storm window (after depressurizing will facilitate smoke and fume removal.

7. Engine instruments — Monitor.

9-26. FUEL SYSTEM.

a. FUEL PRESS Warning Annunciator Illuminated. Illumination of the #1 and #2 FUEL PRESS warning annunciator usually indicates failure of the respective engine-driven boost pump. Perform the following:

1. STANDBY PUMP switch — ON.
2. FUEL PRESS annunciator — Check extinguished.
3. FUEL PRESS annunciator still illuminated — Record unboosted time.
4. Monitor system for further abnormal indications.

b. NO FUEL XFER Caution Annunciator Illuminated. Illumination of a #1 or #2 NO FUEL XFR annunciator with fuel remaining in the respective auxiliary fuel tank indicates a failure of that automatic fuel transfer system. Proceed as follows:

1. AUX XFER switch (affected side) — OVRD.
2. Auxiliary fuel quantity — Monitor.
3. AUX XFER switch (after respective auxiliary fuel has completely transferred) — AUTO.

c. Nacelle Fuel Leak. If nacelle fuel leaks are evident, perform the following:

1. Perform engine shutdown.
2. FIRE PULL handle — Pull.
3. Land as soon as practicable.

d. Fuel Crossfeed. For fuel crossfeed, perform the following:

1. AUX XFER switches — AUTO.

NOTE

With the FIRE PULL handle pulled, the fuel in the auxiliary tank for that side will not be available (usable) for crossfeed.

2. STANDBY PUMP switches — Off.
3. CROSSFEED switch — As required.
4. FUEL CROSSFEED annunciator illuminated — Check.

NOTE

With the FIRE PULL handle pulled, the FUEL PRESS annunciator will remain illuminated on the side supplying fuel.

5. FUEL PRESS annunciator extinguished — Check.
6. Fuel quantity — Monitor.

e. NAC LOW Annunciator Illuminated. Illumination of the #1 or #2 NAC LOW caution annunciator indicates that the affected tank has approximately 30 minutes (58 gallons) of usable fuel remaining at sea level, at maximum cruise power consumption rate. Proceed as follows:

WARNING

Failure of the fuel tank venting systems will prevent the fuel in the wing tanks from gravity feeding into the nacelle tank. Fuel vent system failure may be indicated by illumination of the #1 or #2 NAC LOW caution light with greater than 30 minutes of usable fuel indicated in the main tank fuel system. The total usable fuel remaining in the main fuel supply system with the low fuel caution light illuminated may be as little as 140 pounds, regardless of the total fuel quantity indicated. Continued flight may result in engine flameout due to fuel starvation.

1. Land as soon as practicable.

9-27. ELECTRICAL SYSTEM EMERGENCIES.

a. DC GEN Annunciator Illuminated. When a DC GEN annunciator illuminates, perform the following:

1. GENERATOR switch — OFF, RESET, then ON.
2. GENERATOR switch (no reset) — OFF.
3. MISSION CONTROL switch — ORIDE.
4. Operating loadmeter — 100% maximum.

b. Both DC GEN Annunciators Illuminated (reset failed).

1. All nonessential equipment — Off.
2. Land as soon as practicable.

c. Excessive Loadmeter Indication (over 100%). If either loadmeter indicates over 100%, perform the following:

1. BATTERY switch — OFF (monitor loadmeter).
2. Loadmeter over 100% — Nonessential electrical equipment off.
3. Loadmeter under 100% — BATTERY switch ON.

d. INVERTER Annunciator Illuminated. When either #1 or #2 INVERTER annunciator illuminates, perform the following:

1. Affected INVERTER switch — Off.

e. INST AC Annunciator Illuminated.

NOTE

Illumination of the INST AC warning annunciator indicates that both 26 VAC circuits are inoperative.

The following systems will be affected.

NAV #1
NAV #2
Heading #1
Heading #2
#1 torquemeter
#2 torquemeter
Pilot's EFIS
Copilot's EFIS
INS
ADF
#2 rate of turn
Air data computer

Under these conditions power must be governed by indications of N1 and TGT gages. Perform the following:

1. N1 and TGT indications — Check.
2. Other engine instruments — Monitor.

f. Circuit Breaker Tripped. If a circuit breaker trips, perform the following:

1. Bus feeder breaker tripped — Do not reset.

NOTE

Circuit breakers should not be reset more than once until the cause of circuit malfunction has been determined and corrected.

2. Nonessential circuit - Do not reset.

(3.) Essential circuit - Reset once.

g. BATTERY CHARGE Annunciator Illuminated. If the BATTERY CHARGE caution annunciator illuminates during normal cruise flight, perform the following:

(1.) Battery ammeter - Check, note indication, and monitor for increasing load. If load continues to increase, turn battery switch OFF.

(2.) BATTERY switch - OFF.

NOTE

The battery may be turned back ON only for gear and flap extension and approach to landing. Battery may be usable after a 15 20 minute cool down period.

(3.) BATTERY switch (landing gear/nap extension only) - ON.

h. AVIONICS MASTER POWER Switch Failure.

If the AVIONICS MASTER POWER Switch fails to operate in the ON position, perform the following:

(1.) AVIONICS MASTER CONTR circuit breaker - Pull.

NOTE

The avionics power relay is normally hot Pulling the AVIONICS MASTER CONTR circuit breaker will remove power to the relay, thus allowing electrical power to the associated busses.

i. BAT FEED FAULT Annunciator Illuminated. If the BAT FFEED FAULT caution annunciator illuminates, perform the following:

(1.) BATTERY switch - RESET, then ON.

9-28. EMERGENCY DESCENT.

The following procedure assumes the structural integrity of the aircraft and smooth flight conditions. If structural integrity is in doubt, limit speed as much as possible, reduce rate of descent if necessary, and avoid high maneuvering loads. For emergency descent, perform the following:

1. POWER levers - IDLE
2. PROP levers - HIGH RPM.
3. Flaps - APPROACH
4. Gear - DN.
5. Airspeed - 179 KIAS (0.472 Mach) maximum.

NOTE

Windshield defogging may be required.

9-29. FLIGHT CONTROL MALFUNCTIONS.

Use the following procedures, as applicable, for flight control malfunctions.

a. Autopilot Emergency Disconnection. The autopilot can be disengaged by any of the following methods:

1. Pressing the AP & YD/TRIM DISC switch (control wheels).
2. Pressing the AP ENGAGE pushbutton on the autopilot controller (pedestal extension).
3. Pressing the GO-AROUND switch (left power lever, yaw damper will remain on).
4. Pulling the AP CONTR and AFCS DIRECT circuit breakers (overhead control panel).
5. Setting AVIONICS MASTER POWER switch (overhead control panel) to the off (aft) position.
6. Setting aircraft MASTER SWITCH (overhead control panel) to the OFF position
7. Setting the AUTO PLT power switch (over-head control panel) to off position.

b. Yaw Damp Emergency Disconnection. The yaw damp can be disengaged by any of the following methods:

1. Pressing the AP & YD/RIM DISC switch (control wheels).
2. Pressing the AP ENGAGE pushbutton on the autopilot controller (pedestal extension).
3. Setting the RUDDER BOOST/YAW CONTROL TEST switch (pedestal extension) to the YAW CONTROL TEST position
4. Pulling the AP CONTR circuit breaker (over-head control panel).
5. Pulling the RUDDER BOOST circuit breaker (overhead control panel).

6. Setting AVIONICS MASTER POWER switch (overhead control panel) to the off (aft) position.
7. Setting aircraft MASTER switch (overhead control panel) to the OFF position
8. Setting the AUTO PLT power switch (overhead control panel) to off.

c. Unscheduled Rudder Boost Activation. Rudder boost operation without a large variation of power between engines indicates a failure of the system. Perform the fol- lowing:

1. AP & YD/RIM DISC switch (control wheel) - Disconnect and hold (hold to first level).

(2.) RUDDER BOOST switch - OFF.

3. RUDDER BOOST circuit breaker - Pull (Provided that rudder boost does not deactivate).
4. AP & YD/TRIM DISC switch - Release.

(5.) Yaw damper - Reengage (if RUDDER BOOST circuit breaker is not pulled).

d. Unscheduled Electric Trim. In the event of unscheduled electric elevator trim, perform the following:

1. ELEV TRIM switch - OFF.
2. ELEC TRIM circuit breaker - Pull.

9-30. LANDING EMERGENCIES.

WARNING

Structural damage may exist after landing with brake, tire, or landing gear malfunctions. Under no circumstances shall an attempt be made to inspect the aircraft until jacks have been installed.

a. Landing Gear Unsafe Indication.

1. LDG GEAR CONTR switch - Check DN.

(2.) LANDING GEAR CONTROL and LANDING GEAR IND circuit breakers - Check in.

3. GEAR DOWN lights - Check illuminated.

If indication remains unsafe:

4. Landing gear emergency extension - Perform.

WARNING

If for any reason the green GEAR DOWN lights do not illuminate (e.g., in case of an electrical system failure), continue pumping until sufficient resistance is felt to ensure that the gear is down and locked. Do not stow the LANDING GEAR ALTERNATE EXTENSION pump handle, but leave it in the full up position. The landing gear cannot be manually retracted in flight.

b. Landing Gear Emergency Extension.

1. Airspeed - Below 179 KIAS.

(2.) LANDING GEAR CONTROL circuit breaker - Pull.

3. LDG GEAR CONTPR switch - DN.
4. LANDING GEAR ALTERNATE EXTENSION pump handle - Unstow.
5. LANDING GEAR ALTERNATE EXTENSION pump handle Pump until the three green GEAR DOWN annunciators illuminate and red gear handle lights extinguish
6. LANDING GEAR ALTERNATE EXTENSION pump handle - Stow (secure in clip).

c. Gear-up Landing.

1. Crew emergency briefing - Completed.

(2.) Loose equipment - Stowed.

(3.) ENVIRO & PNEU BLEED AIR valve switches - PNEU ONLY.

(4.) CABIN PRESS switch - DUMP.

(5.) Cabin emergency hatch - Remove and stow.

6. Seat belts and harnesses - Secured.
7. LANDING GEAR ALTERNATE EXTENSION pump handle - Stowed.

(8.) LANDING GEAR, CONTROL circuit breaker - In.

9. Gear- UP.

(10) Nonessential electrical equipment - Off.

11. Flaps - As required (DOWN for landing).

NOTE

Fly a normal approach to touchdown. Avoid touching down in a nose-high attitude.

Brakes may be used for reducing landing roll and for directional control.

12 POWER levers (runway assured) - IDLE

13. PROP levers - FEATHER

(14.) CONDITION levers - FUEL CUTOFF.

(15.) FIRE PULL handles - Pull.

(16.) MASTER SWITCH - OFF.

9-31. CRACK IN ANY SIDE WINDOW OR IN WINDSHIELD.

If it has been determined that a crack has developed in any side window or windshield:

1. Altitude - Maintain 25,000 feet or less.

(2.) Pressurization controller - Reset to maintain 4.0 PSI or less as required.

NOTE

Prior to next flight, maintenance actions are required. Refer to the Cracked Cabin Window/ Windshield limitations in chapter 5. While inner-ply cracking is not a structural consideration requiring replacement, possible glass flaking from the damaged area could interfere with pilot vision.

Visibility through the windshield may be significantly impaired, windshield wipers could be damaged if used on cracked surface, and heating elements could be inoperative in the area of the crack

9-32. DITCHING.

Landing should be made with full flaps and landing gear retracted Refer to Table 9-1 for pilot, copilot and ferry chair occupant actions. Refer to figure 9-3 for body positions during ditching. Figure 9-4 shows sea swell information. Refer to FM 20-151 for techniques to be used during ditching. Table 9-1 lists the appropriate duties for crew and occupants for planned ditching and immediate ditching.

WARNING

Do not unstrap from the seat until all motion stops. The possibility of injury and disorientation requires that evacuation not be attempted until the aircraft comes to a complete stop.

(1.) Radio calls/transponder - As required.

(2.) Crew emergency briefing - As required.

(3.) ENVIRO & PNEU BILEED AIR valve switches - PNEU ONLY.

(4.) Cabin pressure switch - DUMP.

(5.) Cabin emergency hatch - Remove and stow.

6. Seat belts and harnesses - Secured.

7. Gear- UP.

8. Flaps - DOWN.

(9.) Nonessential electrical equipment - Off.

10. Approach - Normal, power on.

(11.) Emergency lights - As required.

9-33. BAILOUT.

When the decision has been made to abandon the aircraft in flight, the pilot will give the warning signal. Exit from the aircraft will be through the main entrance door, and in the departure sequence using the exit routes as indicated in figure 9-1. Proceed as follows if bailout becomes necessary:

1. Notify crew to prepare to bail out

(2.) Distress message - Transmit

(3.) COMSEC - ZEROIZE

(4.) Transponder - 7700.

5. Flaps - DOWN.

6. Airspeed - 116 KIAS.

7. Trim - As required.

8. Autopilot - Engage.

(9.) Cabin pressure switch - DUMP.

10. Parachute - Attach to harness.

11. Cabin door - Open.

12. Abandon the aircraft

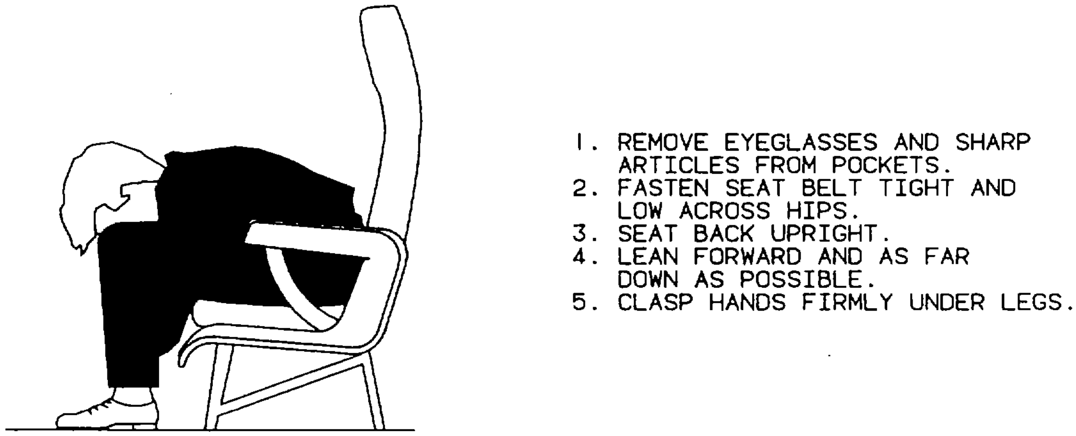

Figure 9-3. Ferry Chair Occupant Emergency Body Position

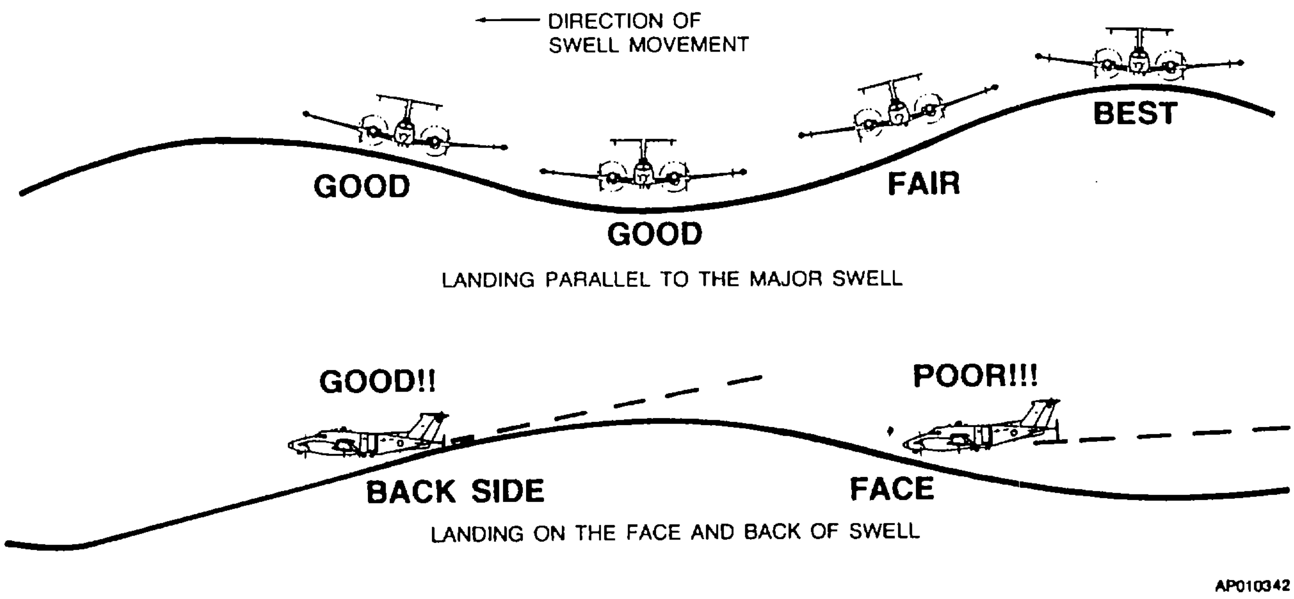

Figure 9-4. Wild Swell Ditch Heading Evaluation

Table 9-1. Ditching

PLANNED DITCHING	IMMEDIATE DITCHING
PILOT	**PILOT**
A. ALERT B. ORDER TO PREPARE SURVIVAL GEAR FOR AERIAL DROP C. TRANSMIT DISTRESS MESSAGE D. LIFE VEST - CHECK (DO NOT INFLATE) E. DISCHARGE MARKER F. DITCH AIRCRAFT G. ABANDON AIRCRAFT	A. WARN OCCUPANTS B. TRANSMIT DISTRESS MESSAGE C. LIFE VEST - CHECK (DO NOT INFLATE) D. APPROACH - NORMAL E. NOTIFY OCCUPANTS TO BRACE FOR DITCHING F. DITCH AIRCRAFT G. ABANDON AIRCRAFT AFTER COPILOT THROUGH CABIN EMERGENCY HATCH
COPILOT	**COPILOT**
A. REMOVE CABIN EMERGENCY HATCH B. LIFE VEST - CHECK (DO NOT INFLATE) C. ABANDON AIRCRAFT (TAKE LIFE RAFT AND FIRST AID KIT)	A. REMOVE CABIN EMERGENCY HATCH B. LIFE VEST - CHECK (DO NOT INFLATE) C. ABANDON AIRCRAFT (TAKE LIFE RAFT AND FIRST AID KIT)
FERRY CHAIR OCCUPANT	**FERRY CHAIR OCCUPANT**
A. SEAT BELTS - FASTEN B. LIFE VEST - CHECK (DO NOT INFLATE) C. ON PILOTS SIGNAL- BRACE FOR DITCHING D. ABANDON AIRCRAFT THROUGH CABIN DOOR (TAKE LIFE RAFT AND FIRST AID KIT)	A. SEAT BELTS - FASTEN B. LIFE VEST - CHECK (DO NOT INFLATE) C. ON PILOT'S SIGNAL BRACE FOR DITCHING D. ABANDON AIRCRAFT THROUGH CABIN DOOR (TAKE LIFE RAFT AND FIRST AID KIT)

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APPENDIX A

REFERENCES

Reference information for the subject material contained in this manual can be found in the following publications.

AR 70-50	Designating and Naming Defense Equipment, Rockets, and Guided Missiles
AR 95-1	Army Aviation - General Provisions and Flight Regulations
AR 95-16	Weight and Balance - Army Aircraft
AR 380-40	Safeguarding COMSEC Information
AR 385-40	Accident Reporting and Records
AR 700-26	Aircraft Designation System
DA PAM 738-751	Functional User's Manual for the Army Maintenance Management System - Aviation - (TAMMS-A)
FAR Part 91	General Operating and Flight Rules
FM 1-5	Instrument Flying and Navigation for Army Aviators
FM 1-30	Meteorology for Army Aviators
TB 55-9150-200-24	Engine and Transmission Oils, Fuels, and Additives for Army Aircraft
TB AVN 23-13	Anti-Icing, Deicing, and Defrosting Procedures for Parked Aircraft
TB MED 501	Noise and Conservation of Hearing
TM 9-1095-206-13&P	Operator's Aviation Unit Maintenance and Aviation Intermediate Maintenance Manual (Including Repair Parts and Special Tools List) to Dispenser, General Purpose Aircraft: M-130
TM 11-5841-283-20	Organizational Maintenance Manual for Detection Set, Radar Signal AN/APR-39(V)1.
TM 11-5841-291-12	Operator and Organizational Maintenance Manual, Radar Warning System, AN/APR-44(V)1
TM 11-6140-203-14-2	Operator's Organizational, Direct Support, General Support and Depot Maintenance Manual Including Repair Parts and Special Tools List: Aircraft Nickel-Cadmium Batteries
TM 11-6940-214-12	Operator and Organization Maintenance Manual, Simulator, Radar Signal, SM-756/APR-44(V)
TM 55-410	Aircraft Maintenance, Servicing and Ground Handling Under Extreme Environmental Conditions
TM 55-1500-204-25/1	General Aircraft Maintenance Manual
TM 55-1500-314-25	Handling, Storage, and Disposal of Army Aircraft Components Containing Radioactive Materials
TM 55-1500-342-23	Army Aviation Maintenance Manual - Weight and Balance

TM 750-244-1-5	Procedures for the Destruction of Aircraft and Associated Equipment to Prevent Enemy Use
92-30109	Maintenance Manual
92-301 10C	Continuous Inspection Procedures Manual

APPENDIX B
ABBREVIATIONS AND TERMS

For the purpose of this manual, the following abbreviations and terms apply. See appropriate technical manuals for additional terms and abbreviations.

B-1. AIRSPEED TERMINOLOGY.

CAS	Calibrated airspeed is indicated airspeed corrected for position and instrument error.
GS	Ground speed is the speed of the aircraft relative to the ground.
IAS	Indicated airspeed is the speed as shown on the air-no instrument error.
KT	Knots.
M	Mach number. The ratio of true airspeed to the speed of sound.
M_{mo}	Maximum operating Mach number.
TAS	True airspeed is calibrated airspeed corrected for altitude, temperature, pressure, and compressibility effects.
V_1	Takeoff decision speed
V_{50}	Takeoff safety speed is the speed at 50 feet AGL (35 feet AGL with one engine inoperative).
V_a	Maneuvering speed is the maximum speed at which application of full available aerodynamic control will not overstress the aircraft.
V_{enr}	One engine inoperative enroute climb speed.
V_f	Design flap speed is the highest speed permissible at which wing flaps may be actuated.
V_{fe}	Maximum flap extended speed is the highest speed permissible with wing flaps a prescribed extended position.
V_{le}	Maximum landing gear extended speed is the maximum speed at which an aircraft can be safely flown with the landing gear extended. .
V_{lo}	Maximum landing gear operating speed is the maximum speed at which the landing gear can be safely extended or retracted.
V_{mca}	The minimum flight speed at which the aircraft is directionally controllable as determined in accordance with Federal Aviation Regulations. Aircraft Certification conditions include one engine becoming inoperative and propeller feathered; up to a 5° bank toward the operative engine; takeoff power on operative engine; landing gear up; flaps up, and most rearward CG. This speed has been demonstrated to provide satisfactory control above power off stall speed (which varies with weight, configuration, and flight attitude).
V_{mo}	Maximum operating limit speed.
V_r	Rotation speed.
V_{ref}	The indicated airspeed that the aircraft should be at when 50 feet above the runway in the landing configuration.

V_s	Power off stalling speed or the minimum steady flight speed at which the aircraft is controllable.
V_{so}	Stalling speed or the minimum steady flight speed in the landing configuration.
V_{yse}	The safe one-engine inoperative speed selected to provide a reasonable margin against the occurrence of an unintentional stall when making intentional engine cuts.
V_{yse}	The best single-engine rate of climb speed.

B-2. METEOROLOGICAL TERMINOLOGY.

Altimeter Setting	Barometric pressure corrected to sea level.
°C	Degrees Celsius.
°F	Degrees Fahrenheit
FAT	Free air temperature is the free air static temperature, obtained either from ground meteorological sources or from inflight temperature indications adjusted for compressibility effects.
Indicated Pressure Altitude	The number actually read from an altimeter when, the barometric scale (Kollsman window) has been set to 29.92 inches of mercury (1013 millibars).
ISA	International Standard Atmosphere in which: a. The air is a dry perfect gas. b. The temperature at sea level is 59 degrees Fahrenheit, 15 degrees Celsius. c. The pressure at seal level is 29.92 inches Hg. d. The temperature gradient from sea level to the altitude at which the temperature is -69.7 degrees Fahrenheit is -0.003566 Fahrenheit per foot and zero above that altitude.
Pressure Altitude	Indicated pressure altitude corrected for altimeter error.
SL	Sea leveL
Wind	The wind velocities recorded as variables on the charts of this manual are to be understood as the headwind or tailwind components of the actual winds at 50 feet above runway surface (tower winds).

B-3. POWER TERMINOLOGY.

Cruise Climb	Is the maximum power approved for normal climb. This power is torque or temperature (IGT) limited.
Ground Fine	The region of the power lever control which is aft of the idle stop and forward of reversing range where blade pitch angle and gas generator RPM can be changed.
High Idle	Obtained by placing the condition lever in the HIGH IDLE position.
Low Idle	Obtained by placing the condition lever in the LOW IDLE position.
Maximum Cruise Power	Is the highest power rating for cruise and is not time limited.
Maximum Power	The maximum power available from an engine for use during an emergency operation.
Normal Rated Climb Power	The maximum power available from an engine for continuous normal climb operations.
Normal Rated Power	The maximum power available from an engine for continuous operation in cruise (with lower TGT limit than normal rated climb power).

Reverse Thrust	Obtained by lifting the power levers and moving them aft of the beta range.
RPM	Revolutions Per Minute.
SHP	Shaft horsepower. The horsepower imparted to the propeller shaft.
Static Power	The power which must be available for takeoff without exceeding engine limitations.
Takeoff Power	The maximum power available from an engine for takeoff, limited to periods of five minutes duration.

B-4. CONTROL AND INSTRUMENT TERMINOLOGY.

Condition Lever (Fuel Shut-off Lever)	The fuel shut-off lever actuates a valve in the fuel control unit which controls the flow of fuel at the fuel control outlet and regulates the idle range from LOW to HIGH.
N_1 Tachometer (Gas Generator RPM)	The tachometer registers the RPM of the gas generator with 100% representing a gas generator speed of 37,500 RPM.
Power Lever (Gas Generator N_1 RPM)	This lever serves to modulate engine power from full reverse thrust to takeoff. The position for idle represents the lowest recommended level of power for flight operation.
Propeller Control Lever (N_2 RPM)	This lever requests the control to maintain RPM at a selected value and in the maximum decrease RPM position, feathers the propeller.
Propeller Governor	This Governor will maintain the selected propeller speed requested by the propeller control lever.
Torquemeter	The torquemeter system determines the shaft output torque. Torque values are obtained by tapping into two outlets on the reduction gear case and recording the differential pressure from the outlets.
Turbine Gas Temperature (TGT)	Two gages on the instrument panel indicate the temperature between the compressor and power turbines.

B-5. GRAPH AND TABULAR TERMINOLOGY.

AGL	Above ground level.
Best Angle of Climb	The best angle-of-climb speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance with gear and flaps up.
Best Rate of Climb	The best rate-of-climb speed is the airspeed which delivers the greatest gain of altitude in the shortest possible time with gear and flaps up.
Clean Configuration	Gear and flaps up.
Demonstrated Crosswind	The maximum 90° crosswind component for which adequate control of the aircraft during takeoff and landing was actually demonstrated during certification tests.
Gradient	The ratio of the change in height to the horizontal distance, usually expressed in percent.
Landing Weight	The weight of the aircraft at landing touchdown.
Maximum Zero Fuel Weight	Any weight above the value given must be loaded as fuel.
MEA	Minimum Enroute Altitude.
Ramp Weight	The gross weight of the aircraft before engine start. Included is the takeoff weight plus a fuel allowance for start, taxi, run-up and takeoff ground roll to lift-off.

Service Ceiling	The altitude at which the maximum rate of climb of 100 feet per minute can be attained for existing aircraft weight.
Takeoff Weight	The weight of the aircraft at lift-off from the runway.

B-6. WEIGHT AND BALANCE TERMINOLOGY.

Approved Loading Envelope	Those combinations of aircraft weight and center of gravity which define the limits beyond which loading is not approved.
Arm	The distance from the center of gravity of an object to a line about which moments are to be computed.
Basic Empty Weight	The aircraft weight with fixed ballast, unusable fuel, engine oil, engine coolant, hydraulic fluid, and in other respects as required by applicable regulatory standards.
Center-of-Gravity	A point at which the weight of an object may be considered concentrated for weight and balance purposes.
CG Limits	CG limits are the extremes of movement which the CG can have without making the aircraft unsafe to fly. The CG of the loaded aircraft must be within these limits at takeoff, in the air, and on landing.
Datum	A vertical plane perpendicular to the aircraft longitudinal axis from which fore and aft (usually aft) measurements are made for weight and balance purposes.
Engine Oil	That portion of the engine oil which can be drained from the engine.
Landing Weight	The weight of the aircraft at landing touchdown.
Maximum Weight	The largest weight allowed by design, structural, performance or other limitations.
Maximum Zero Fuel Weight	Any weight above the value must be loaded as fuel.
Moment	A measure of the rotational tendency of a weight, about a specified line, mathematically equal to the product of the weight and the arm.
Standard	Weights corresponding to the aircraft as offered with seating and interior, avionics, accessories, fixed ballast and other equipment specified by the manufacturer as composing a standard aircraft.
Station	The longitudinal distance from some point to the zero datum or zero fuselage station.
Takeoff Weight	The weight of the aircraft at liftoff.
Unusable Fuel	The fuel remaining after consumption of usable fuel.
Usable Fuel	That portion of the total fuel which is available for consumption as determined in accordance with applicable regulatory standards.
Useful Load	The difference between the aircraft ramp weight and basic empty weight.

B-7. MISCELLANEOUS ABBREVIATIONS.

A/A	Air to air
AAA	Anti-aircraft artillery
AC	Advisory circular, alternating current
ACCEL	Accelerometer, acceleration
ACS	Avionics control system
ACT	Active
A/D	Analog to digital
ADC	Air data computer
ADF	Automatic direction finder
ADI	Attitude director indicator

AFC	Automatic frequency control
AFCS	Automatic flight control system
A/G	Air to ground
AGC	Automatic gain control
AGL	Above ground level
AI	Airborne interceptor
AJ	Anti-jam
ALM	Almanac
ALSE	Aviation life support equipment
ALT	Altitude
AM	Amplitude modulation
ANT	Antenna
AP, A/P	Autopilot
APPR	Approach
ARINC	Aeronautical radio, inc.
AS, A/S	Airspeed
ASE	Aircraft survivability equipment
ASET	Aircraft survivability equipment training
ATC	Air traffic control
ATT	Attitude
AUX	Auxiliary
AVGAS	Aviation gasoline
AVUM	Aviation unit maintenance
AZ	Azimuth
BARO	Barometric
BAT	Battery
BC	Back course
BCD	Binary coded decimal
BFO	Beat frequency oscillator
BIT	Built-in test
BOT	Bottom
BRG	Bearing
BU	Back-up, battery unit
CAP	Capture
CDI	Course deviation indicator
CDS	Control-display system
CDU	Control-display unit
CH	Channel
CHALS	Coherent high-accuracy airborne location system
CIPH	Cipher
CKLST	Checklist
CKW	Cryptokey weekly
CLR	Clear
CMD	Command
COMM	Communications
COMSEC	Communications security
CONFIG	Configuration
CN	Carrier to noise
CPU	Central processing unit
CRS	Course
CV	Crypto variable
CW	Continuous wave
C/W	Caution/warning
CWA	Caution, warning, and advisory
DA	Drift angle
D/A	Digital to analog
DC	Direct current
DCU	Digital computer unit
DD	Differential doppler
DEG	Degrees
DEL	Delete

DES TRK	Desired track
DEV	Deviation
DFT ANG	Drift Angle
DG	Directional gyro
DH	Decision height
DIAG	Diagnostic
DIR	Direct
DISP	Dispenser
DIST	Distance
DIV	Diverse
DL	Data link
DME	Distance measuring equipment
DN	Down
DOP	Dilution of precision
DOY	Day of the year
DSCRM	Discriminate
DTRK	Desired track
DTS	Data transfer system
DUR	Duration
E	East
EADI	Electronic attitude director indicator
ECCM	Electronic counter-countermeasure
EEPROM	Electronic erasable/programmable read only memory
EFIS	Electronic flight instrument system
EHSI	Electronic horizontal situation indicator
ELEV	Elevation
ELT	Emergency locator transmitter
EMER	Emergency

ENG	Engage
EPE	Estimated position error
ERF	Electronic remote fill
ESV	Error state vector
ET	Elapsed time
EX LOC	Expanded localizer
EXT	External
FAA	Federal aviation administration
FC	Frequency/code
FCC	Flight control computer
FD, F/D	Flight director
FH	Frequency hopping
FH-M	Frequency hopping-master
FLIP	Flight information publications
FLT	Flight
FM	Frequency modulation
FOD	Foreign object damage
FOM	Figure of merit
FP	Flight plan
FPLN	Flight plan
FR, FRM	From
FREQ	Frequency
FS	Fuselage station
FT	Foot or feet
FT-LB	Foot-pounds
FT/MIN	Feet per minute
G	Glideslope
GA, G/A	Go-around
GAL	Gallons
GMAP	Ground mapping
GPS	Global positioning system

GPU	Ground power unit
GS, G/S	Glideslope
GSPD	Ground speed
GUK	Group unique key
GUV	Group unique variable
HDG	Heading
HF	High frequency
HOM	Homing
HR	Hours
HSET	Hopset
HSI	Horizontal situation indicator
HSSP	High speed signal processor
I	Inner marker
ICS	Intercom system
ID	Identification
IDENT	Identification
IDL	Interoperable data link
IFF	Identification, friend or foe
IFR	Instrument flight rules
ILS	Instrument landing system
INIT	Initialize
INOP	Inoperative
INS	Inertial navigation system
INST	Installed
INSUFF	Insufficient
NTPH	Interphone
I/O	Input/output
IP	Instructor pilot
IPF	Integrated processing facility
IRU	Inertial reference unit
IRUE	Inertial reference unit electronics
kHz	Kilohertz
KU	Keyboard unit
L	Left
LAT	Latitude, lateral
LB	Pounds
LED	Light emitting diode
LH	Left hand
LOC	Localizer
LONG	Longitude
LRN	Long range navigation
LRU	Line replaceable unit
LSB	Lower sideband
LSET	Lockout set
LSS	Lightning sensor system
LVC	Line voltage compensation
LX	Lightning sensor system
MAG	Magnetic
MAN	Manual
MAX	Maximum
MDA	Minimum descent altitude
MEM	Memory
MFD	Multifunction display
MHz	Megahertz
MIC	Microphone
MIN	Minimum
MIS	Mission
MM	Middle marker
MON	Monitor
MSL	Missile
MSU	Mode selector unit
MUX	Multiplex
mV	Millivolt
N	North
N/A	Not applicable

NAUT	Nautical
NAV	Navigation
NDB	Non directional beacon
NM	Nautical miles
NOC	Navigation on course
NORM	Normal
NP	Navigation processor
NTPD	Normal temperature and pressure, dry
NU	Navigation unit
OBI	Omni bearing indicator
OBS	Omni bearing selector
OM	Outer marker
OPER	Operate
PATT	Pattern
PB	Pushbutton
PC	Programmable cartridge
PIT	Pitch
PITCH SYNC	Pitch synchronization
PM	Performance monitor
POS	Position
PPC	Performance planning card
PRE	Preset
PREV	Previous
PROM	Programmable read-only memory
PSI	Pounds per square inch
PSIG	Pounds per square inch gage
PVT	Private
PWR	Power
R	Right
RA, R/A	Radio altimeter
RAD ALT	Radio altimeter
RAM	Random access memory
R/C	Rate of climb
RCT	Rain echo attenuation compensation technique
RCV	Receive
RCVR	Receiver
REACT	Rain echo attenuation compensation technique
RG	Rate gyroscope
RH	Right hand
RMI	Radio magnetic indicator
ROL	Roll
RPM	Revolutions per minute
RT	Receiver-transmitter
R/T	Rate of turn
RTU	Remote terminal unit
RUD	Rudder
S	South
SA	Surface to air
SA/A-S	Selective availability/anti-spoofing
SAM	Surface-to-air missile
SAT	Static air temperature
SBY	Standby
SC	Signal conditioner, single channel
SEC	Seconds
SEL	Select
SG	Symbol generator
SID	Standard instrument departure
SINCGARS	Single channel ground and airborne radio system
SPD	Speed
SQ	Squelch
SRN	Short range navigation

SRU	Shop replaceable unit
STBY	Standby
STO	Store
SV	Space vehicle
SYNC	Synchronization
SYS	System
TACAN	Tactical air navigation
TBO	Time between overhauls
TCN	Tactical air navigation
TCS	Touch control steering
TDOA	Time difference of arrival
TEL	Telephone
TEMP	Temperature
TFOM	Time figure of merit
TGT	Target
THRT	Threat
TOD	Time of day
T/R	Transmit and receive
T/R+G	Transmit/receive +guard
TRK	Track
TRK ERR	Track error
TRU HDG	True heading
TS	Test set
TSEC	Transec
TST	Test
TTG	Time to go
TTL	Tuned to localizer
TX	Transmit
UHF	Ultra high frequency
UNVER	Unverified
USB	Upper sideband
UIIL	Utility
UTM	Universal transverse mercator
VAPP	VOR approach
VAR	Variation
VBS	Vertical beam sensor
VER	Verified
VERT	Vertical
VFR	Visual flight rules
VG	Vertical gyro
VHF	Very high frequency
VIP	Video integrated processor
VLD	Valid
VOL	Volume
VOR	VHF omni range
VORTAC	Collocated VOR and TACAN station
VOW	Voice order wire
VRT	Vertical
VS	Vertical speed
VSI	Vertical speed indicator
W	West
WARN	Warning
WOD	Word of the day
WPT	Waypoint
WR	Weather radar
WX	Weather radar
XFR, XFER	Transfer
XM1T	Transmit
XMTR	Transmitter
XTRK DEV	Cross track deviation
YD, Y/D	Yaw damper

INDEX

Subject	Paragraph, Figure, Table Number

Subject	Paragraph, Figure, Table Number

☆US GOVERNMENT PRINTING OFFICE: 1999 733-172/81005

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
06702

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To be distributed in accordance with DA Form 12-31-E, block no. 3426, Unit, Direct and General Support Maintenance requirements for TM 1-1510-223-10.

These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

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To: ls-lp@redstone. army. mil

Subject: DA Form 2028

1. ***From:*** Joe Smith
2. Unit: home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter FName:*** Joe
14. *Submitter MName:* T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** 1
18. *Page:* 2
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINTYOUR UNIT'S COMPLETE ADDRESS)
PFC John DOE
CO A 3rd Engineer Bn
Ft. Leonardwood, MO 63108

DATE SENT 22 August 1992

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 1-1520-250-10	15 June 1992	Operator's manual MH60K Helicopter

BE EXACT PIN-POINT WHERE IT IS — **IN THIS SPACE, TELL WHAT IS WONG AND WHAT SHOULD BE DONE ABOUT IT:**

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.
81		4-3		Callout 16 on figure 4-3 is pointed at a bolt. In key to figure 4-3, item 16 is calle a shim. Please correct one or the other

EXAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE
JOHN DOE, PFC (268) 317-7111	JOHN DOE *John Doe*

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DRSTS-M verprint2, 1 Nov 80

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TEAR ALONG PERFORATED LINE

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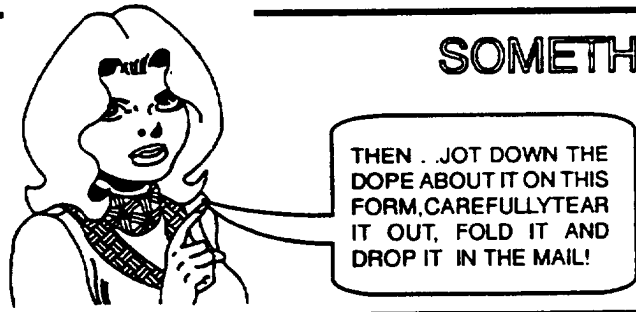

FROM: (PRINTYOUR UNIT'S COMPLETE ADDRESS)

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 1-1510-223-10	29 April 1994	Operator's Manual, RC-12N Aircraft

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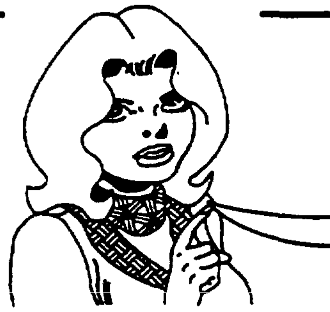

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THE METRIC SYSTEM AND EQUIVALENTS

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 = 3.2808.8 feet

Weights

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

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu in.
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Square measure

1 sq. centimeter = 100 sq. millimeters =.155 sq. in.
1 sq. decimeter = 100 sq. centimeters = 15.5 inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 feet
1 sq. dekameter (are) = 100 sq. meters = 1.076.4 sq. ft.
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 hectometers = .386 sq. miles

Liquid Measure

1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons
1 liter = 10 deciliters = 33.81 fl. ounces
1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3 38 fl. ounces
1 metric ton = 10 quintals = 1.1 short tons

Approximate Conversion Factors

To change	To	Multiply by
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
sq. inches	sq. centimeters	6.451
sq. feet	sq. meters	.093
sq. yards	sq. meters	.836
sq. miles	sq. kilometers	2.590
acres	sq. hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29.573
pints	liters	.472
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound inches	newton-meters	.11296

To change	To	Multiply by
ounce inches	newton-meters	.0070062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
sq. centimeters	sq. inches	.155
sq. meters	sq. yards	10.764
sq. kilometers	sq. miles	1.196
sq. hectometers	acres	2.471
cubic meters	cubic feet	35.315
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102
pound-feet	newton-meters	1.356

Temperature (Exact)

°F Fahrenheit temperature	5/9 (after subtracting 32)	Celsius Temperature °C

PIN 072666-003