CONTENTS

ACRONYM AND ABBREVIATION LIST

AC	advisory circular
AD	airworthiness directive
ADF	automatic direction finder
ADI	attitude director indicator or air data instruments
AFC	automatic frequency control
AFCS	automatic flight control system
AFDS	autopilot flight director system
AFIS	advanced flight instrument system
AFS	automatic flight system
AGL	above ground level
AOA	angle of attack
APFCL	automated pilot factors checklist
ARINC	Aeronautical Radio, Inc.
ASL	above sea level
ATC	air traffic control
BDHI	bearing distance heading indicator
CAC	caution advisory computer
CAS	calibrated airspeed
CAS	computer airspeed
CDI	course deviation indicator
CDU	control display unit
DME	distance measuring equipment (airborne)
DME-P	precision distance measuring equipment
DR	dead reckoning
DR	departure radar control position
EADI	electronic altitude director indicator
EICAS	engine indication and crew alerting system
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FMS	flight management system
4D RNAV	four-dimensional area navigation
GNS	ground navigation system
GS G/S	glideslope or ground speed
HF	high frequency (3-30 MHz)
HSI	horizontal situation indicator
HUD	head-up display
IAS	indicated airspeed
ILS	instrument landing system
ILS	instrument landing system navigation facility
ILS	inventory locator service
INS	inertial navigation system
IRS	inertial reference system
IRU	inertial reference unit
L NAV	lateral navigation
LCD	liquid-crystal display
LED	light emitting diode
LF	low frequency (30-300 kHz)
LFR	low frequency range
LOC	localizer
LORAN	long-range navigation
LORAN C	long-range navigation, Type C, pulsed, hyperbolic, system working on 100 kHz
MLS	microwave landing system
NAV	VHF navigation receiver
NDB	nondirectional beacon

OMEGA	long-range VLF CW, phase comparison, circular or hyperbolic navigation system
ONS	OMEGA navigation system
PFD	primary flight display
RDF	radio direction finder
RDMI	radio distance magnetic indicator
RNAV	partial acronym for area navigation system
SHORAN	short range navigation
T-VOR	partial acronym for terminal very high frequency omnidirectional range
TACAN	tactical air navigational aid (navigation facility)
TAS	true airspeed
TCAS	traffic alert and collision avoidance system
TIA	Type Inspection Authority
TNAV	time navigation (4D)
TSO	Technical Standard Order (FAR Part 37)
UHF	ultrahigh frequency
UHF	ultra-high-frequency (radio communications unit)
VORTAC	VHF omnidirectional range/tactical air navigation
WPT	waypoint
WX	weather
XCVR	transceiver
XPDR	transponder
XXX	Code letters used to avoid identifying a location or navigation facility (ASRS)
XYZ	Code letters used to avoid identifying a location or navigation facility (ASRS)

1.0 INTRODUCTION

This report describes work completed under NASA Contract NAS1-18027, Advanced Transport Aircraft Operating Systems Technology Studies; Task 2, "Pilot Factors Guidelines for Operational Inspection of Navigation Systems." This report describes the work performed and the development of a human-engineered computerized inspection technique. The goal was to develop individual checklists for each identifiable generic navigation system based on pilot factors criteria. Each checklist contains a unique database consisting of human factors design criteria. The shortened title "Nav Handbook" was adopted and used to refer to the program. The computerized handbook is intended for use by FAA inspectors and avionics design engineers.

1.1 PROGRAM TASKS

Six basic tasks were scheduled and completed during the contract period, except Task 3, which was partially completed.

1. Survey and document existing navigation systems.
2. Analyze existing navigation systems and categorize pilot factors considerations. Identify operational procedures and related controls and displays.
3. Develop human-engineered checklists and a supporting relational database of human factors design criteria.
4. Develop guidelines for use of the checklists/database and record/report concepts.
5. Perform operational suitability testing of checklists, users guide, and data records.
6. Develop a draft handbook for reference use by FAA personnel. Document and report results of this study.

2.0 APPROACH AND METHODOLOGY

2.1 MANUFACTURERS' SURVEY

A survey of navigation system manufacturers was conducted. Sales literature, technical publications/manuals, and pilot guides were solicited from selected navigation system manufacturers by telephone request and letter correspondence. Onsite visits were made to a selected group of manufacturers and interviews conducted. Survey trip findings indicated that most companies require design engineers to do human engineering. New designs are logical progressions from previous designs. Larger companies get human engineering support for commercial hardware from their military divisions. See appendix A for a summary of manufacturers contacted and visited, survey trip findings, and type and number of navigation units reviewed.

2.2 PILOT FACTORS AND GENERIC NAVIGATION SYSTEMS

Pilot factors features were identified during the literature review and categorized by generic navigation system.

The navigation equipment survey was organized around 10 identifiable generic navigation systems.

Generic navigation systems:

1) ADF
2) VOR
3) VOR/DME
4) ILS
5) MLS
6) LORAN-C
7) OMEGA/VLF
8) IRS/INS
9) RNAV
10) FMS

Three individualized inspection checklists with tailored database reference data have been completed for three of the systems. Computerized checklists for LORAN-C, OMEGA/VLF, and RNAV were completed and were delivered as soft copy (disks) along with the Zenith Model 181 Lap-Top portable computer.

Control and display listings for each generic navigation system (see appendix B) were derived from the navigation system hardware literature and were categorized by the required operations that were taken from pilot guides. The operations and the controls and displays necessary to effect them were then incorporated into the individual inspection checklists within a standardized flight scenario. Flight scenarios and required generic navigation system operations are shown in appendix C.

3.0 INSPECTION CHECKLIST DEVELOPMENT

3.1 LOGIC TREE STRUCTURE

Each inspection checklist is organized as a decision or "logic" tree. This "tree" is imagined with the leaves at the bottom. As one makes decisions on what to see, one moves down the tree. When finished with a checklist item, one moves back up the tree. One traverses the tree using menu formats. This organizational structure is illustrated by the hard-copy checklist outlines for LORAN-C, OMEGA/VLF, and RNAV that are presented in appendix D.

3.2 INSPECTION CHECKLIST CONSTRUCTION

The manufacturers' survey and analysis resulted in generic navigation system definition, control and display listings, and identified operations within a standard flight scenario. These parameters provided the basis for checklist development. Within the compiled MIL-STD-1472C design criteria database, specific reference paragraphs were identified and dedicated to navigation system characteristics, controls and displays, and operational characteristics. The program "linked" the navigation system characteristics, controls, displays, and operational characteristics unique to each operation within a flight phase with relevant and edited database reference data.

3.3 CHECKLIST FORMAT STANDARDIZATION

All of the operations that occur within each flight phase are broken down into four standard categories: (1) system characteristics, (2) controls, (3) displays, and (4) operational characteristics for each generic navigation system. Each checklist developed for the different generic navigation systems has the same basic organizational structure. This organization provides an ease-of-use feature for inspectors.

3.4 MENUS

The menus are constructed and displayed by the software program. The contents of a menu can be manually entered by constructing menu records that contain all of the options by paragraph title numbers. The program then assembles the menu from an associated text file. An automated text entry feature will read in prepared data that will assemble the menus in correct order and link each menu option with successive menus on through to the last menu that contains only choices. That is, one can go no further down the tree, having arrived at a menu of choices only. All choices are linked to database reference data.

3.5 CHOICES

In a similar fashion, choice records can be manually or automatically assembled. In the manual mode each choice record is constructed by inserting relevant paragraph numbers from the database reference data file. The automated mode reads in prepared data that assembles the choice records and links the choices to relevant paragraphs contained in the database file.

3.6 AUTOMATED TEXT ENTRY AND EDITOR FEATURES

The automated text entry feature developed during the course of the Nav Handbook program is included in the software documentation. This is a standalone piece of software or can be incorporated in the Nav Handbook program soft-copy disks.

The editor feature permits editing of any text in the checklists or the database, modification of menu and choice records, and entry or modification of decisions and comments. The easy-to-use,

full-featured editor is a standalone piece of software or can be incorporated in the Nav Handbook program soft-copy disks.

3.7 USING THE CHECKLIST

The automated checklist has some characteristics similar to a written checklist. Both are "filled in" as they are completed. With the automated checklist, one can fill it in with decisions—accepted, rejected, not applicable, and comments; then select the type of report you want printed. After the report is written, one performs a "Clear Marks" routine and the checklist is ready to be used again, over and over. However, it is suggested that the user make a backup soft copy of the files containing the completed checklist prior to doing a "Clear Marks."

3.8 THE PRINTED REPORT

Two types of hard-copy report are available. One report shows all items to which one made any response, decision, and/or comment. The second report is in summary form and shows only those items that you rejected or on which you made comments or both. See appendix E for a sample report.

3.9 USERS MANUAL

A users manual was developed and is shown in appendix F. The manual presently is in an abbreviated draft form.

4.0 DATABASE DEVELOPMENT

4.1 DATA SOURCES

The listing of references from which the Nav Handbook database is to be compiled is shown in appendix G. At present, selected sections have been taken from MIL-STD-1472C and modified for use as reference data for the three completed checklists. Selection and editing of these reference data were accomplished in such a manner as to include relevant tables. Inclusion of figures is a major software undertaking and far beyond the scope of the present effort. However, tables can easily be typed in, and several are included.

4.2 DATABASE AUTOMATED TEXT ENTRY AND EDITOR

These features are the same as for the checklist. Large blocks of text including tables can be read into program files and modified at any time.

4.3 DESIGNER'S UNIQUE DATABASE ACCESS TECHNIQUE

A technique for accessing the database for design criteria of specific interest to a navigation system designer was identified. Development and demonstration of the technique would require significant software development support and was not completed during the present effort. The technique is a logic tree format of successive menus that would take the designer quickly to the human factors design criteria of interest. A search word feature was considered and would require originally establishing "strings" between search words and specific text paragraphs.

5.0 OPERATIONAL SUITABILITY TESTING

The OMEGA/VLF checklist was selected for operational evaluation. The objective of the testing was to demonstrate the suitability of the Zenith Model 181 Lap-Top computer, the inspection checklist contents, user's procedures, and user's acceptance of the automated approach to evaluating the human factors aspect of navigation systems. The Nav Handbook suitability testing plan and testing report and the questionnaire used are shown in appendix H. One of the most interesting findings is that the automated program is user friendly. Subjects operated the computer program efficiently following a briefing and short hands-on practice session. See appendix H for the complete results of the testing.

6.0 CONCLUSION AND RECOMMENDATION

The concept of an automated human engineered checklist for the evaluation of the human factors aspects of navigation system design has been satisfactorily demonstrated. It is apparent that there are three generic areas of application. The areas are (1) ground TIA, (2) flight TIA, and (3) field approval (see appendix H). Each can be defined by type of content of the resident reference data contained in each checklist. Further definition of the data packages needs to be pursued. The current checklists are most applicable to ground TIA but easily adaptable to the other two.

Ratings from the questionnaires show that the automated checklist has potential for improvement over currently used methods and that it is adaptable to evaluating other systems. Evaluators felt that the evaluated concept could improve the current certification process by as much as 70% to 80% in terms of efficiency and provide a standardized approach.

7.0 DOCUMENTATION

During the Nav Handbook program, seven technical reports were submitted. A manufacturers' survey report (Task 1: Survey and Document Existing Flight Navigation Systems), and a Computer Purchase/Rationale Report (Portable Computer Purchase Analysis) were prepared and submitted. The latter two reports are contained in appendixes A and I, respectively. An Operational Suitability Test Report was written and submitted (appendix H). A software document was prepared and submitted. This document is programmer orientated and contains the code and routines making up the soft-copy portion of the Nav Handbook. This document was delivered under separate cover. An abbreviated users manual was prepared and submitted. It contains information that describes the capabilities of the automated checklist program and how to conduct an inspection and print out a report (see appendix F).

8.0 HARDWARE AND SOFTWARE DELIVERABLES

Two Zenith Model 181-93 Lap-Top computers were purchased complete with MS-DOS 3.2 operating software, Laplink program (links Lap-Top and Desktop), and carrying cases. One computer was delivered with the final report and other program documentation while one was retained at Boeing for further Nav Handbook work.

APPENDIXES

This section contains pilot factors guidelines for the Operational Inspection of Navigation Systems Final Report, appendixes A through I.

APPENDIX A

NAVIGATION HANDBOOK

Survey of manufacturers, onsite visit findings, and listings of navigation units reviewed.

NAVIGATION HANDBOOK

TASK 1: SURVEY AND DOCUMENT EXISTING FLIGHT NAVIGATION SYSTEMS

Task 1 consisted of contacting vendors and manufacturers of navigation equipment relevant to the development of the Nav Handbook. Telephone calls, letters, and onsite visits were the avenues used to solicit and obtain sales literature, brochures, engineering/design manuals, and pilot guides for Nav systems in each generic category of navigation equipment. Onsite visits allowed a firsthand look at the approach manufacturers use to provide human factors support to product development.

On page A3 is a list of manufacturers considered for onsite visits and shows those visited. On page A4 is a summary of observations made resulting from the visits.

A total of 59 manufacturers were contacted by one or more methods; 17 special letters were sent out, and 16 companies were visited. Numbers of telephone contacts were not tabulated.

Page A5 shows how many manufacturers made up each of the generic groups.

MANUFACTURERS OF NAVIGATION SYSTEMS
SURVEY LIST

AERITALIA
AEROJET
AERONETIC
ARNAV
*AIM
*BENDIX
BRITISH AEROSPACE
*COLLINS
COSSOR
DECCA
DELCO
EATON
FAIRCHILD WESTON
FERRANTI
GAFRTNER
*ELECTROSPACE SYSTEMS
FDO
FRMI
GARRETT
GENERAL DYNAMICS
GENERAL ELECTRIC
*GLOBAL
GOODYEAR
GOULD
HARRIS
HAZELTINE
*HONEYWELL
IAI
II MORROW
INTERSTATE ELECTRIC
ITT, AVIONICS DIV.
*KING
*LEAR SIEGLER
*LITTON
LORAL
MAGNAVOX
MARCONI
MC DONNELL DOUGLAS
MITRE
*MOTOROLA
*NARCO AVIONICS
NORTHROP
*OFFSHORE NAVIGATION
PICKINGTON
PLESSEY
RAYTHEON
RHODE & SCHWARYZ
*ROSEMONT
SINGER
SMITH
*SPERRY
SUNDSTRAND
TELEDYNE
THOMPSON—CSF
TRT
*TRACOR
*UNIVERSAL NAVIGATION
WILCOX
WULFSBERG

*Indicates onsite visit and interview completed

SURVEY TRIP FINDINGS

- All indicated ongoing effort in human engineering.
- New designs were logical progressions from previous systems.
- All require design engineers to do human engineering.
- Larger companies get human factors support from their military division, human factors requirements from the customer.
- Collins Avionics has formal human engineering staff for their general aviation product line.

NUMBER OF MANUFACTURERS PER GENERIC NAVIGATION SYSTEM GROUP

Generic Nav system groups	Number of Nav units per group	Manufacturers
LORAN	12	Airnav, Foster Air Data Offshore Nav, II Morrow, Texas Instruments
OMEGA/VLF	12	Global, Canadian Marconi, Garrett (AiResearch) Tracor, Collins, King, Litton
RNAV	15	King, Collins, Foster, Airdata, Narco
IRS/INS	9	Delco, Honeywell, Litton
MLS	3	Bendix, Sperry Corp.
ILS	No data	Narco, King Collins, II Morrow
VOR/DME	34	Narco, King, Collins, II Morrow
VOR	No data	Narco, King, Collins, II Morrow
ADF	15	Narco, King, Foster, Airdata, Collins

APPENDIX B

Listings of system characteristics, controls, displays, and operational characteristics for generic navigation systems LORAN-C, OMEGA/VLF, and RNAV.

RNAV

SYSTEM CHARACTERISTICS

Continuous display of bearing and range to waypoint
Programmable waypoints
Flight plan storage
Commanded display of groundspeed, time to waypoint, and aircraft present position
CDI/HSI steering drive provided
Selectable en route, approach, or crosstrack (parallel offset) steering
Autopilot coupling
VOR/LOC mode
VOR course width
VOR bearing accuracy
LOC course width
DME distance readout
RNAV mode
Waypoint offset distance
Range to waypoint
En route steering course width
Approach steering course width
Crosstrack offset (XTK) steering
Waypoint storage
Self-test of displays and electronic circuitry
Waypoint programming while navigating unless active RNAV waypoint is being programmed
Loran C positioning—LAT/LON coordinates
VORTAC positioning—radial and distance to aircraft from selected VOR/TAC
Combined LORAN C/VORTAC positioning
Primary displays are of bearing and range
Flight performance data available
Linear deviation (nautical miles crosstrack)
DME range corrected for slant range error
Groundspeed
Distance to waypoint
Time to waypoint
Auto transition to dead reckoning
VOR scalloping suppressed
Failure—indication by flag
Auto tuning of VOR and DME with waypoint selection
Waypoint passage alert
Increased sensitivity for RNAV approach—approach mode
Automatic switching to localizer mode with selection of localizer frequency
Outputs to flight director
Outputs to autopilots

Self-test automatically disabled when autopilot engaged or in ILS mode
Units power on with aircraft power or circuit breaker closure
Off Is Out design standard
Initialization messages appear with power on
Diagnostic function—diagnostic tests can be conducted

CONTROLS

Rotary selector switches—discrete action
Pushbutton switches—illuminating
Pushbutton switches—nonilluminating
Pushbutton switches—alternate action
Pushbutton switches—momentary action
Illuminating legend switches
Toggle switches
Stacked knobs—discrete action switches
Thumbwheels
Push-pull switches
Knob—spring-loaded momentary position to start test
Keyboard/keypad—numeric

DISPLAYS

Annunciators
Annunciator and switch combination
Illuminating switch legends/labels
Digital displays
LED displays
Gas discharge displays
Flags
Painted or decal labels
Associated aural display via headset

OPERATIONAL CHARACTERISTICS

Automatic display-dimming feature
Color coding of input controls
Indication of automatic mode changes
Mechanical interlocks—only one key can be down at any one time
Guarded switches—barriers
Scratchpad feature—blinking display prior to entry
Function-specific keys
Parallel data displays
Recessed pushbutton "keys" with surrounding barriers
Feedback from control action
Tactical

Audible
Visual
Lighted keypad
Reach envelope—controls within reach and vision of the normally seated operator
Visual envelope—displays within the primary or secondary visual envelope of the normally seated operator
Grouping and arrangement of controls/displays
Co-located controls for the same function desirable
Similar controls located close together, but controlling different functions not desirable
Confusion with adjacent controls/displays
Indication of self-test in progress
Indication of self-test pass or fail
Prevention of accidental activation
Coding
Color
Size
Flashing/blinking
Inhibited data entry when erroneous data is present
Single keyboard control

OMEGA/VLF

SYSTEM CHARACTERISTICS

Auto position initialization with power on
Auto initialization of date and time
Auto switching between OMEGA/VLF stations
Auto switching between OMEGA/VLF and VOR/DME
Optimized use of VOR, DME, VORTAC, TACAN radio aids plus OMEGA and VLF
Fly-to or direct-to waypoint selection
Auto correction for diurnal effects and receiver clock drift
Self-test/built-in test (BIT) feature
Certified Nav for terminal approach and en route
TAS, ALT, and static air temperature from air data computer are displayed
Dual installation provides assurance of meeting MNPS for North Atlantic
On dual installation, slaved unit will copy Nav data from master unit
On dual installation, either unit or both can be interconnected to the autopilot
Inflight changes accomplished via a single keyboard
VNAV (vertical guidance feature)
Autopilot, HSI, and external annunciator check
Signal outputs to G/S flag, course indicator, BRG to waypoint indicator, VOR/LOC flag and distance display
WX radar interface for pictorial display of Nav data
Data output to passenger information display
Outputs to external annunciators (external to Nav unit)

UNIT ANNUNCIATORS: WARNING ANNUNCIATORS FAULT CODES

Autotune
RNAV MSG
RNAV approach (approach mode)
WPT alert (approaching waypoint)
SYS (system failure)
DR (dead reckoning)
SYN (synchronization)
QUAL (system error exceeds limits)
AMB (ambiguity) LOP geometry is poor and system error exceeds limits
OFFSET (offset course programmed)
VERT (vertical change in altitude)
STD (frequency standard is warming up and stabilizing)
SY (OMEGA receivers synchronizing with OMEGA format)
OMEGA station annunciators (alphas)
VLF station annunciators (numerics)
WARN—red (indicates malfunction)
BATT—red (indicates on internal battery power)

EN ROUTE (VLF/OMEGA signals used for navigation)
APRT (airport) indicates waypoint is an airport
N, E, S, W, L, R, A-H, 1-8, annunciators
Preflight planning and editing—insert or delete a waypoint from active route
Flight plan storage
Flight plan display
Input LAT/LON coordinates
Input waypoint identifiers
Fly great circle route using LAT/LON coordinates
VHF navigational aids and airports stored in computer memory
Fly parallel course (offset track)
Displays distance and bearing to selected waypoint
Displays desired track and crosstrack guidance
Displays TTG and groundspeed
Displays current wind information—vector and speed
Displays autopilot left and right steering
Displays computed time and distance from aircraft to any specified point and between two waypoints
Displays aircraft drift angle, track angle and track angle error
Unit assumes logical mode of entry—alpha mode or numeric mode
Manual entry of HDG, TAS, WIND, GS, DA
Ambiguity resolution
Lane resolution
Grid navigation

CONTROLS

Legend switches (switch lights)
- Function keys
- Selector keys
- Mode keys
- MSG keys
- BRT key
- PWR key
- Dual entry key
- Triple entry key

Key pads
- Alphas
- Numerics

Keyboards (alpha and numeric keys)
Pushbuttons
Toggle switches
Locking toggle switches
Rotary selector switch discrete action
- Turn
- Push
- Pull

Rotary knob switches
- Discrete action
- Continuous action

DISPLAYS

CRTs
- Alphanumerics
- Symbology
- Graphics

LCDs
- Segmented
- Lighted

LEDs
- Dot matrix
- Segmented

Incandescent displays
- Alphanumerics

Fiber optics

Annunciators

Indicators

Illuminating switch legends or labels

Color coding of keys for functional grouping

Color coding of annunciators
- Red
- Green
- Yellow

Flash coding of annunciators

OPERATIONAL CHARACTERISTICS

Direct data entry

Data entry prompting

Scrolling of display pages or lines
- Fast forward
- Fast reverse
- Variable speed

Feedback from control action
- Tactical
- Audible
- Visual

Backlighting
- Group labels
- Panel labels
- Switch positions

Lighted keypad

Reach envelope—controls within reach and vision of the seated operator

Visual envelope—displays within the primary or secondary visual envelope of the seated operator

Prevention of accidental control actuation

Coding

- Color
- Size
- Flashing

Grouping and arrangement of controls and displays

- Controls and displays associated with a specific function are co-located

No confusion with adjacent unit controls/displays

Indication of self-test/BIT in progress

Indication of self-test/BIT pass or fail

Display brightness control

- Discrete steps
- Continuous control
- Automatic

LORAN-C

SYSTEM CHARACTERISTICS

Self-initialization
MAG VAR correction
Way point sequencing/route LEG sequencing
Auto tuning and tracking of LORAN stations
Simultaneous tracking of multiple LORAN chains
ASF correction to reduce signal distortion
Assumption of proper LAT/LON (N, S, E, W)
Recall last waypoint
Self-test/built-in test (BIT) without loss of Nav capability
Display brightness control
Signal calibration—propagation errors corrected
Area calibration—dedicated triad operation
Emergency location of nearest airport
Protection from transients caused by power source change
One touch "fly to," "fly direct" feature
Outputs to drive steering indicators (HSI, CDI, AUTOPILOT)
Computer storage
U.S. public airports
- VOR
- VORTAC
- NDB
- Intersections
- Airport data
- MAG VAR
- Flight plan storage

Flight plan editing capability
V-Nav feature
Waypoint definition by:
- LAT/LON
- Offset
- Time difference
- Present position

Course deviation display
Constant memory for time and date
Displays ETE and groundspeed
Displays ETA
Displays position in LAT/LON
Displays TAS
Displays track and crosstrack error
Displays BRG and distance to waypoint
Displays parallel offset track distance
Displays BRG and range from current position to point of origin

Displays speed and direction of wind
Displays estimate of position error

CONTROLS

Enter keys
Clear keys
Hold keys
Function keys
Dual-entry keys
Mode keys
Soft keys—set up prior to entry
Keypads/keyboards
- A to Z alphas
- 0 to 9 numerics

Control types:
- Push-pull switch
- Pushbutton switch
- Rotary selector with pointer knob detent-type multiple position
- Rotary selector with round knob detent-type multiple position
- Stacked knobs (ganged)
- Knob, continuous action
- Knob, discrete action
- Toggle switch
- Illuminating legend switch (switch light)

Dual-function switches
- Power on combined with brightness control
- Power on combined with BIT initiate

Miniature controls

DISPLAYS

Annunciators
- Poor geometry of stations
- Inadequate or loss of signal
- Power on

Indicators
- Low battery
- Power on

LCD
LED
- Dot matrix and segmented (red, yellow, green)

Fiber optics
Size coding
- Of symbols and characters, no more than two sizes
- Color coding
- Of symbols and characteristics, no more than three colors plus white

Dual readouts

- Two different elements of Nav displayed at one time

Flash/blinking feature
- Characters/cursor/symbols
- Prompting

Sunlight readable displays

Illuminated panel labels
- Switch labels
- Switch position labels

Illuminated LCD for night viewing

"Plain English" display (not coded)

OPERATIONAL CHARACTERISTICS

Direct data entry

Data entry prompting

Scrolling
- Fast forward
- Fast reverse
- Variable speed
- Line by line
- Page by page

Viewing angle adjustment of display

Feedback from control action
- Tactile
- Audible
- Visual

Back lighting
- Group labels
- Switch labels
- Switch positions

Lighted keypad

Reach envelope—controls within reach and vision of the normally seated operator

Visual envelope—displays within the primary or secondary visual envelope of the normally seated operator

Grouping and arrangement of controls/display

Co-located controls for the same function desirable

Similar located close together, but controlling different functions not desirable

Confusion with adjacent controls/display

Indication of self-test/BIT in progress

Indication of self-test/BIT pass or fail

Prevention of accidental activation

Coding
- Color
- Size
- Flashing/blinking

APPENDIX C

Flight scenarios and required generic navigation system operations.

LORAN-C

VOR

VOR/DME

ILS

MLS

INS/IRS

FMS

ADF

LORAN-C

LORAN-C

Before engine start

These steps are to be done only after engine start, with aircraft power supplying the avionics bus. However, these steps may be done before engine start if transients due to a change in power source are not a problem to the unit.

1. Power on.
2. Initiate/observe indication of self-test or built-in test completion.
3. Select master and secondary for appropriate GRI chain.
4. Enter magnetic variation if not automatic.
5. Select waypoint(s) for route of flight using the following:
   a. Stored database routes.
   b. Stored database selection by identifier.
   c. User-stored waypoints.
   d. Create waypoints by latitude/longitude entry.
   e. Create "phantom" waypoints by radial/distance from existing waypoints.
6. Check waypoints and route sequence.
7. Select desired display.

After engine start and taxi

Monitor for proper tracking indications.

Climb and departure

Modify interim waypoints as required to comply with departure routing instructions.

En route

1. Monitor course deviation, distance, and estimated time of arrival to waypoints.
2. Select next waypoint at each crossover if not automatic.
3. Update magnetic variation if not automatic.
4. Select or consent new GRI chain or change secondaries for improved accuracy as needed.

Reroute

1. Enter initial routing of present position to next desired waypoint.

2. Enter subsequent waypoints to destination.

   or

3. Insert, delete, or add waypoints to stored flight plan.

Nonnormal or anomaly

1. Loss of signal due to atmospheric or precipitation static.

   a. Use alternate navigation method.
   b. Depart precipitation or area of atmospheric static.
   c. Select chain or secondaries with better signal-to-noise ratio.

2. Ambiguous position solution (only two lines of position). Designate correct latitude/longitude position.

Descent and approach

1. Select waypoints or route for arrival routing instructions.

2. Select desired crosstrack error or deviation display sensitivity.

Landing

1. Monitor course guidance until runway is in sight for landing.

2. After landing, power off after avionics are shut down.

OMEGA/VLF

Before engine start

1. Power on.
2. Perform display test.
3. Enter date, time, variation, and present position coordinates.
4. Enter waypoints for route of flight.
5. Check waypoints and route sequence.
6. Test autopilot and Nav display interface.

After engine start and taxi

1. Select navigation mode and monitor for proper tracking indications.

Climb and departure

1. Modify interim waypoints as required to comply with departure routing instructions.
2. Select autopilot coupling as appropriate.

En route

1. Modify interim waypoints as required to comply with departure routing instructions.
2. Monitor OMEGA/VLF station and signal status.
3. Enter grid mode if required by unreliable magnetic reference.

Reroute

1. Enter present position to next desired waypoint, or
2. Enter subsequent waypoints to destination.
3. Insert, delete, or add waypoints to stored flight plan.

Nonnormal or anomaly

1. System warning indication: Display status codes and accomplish actions dictated in pilot handbook.

2. Power interruption: Reenter present position, date, and time and waypoints/route of flight.

3. Ambiguity or lane resolution: Accomplish actions recommended in pilot handbook.

Descent and approach

1. Deselect autopilot and Nav display coupling. (OMEGA/VLF is not accurate enough for terminal navigation).

Landing

1. Power off before aircraft power is removed.

RNAV

Before engine start

These steps are to be done only after engine start, with aircraft power supplying the avionics bus. However, these steps may be done before engine start if power source change transients are not a problem to the unit.

1. Power on.

2. Select and load waypoint information for route of flight.

   a. Frequency (if automatic frequency selecting).
   b. Radial/distance.
   c. Elevation (if used).

After engine start and taxi

1. Tune VOR/TAC frequency for first waypoint and verify aural station identifier ("identifier") if possible.

2. Activate first waypoint.

3. Verify correct bearing.

4. Monitor course guidance and departure routing progress.

5. Engage autopilot in VOR/LOC-coupled mode if desired.

En route

1. Monitor course guidance and route progress.

2. At waypoint passage (if not automatic).

   a. As required, tune next VOR/TAC frequency and identify.
   b. Activate nNext waypoint.
   c. Verify correct bearing.

3. Select and load additional waypoints as required to complete en route navigation.

Reroute

1. Select and load new waypoints for revised routing.

2. Activate next waypoint.

3. Monitor course guidance and route progress.

Nonnormal or anomaly

1. Unreliable display or navigation data.

   a. Use alternate navigation method.
   b. Check waypoint information and VOR/TAC tuning.

Descent and approach

1. Select and load waypoints for arrival/approach procedure.
2. Activate waypoints in sequence.
3. Monitor course guidance and routing progress.
4. Select approach sensitivity for final approach course guidance.

Landing

1. Monitor course guidance until runway is in sight for landing.
2. After landing, power off after avionics are shut down.

VOR

Before engine start

Power on only after engine start, with aircraft power supplying the avionics bus. However, this step may be done before engine start if power source change transients are not a problem to the unit.

1. Power on.

After start and taxi

1. Select VOR receiver frequency and verify station aural identifier (identify).
2. Check for correct bearing and course deviation displays.
3. Select initial course in the course selector for navigation display.

En route

1. Monitor course deviation and bearing.
2. At appropriate changeover points, select subsequent VOR frequencies, identify, set desired course, and monitor navigation.
3. Monitor station passages and reset course as required.
4. Engage autopilot in VOR/LOC-coupled mode as desired.

Reroute

1. Select appropriate VOR frequency, identify, set desired course, and monitor bearing and course deviation indications for new routing.

Nonnormal or anomaly

1. Unreliable or no course guidance.
    a. Check receiver tuning and station aural identification.
    b. Climb if appropriate to improve signal reception.
    c. Select another VOR, and change routing if possible.
    d. Use alternate navigation methods.

Descent and approach

1. Select arrival and terminal VOR frequencies, identify, set desired course, and monitor bearing and course deviation for compliance with arrival and approach routing.

Landing

1. Monitor bearing and course deviation until runway is in sight for landing.
2. After landing, power off after avionics are shut down.

VOR/DME

Before engine start

1. Power on (assuming power changeover transients after engine start are not a problem; otherwise power on after engine start).

After start and taxi

1. Select VOR receiver frequency and identify station.
2. Select VOR frequency on DME receiver if not channelized automatically by VOR receiver.
3. Check for correct bearing, course deviation indications, and distance display.
4. Select initial course with the course selector for navigation display.

Climb and departure

1. Monitor course deviation, bearing, and distance for departure navigation.
2. Select subsequent VOR/DME receiver frequencies, identify, set desired course, and monitor navigation information for departure routing compliance.
3. Engage autopilot in navigation mode as desired.

En route

1. Monitor course deviation, bearing, and distance for en route navigation.
2. Select subsequent VOR/DME receiver frequencies, identify, set desired course, and monitor navigation information for en route routing compliance.
3. Monitor station passages and reset course as required.
4. Engage autopilot in navigation mode as desired.

Reroute

1. Select appropriate VOR/DME receiver frequencies, identify, set desired course, and monitor navigation information for new routing.

Nonnormal or anomaly

1. Unreliable or no course/distance guidance
   a. Check receiver tuning and station identification.

b. Climb if appropriate to improve signal reception.
c. Select another VOR/DME, and change routing if indications are normal.
d. Use alternate navigation methods.

Descent and approach

1. Select arrival and terminal VOR/DME frequencies, identify, set desired course, and monitor bearing, course deviation, and distance for compliance with arrival and approach routing.

Landing

1. Monitor bearing, course deviation, and distance until runway is in sight for landing.

2. After landing, power off before aircraft electrical system is shutdown.

ILS

Before Engine Start

These steps are to be done only after engine start, with aircraft power supplying the avionics bus. However, these steps may be done before engine start if power source change transients are not a problem to the unit.

1. Power on.

After start and taxi

Accomplish above if not done before engine start.

Climb and departure

(No action)

En route

(No action)

Reroute

(No action)

Nonnormal or anomaly

1. Unreliable lateral course information.

    a. Check frequency selection.
    b. Change to alternate approach navigation system.

2. Unreliable glideslope information.

    a. Use localizer-only approach procedure.
    b. Change to alternate approach navigation system.

Descent and approach

1. As required by procedure for final approach guidance, select ILS frequency on VOR receiver and verify correct station aural identifier.

2. Set course deviation display heading to published ILS course.

3. Monitor localizer and glideslope deviation displays for flightpath guidance.

Landing

1. Fly approach using displayed localizer and glideslope deviation displays, flight director guidance, or autopilot coupling.

2. At decision altitude, proceed visually to landing or execute missed approach.

3. After landing, power off after avionics are shut down.

MLS

Before engine start

1. Power on.
2. Perform system self-test as applicable.

After start and taxi

(No action)

Climb and departure

(No action)

En route

(No action)

Reroute

(No action)

Nonnormal or anomaly

1. Fault indication or unreliable display.
2. Select azimuth or azimuth offset as published.
3. Set course deviation display heading to corresponding MLS azimuth.
4. Select elevation angle with published limits and aircraft performance capabilities.
5. Monitor azimuth and elevation deviation displays for flightpath guidance.

Landing

1. Fly approach using displayed lateral and vertical deviation displays or autopilot coupling.
2. At decision altitude, proceed visually to landing or execute missed approach.
3. After landing, power off after avionics are shut down.

INS/IRS

Before engine starts

1. Power on (mode selector to standby).
2. Data selector to Position if not automatic at powerup.
3. Use keyboard to enter present position latitude and longitude to the nearest tenth of a minute.

After start and taxi

1. Select INS navigation display and autopilot coupling when appropriate.
2. Monitor course guidance, distance, time to waypoint.
3. Monitor waypoint warning indications and either manually step to next waypoint or observe proper automatic step indications.

En route

1. Monitor course guidance, distance, time to waypoint.
2. Monitor waypoint warning indications and either manually step to next waypoint or observe proper automatic step indications.
3. If position correction by VOR/DME/OMEGA is not automatic, occasionally check and update position passing over known coordinates.
   a. Data selector to Position.
   b. Activate latitude and longitude hold function.
   c. Insert correct latitude and longitude using keyboard.
4. Monitor INS system status.

Reroute

1. Data selector to Waypoint.
2. Insert first waypoint of reroute using waypoint selector and keyboard.
3. Select "from-to" and insert present position to first reroute waypoint using keyboard.
4. Monitor course guidance, distance, and time to waypoint.
5. Insert subsequent waypoints of new routing.

Nonnormal or anomaly

1. Select status display and observe malfunction code(s).
2. Accomplish handbook corrective actions.
3. If navigation information is unreliable and cannot be corrected, change to alternate navigation method.

Descent approach

1. Continue en route navigation procedures until changeover to approach/final approach terminal navigation system (VOR, ILS, MLS, etc.) as required.
2. Power off before shutting down aircraft electrical system.

FMS

Before engine start

1. Power on.
2. Enter time and present position according to initialization menu.
3. Enter performance information according to initialization menu.
4. Enter departure and destination points from database.
5. Enter designated route from database, or manually enter all legs from database.
6. Review route and reconcile discontinuities.
7. Activate route.

After engine start and taxi

Select takeoff performance page for necessary takeoff information.

Climb

1. Select climb performance page for necessary climb information.
2. Select navigation progress page.
3. Select navigation mode of flight director/FMS interface.
4. Engage autopilot as desired.

En route

1. Select cruise performance page for necessary cruise information.
2. Select navigation progress page.
3. Monitor navigation progress.

Reroute

1. Select navigation legs page.
2. Enter new routing legs from database.
3. Review route and reconcile discontinuities.

4. Activate route.

5. Monitor navigation progress page.

Nonnormal or anomaly

1. Use alternate navigation/flight guidance information.

2. Resolve programming/routing errors.

3. If errors are cleared, resume FMS navigation.

Descent and approach

1. Monitor top-of-descent performance information.

2. From Nav database, select landing runway approach and arrival.

3. Review route and reconcile discontinuities.

4. Activate arrival portion of route.

5. Monitor navigation progress page.

6. At appropriate point, deselect navigation mode of flight director and FMS interface.

7. Complete approach as published using discrete navigation data (ADF, VOR, ILS, etc.).

Landing

(No action required)

ADF

Before engine start

These steps may be done only after engine start, with aircraft power supplying the avionics bus. However, these steps may be done before engine start if transients due to a change in power source are not a problem to the unit.

1. Power on.
2. Tune and verify aural identifier of the desired nondirectional beacon (NDB).
3. Select ADF mode.
4. Check bearing display for proper indication.

After start and taxi

Accomplish above if not done before engine start.

En route

1. Monitor bearing for navigation.
2. Tune and identify subsequent NDBs for en route course guidance; select ADF mode and monitor bearing for navigation.

Reroute

Tune and identify subsequent NDB station appropriate to new route; select ADF mode and monitor bearing for navigation.

Nonnormal or anomaly

1. Static discharge or poor signal propagation causes unreliable bearing.
   a. Use alternate or supplemental navigation method until departing region of lightning or precipitation static, or
   b. Tune a stronger station and change routing.

Descent and approach

1. Tune and identify terminal NDB.
2. Select ADF mode.
3. Monitor bearing for arrival and approach procedure navigation.

Landing

1. Monitor bearing until runway is in sight for landing.
2. After landing, power off after avionics are shut down.

APPENDIX D

LORAN-C, OMEGA/VLF, and RNAV checklist outlines with associated reference database paragraph numbers.

CONTENTS:

LORAN-C

1.0 LORAN-C
~FLTPHASES

1.1 BEFORE ENGINE START
~OPS

1.1.1 POWER ON
~STDCAT

1.1.1.1 SYSTEM CHARACTERISTICS
~SC1.1.1.1

1.1.1.2 CONTROLS
~CONTROLS

1.1.1.2.1 PUSHBUTTON SWITCHES
~5.4.3.1.1

1.1.1.2.2 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.1.2.3 PUSH-PULL SWITCHES
~5.4.3.1.8

1.1.1.2.4 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.1.2.5 TOGGLE SWITCHES
~5.4.3.1.4

1.1.1.2.6 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.1.2.6.1 CONTROLS
~5.4

1.1.1.2.6.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.1.2.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.1.3 DISPLAYS
~DISPLAYS

1.1.1.3.1 INDICATORS
~5.2.2.5.2.2.3

1.1.1.3.2 ANNUNCIATORS
~5.2.2

1.1.1.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2

1.1.1.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.1.3.4.1 VISUAL DISPLAYS
~5.2

1.1.1.3.4.2 AUDIO DISPLAYS
~5.3

1.1.1.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.1.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.1.4.1 PROTECTION FROM INADVERTENT CONTROL ACTUATION
~5.4.1.8

1.1.1.4.2 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.1.1.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.1.4.4 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.1.1.5,5.2.2.1,5.2.2.1.10

1.1.1.4.5 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.1.4.5.1 TACTILE
~5.4.1.8.4.14

1.1.1.4.5.2 AUDIBLE
~5.3.3,5.15.3.9

1.1.1.4.5.3 VISUAL
~5.2.1.4

1.1.2 INITIATE/OBSERVE BUILT-IN TEST
~STDCAT

1.1.2.1 SYSTEM CHARACTERISTICS
~SC1.1.2.1

1.1.2.2 CONTROLS
~CONTROLS

1.1.2.2.1 PUSHBUTTON SWITCHES
~5.4.3.1.1

1.1.2.2.2 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.2.2.3 PUSH-PULL SWITCHES
~5.4.3.1.8

1.1.2.2.4 TOGGLE SWITCHES
~5.4.3.1.4

1.1.2.2.5 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.2.2.6 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.2.2.6.1 CONTROLS
~5.4

1.1.2.2.6.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.2.2.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.2.3 DISPLAYS
~DISPLAYS

1.1.2.3.1 ANNUNCIATORS
~5.2.2

1.1.2.3.1.1 BUILT-IN TEST IN PROGRESS
~5.2.2.1.14

1.1.2.3.1.2 BUILT-IN TEST PASS OR FAIL
~5.2.1.3.6,5.2.1.3.7

1.1.2.3.2 DISPLAY OF TEST DATA
~DD

1.1.2.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.1.2.3.2.2 LED
~5.2.6.7,5.2.6.8

1.1.2.3.2.3 FIBER OPTICS
~5.2.2

1.1.2.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.1.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.2.3.4.1 VISUAL DISPLAYS
~5.2

1.1.2.3.4.2 AUDIO DISPLAYS
~5.3

1.1.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.2.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.2.4.1 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.1.2.4.2 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.1.2.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.2.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.2.4.4.1 TACTILE
~5.4.1.8.4.14

1.1.2.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.1.2.4.4.3 VISUAL
~5.2.1.4

1.1.3 SELECT MASTER AND SECONDARY GRI LORAN CHAIN
~STDCAT

1.1.3.1 SYSTEM CHARACTERISTICS
~SC1.1.3.1

1.1.3.2 CONTROLS
~CONTROLS

1.1.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.3.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.1.3.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.3.2.4.1 CONTROLS
~5.4

1.1.3.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.3.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.3.3 DISPLAYS
~DISPLAYS

1.1.3.3.1 ANNUNCIATORS—INADEQUATE SIGNAL OR LOSS OF SIGNAL
~5.2.2

1.1.3.3.2 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.1.3.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.1.3.3.4 DISPLAY STATION IDENTIFIER NUMBERS AND SIGNAL TO NOISE RATIO
~DD

1.1.3.3.4.1 LCD
~5.2.6.9,5.2.6.8

1.1.3.3.4.2 LED
~5.2.6.7,5.2.6.8

1.1.3.3.4.3 FIBER OPTICS
~5.2.2

1.1.3.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.3.3.5.1 VISUAL DISPLAYS
~5.2

1.1.3.3.5.2 AUDIO DISPLAYS
~5.3

1.1.3.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.3.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.3.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.3.4.1 INDICATION OF STATION SIGNAL TUNING/TRACKING/LOCKON
~5.2.1.1

1.1.3.4.2 INDICATION OF INADEQUATE SIGNAL OR LOSS OF SIGNAL
~5.2.1.1

1.1.3.4.3 FLASH CODING TO ATTRACT OPERATOR'S ATTENTION
~5.2.2.1.19

1.1.3.4.4 LIGHTED KEYPAD
~5.2.1.2.1

1.1.3.4.5 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.1.3.4.6 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.3.4.7 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.1.3.4.8 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.3.4.8.1 TACTILE
~5.4.1.8.4.14

1.1.3.4.8.2 AUDIBLE
~5.3.3,5.15.3.9

1.1.3.4.8.3 VISUAL
~5.2.1.4

1.1.4 ENTER MAG VAR
~STDCAT

1.1.4.1 SYSTEM CHARACTERISTICS
~SC1.1.4.1

1.1.4.2 CONTROLS
~CONTROLS

1.1.4.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.4.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.4.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.1.4.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.4.2.4.1 CONTROLS
~5.4

1.1.4.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.4.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.4.3 DISPLAYS
~DISPLAYS

1.1.4.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.1.4.3.2 DISPLAYS OF MAG VAR, YEAR AND VARIATION—POSITION AT SHUTDOWN
~DD

1.1.4.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.1.4.3.2.2 LED
~5.2.6.7,5.2.6.8

1.1.4.3.2.3 FIBER OPTICS
~5.2.2

1.1.4.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.1.4.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.4.3.5.1 VISUAL DISPLAYS
~5.2

1.1.4.3.5.2 AUDIO DISPLAYS
~5.3

1.1.4.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.4.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.4.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.4.4.1 CONTROLS WITHIN REACH AND VISION OF THE SEATED OPERATOR
~5.4.1.3

1.1.4.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.4.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.1.4.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.4.4.4.1 TACTILE
~5.4.1.8.4.14

1.1.4.4.4.2 AUDIBLE
~5.3.3.5.15.3.9

1.1.4.4.4.3 VISUAL
~5.2.1.4

1.1.5 SELECT WAYPOINTS
~STDCAT

1.1.5.1 SYSTEM CHARACTERISTICS
~SC1.1.5.1

1.1.5.2 CONTROLS
~CONTROLS

1.1.5.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.5.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.5.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.1.5.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.5.2.4.1 CONTROLS
~5.4

1.1.5.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.5.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.5.3 DISPLAYS
~DISPLAYS

1.1.5.3.1 DISPLAYS OF WAYPOINTS, DESTINATION AND DEPARTURE POINTS BY LAT/LON
~DD

1.1.5.3.1.1 LCD
~5.2.6.9,5.2.6.8

1.1.5.3.1.2 LED
~5.2.6.7,5.2.6.8

1.1.5.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.1.5.3.3 SWITCH POSITIONS ILLUMINATED
~5.2.2.4

1.1.5.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.5.3.4.1 VISUAL DISPLAYS
~5.2

1.1.5.3.4.2 AUDIO DISPLAYS
~5.3

1.1.5.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.5.3.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.5.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.5.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.1.5.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.5.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.1.5.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.5.4.4.1 TACTILE
~5.4.1.8.4.14

1.1.5.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.1.5.4.4.3 VISUAL
~5.2.1.4

1.1.6 CHECK WAYPOINTS AND ROUTE SEQUENCE
~STDCAT

1.1.6.1 SYSTEM CHARACTERISTICS
~SC1.1.6.1

1.1.6.2 CONTROLS
~CONTROLS

1.1.6.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.6.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.6.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.1.6.2.4 FUNCTION KEYS
~5.15.2.3

1.1.6.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.6.2.5.1 CONTROLS
~5.4

1.1.6.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.6.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.6.3 DISPLAYS
~DISPLAYS

1.1.6.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.1.6.3.2 DISPLAYS WAYPOINT SEQUENCE BY LAT/LON OR WAYPOINT IDENTIFIER
~DD

1.1.6.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.1.6.3.2.2 LED
~5.2.6.7,5.2.6.8

1.1.6.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.1.6.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.6.3.4.1 VISUAL DISPLAYS
~5.2

1.1.6.3.4.2 AUDIO DISPLAYS
~5.3

1.1.6.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.6.3.4.2 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.6.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.6.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.1.6.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.6.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.1.6.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.6.4.4.1 TACTILE
~5.4.1.8.4.14

1.1.6.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.1.6.4.4.3 VISUAL
~5.2.1.4

1.1.7 SELECT DESIRED DISPLAY
~STDCAT

1.1.7.1 SYSTEM CHARACTERISTICS
~SC1.1.7.1

1.1.7.2 CONTROLS
~CONTROLS

1.1.7.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.1.7.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.1.7.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.1.7.2.4 FUNCTION KEYS
~5.15.2.3

1.1.7.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.7.2.5.1 CONTROLS
~5.4

1.1.7.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.7.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.7.3 DISPLAYS
~DISPLAYS

1.1.7.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.1.7.3.2 DISPLAYS WAYPOINT SEQUENCE BY LAT/LON AND WAYPOINT IDENTIFIER
~DD

1.1.7.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.1.7.3.2.2 LED
~5.2.6.7,5.2.6.8

1.1.7.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.1.7.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.1.7.3.4.1 VISUAL DISPLAYS
~5.2

1.1.7.3.4.2 AUDIO DISPLAYS
~5.3

1.1.7.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.7.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.1.7.4 OPERATIONAL CHARACTERISTICS
~OC

1.1.7.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.1.7.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.1.7.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.1.7.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.1.7.4.4.1 TACTILE
~5.4.1.8.4.14

1.1.7.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.1.7.4.4.3 VISUAL
~5.2.1.4

1.2 AFTER ENGINE START AND TAXI
~OPS

1.2.1 MONITOR FOR PROPER TRACKING INDICATIONS
~STDCAT

1.2.1.1 SYSTEM CHARACTERISTICS
~SC1.2.1.1

1.2.1.2 CONTROLS
~CONTROLS

1.2.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.2.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.2.1.2.3 FUNCTION KEYS
~5.15.2.3

1.2.1.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

1.2.1.2.4.1 CONTROLS
~5.4

1.2.1.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.2.1.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.2.1.3 DISPLAYS
~DISPLAYS

1.2.1.3.1 DISPLAY OF NAV FUNCTIONS
~DD

1.2.1.3.1.1 LCD
~5.2.6.9,5.2.6.8

1.2.1.3.1.2 LED
~5.2.6.7,5.2.6.8

1.2.1.3.2 ILLUMINATED SWITCH LEGEND/LABELS
~5.2.2.2,5.2.2.4

1.2.1.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.2.1.3.3.1 VISUAL DISPLAYS
~5.2

1.2.1.3.3.2 AUDIO DISPLAYS
~5.3

1.2.1.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.2.1.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.2.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.2.1.4.1 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.2.1.4.2 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.3 CLIMB AND DEPARTURE
~OPS

1.3.1 MODIFY INTERIM WAYPOINTS AS REQUIRED
~STDCAT

1.3.1.1 SYSTEM CHARACTERISTICS
~SC1.3.1.1

1.3.1.2 CONTROLS
~CONTROLS

1.3.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.3.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.3.1.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.3.1.2.4 FUNCTION KEYS
~5.15.2.3

1.3.1.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.3.1.2.5.1 CONTROLS
~5.4

1.3.1.2.5.2 CONTROLS/DISPLAYS INTEGRATION
~5.1

1.3.1.2.5.3 CONTROLS/DISPLAYS LABELING
~5.5.6.2

1.3.1.3 DISPLAYS

1.3.1.3.1 LCD DISPLAYS
~5.2.6.9,5.2.6.8

1.3.1.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

1.3.1.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.3.1.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.3.4.3.4.1 VISUAL DISPLAYS
~5.2

1.3.4.3.4.2 AUDIO DISPLAYS
~5.3

1.3.4.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.3.4.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.3.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.3.1.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.3.1.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.3.1.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.3.1.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.3.1.4.4.1 TACTILE
~5.4.1.8.4.14

1.3.1.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.3.1.4.4.3 VISUAL
~5.2.1.4

1.4 EN ROUTE
~OPS

1.4.1 MONITOR COURSE DEVIATION, DISTANCE AND ETA TO WAYPOINTS
~STDCAT

1.4.1.1 SYSTEM CHARACTERISTICS
~SC1.4.1.1

1.4.1.2 CONTROLS
~CONTROLS

1.4.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.4.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.4.1.2.3 FUNCTION KEYS
~5.15.2.3

1.4.1.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

1.4.1.2.4.1 CONTROLS
~5.4

1.4.1.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.1.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.1.3 DISPLAYS
~DISPLAYS

1.4.1.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.4.1.3.2 DISPLAY OF NAV FUNCTIONS
~DD

1.4.1.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.4.1.3.2.2 LED
~5.2.6.7,5.2.6.8

1.4.1.3.2.3 FIBER OPTICS
~5.2.2

1.4.1.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.4.1.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.4.1.3.4.1 VISUAL DISPLAYS
~5.2

1.4.1.3.4.2 AUDIO DISPLAYS
~5.3

1.4.1.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.1.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.4.1.4.1 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.4.1.4.2 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.4.2 SELECT NEXT WAYPOINT AT EACH CROSSOVER IF NOT AUTOMATIC
~STDCAT

1.4.2.1 SYSTEM CHARACTERISTICS
~SC1.4.2.1

1.4.2.2 CONTROLS
~CONTROLS

1.4.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.4.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.4.2.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3

1.4.2.2.4 FUNCTION KEYS
~5.15.2.3,5.15.2.2

1.4.2.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.4.2.2.5.1 CONTROLS
~5.4

1.4.2.2.5.2 CONTROLS/DISPLAYS INTEGRATION
~5.1

1.4.2.2.5.3 CONTROLS/DISPLAYS LABELING
~5.5.6.2

1.4.2.3 DISPLAYS
~DISPLAYS

1.4.2.3.1 ILLUMINATED SWITCH POSITIONS
~5.2.2.4

1.4.2.3.2 DISPLAY OF FLIGHT PLAN
~DD

1.4.2.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.4.2.3.2.2 LED
~5.2.6.7,5.2.6.8

1.4.2.3.2.3 FIBER OPTICS
~5.2.2

1.4.2.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.4.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.4.2.3.4.1 VISUAL DISPLAYS
~5.2

1.4.2.3.4.2 AUDIO DISPLAYS
~5.3

1.4.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.2.4 OPERATIONAL CHARACTERISTICS
~OC

1.4.2.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.4.2.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.4.2.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.4.2.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.4.2.4.4.1 TACTILE
~5.4.1.8.4.14

1.4.2.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.4.2.4.4.3 VISUAL
~5.2.1.4

1.4.3 UPDATE MAG VAR IF NOT AUTOMATIC
~STDCAT

1.4.3.1 SYSTEM CHARACTERISTICS
~SC1.4.3.1

1.4.3.2 CONTROLS
~CONTROLS

1.4.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.4.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.4.3.2.3 FUNCTION KEYS
~5.15.2.3

1.4.3.2.4 ALPHANUMERIC KEYPAD
~5.4.3.1.3.5.15.2.2

1.4.3.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.4.3.2.5.1 CONTROLS
~5.4

1.4.3.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.3.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.3.3 DISPLAYS
~DISPLAYS

1.4.3.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.4.3.3.2 DISPLAYS FOR MAG VAR, YEAR, AND VARIATION—POSITION AT SHUTDOWN
~DD

1.4.3.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.4.3.3.2.2 LED
~5.2.6.7,5.2.6.8

1.4.3.3.2.3 FIBER OPTICS
~5.2.2

1.4.3.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.4.3.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.4.3.3.4.1 VISUAL DISPLAYS
~5.2

1.4.3.3.4.2 AUDIO DISPLAYS
~5.3

1.4.3.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.3.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.3.4 OPERATIONAL CHARACTERISTICS
~OC

1.4.3.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.4.3.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.4.3.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.4.3.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.4.3.4.4.1 TACTILE
~5.4.1.8.4.14

1.4.3.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.4.3.4.4.3 VISUAL
~5.2.1.4

1.4.4 SELECT OR CONSENT NEW GRI CHAIN OR CHANGE SECONDARIES
~STDCAT

1.4.4.1 SYSTEM CHARACTERISTICS
~SC1.4.4.1

1.4.4.2 CONTROLS
~CONTROLS

1.4.4.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.4.4.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.4.4.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3.5.15.2.2

1.4.4.2.4 FUNCTION KEYS
~5.15.2.3

1.4.4.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.4.4.2.5.1 CONTROLS
~5.4

1.4.4.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.4.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.4.3 DISPLAYS
~DISPLAYS

1.4.4.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.4.4.3.2 DISPLAYS OF NEW GRI CHAIN AND SECONDARIES
~DD

1.4.4.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.4.4.3.2.2 LED
~5.2.6.7,5.2.6.8

1.4.4.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.4.4.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.4.4.3.4.1 VISUAL DISPLAYS
~5.2

1.4.4.3.4.2 AUDIO DISPLAYS
~5.3

1.4.4.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.4.4.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.4.4.4 OPERATIONAL CHARACTERISTICS
~OC

1.4.4.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.4.4.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.4.4.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.4.4.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.4.4.4.4.1 TACTILE
~5.4.1.8.4.14

1.4.4.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.4.4.4.4.3 VISUAL
~5.2.1.4

1.5 REROUTE
~OPS

1.5.1 ENTER PRESENT POSITION TO NEXT DESIRED WAYPOINT ROUTING
~STDCAT

1.5.1.1 SYSTEM CHARACTERISTICS
~SC1.5.1.1

1.5.1.2 CONTROLS
~CONTROLS

1.5.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.5.1.2.2 ILLUMINATING SWITCH LEGEND
~5.4.3.1.5

1.5.1.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.5.1.2.4 FUNCTION KEYS
~5.15.2.2

1.5.1.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.1.5.2.5.1 CONTROLS
~5.4

1.1.5.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.1.5.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.5.1.3 DISPLAYS
~DISPLAYS

1.5.1.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.5.1.3.2 DISPLAYS OF PRESENT POSITION, DESTINATION, AND WAYPOINTS
~DD

1.5.1.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.5.1.3.2.2 LED
~5.2.6.7,5.2.6.8

1.5.1.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.5.1.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.5.1.3.4.1 VISUAL DISPLAYS
~5.2

1.5.1.3.4.2 AUDIO DISPLAYS
~5.3

1.5.1.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.5.1.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.5.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.5.1.4.1 DIRECT DATA ENTRY
~5.15.2

1.5.1.4.2 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.5.1.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.5.1.4.4 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.5.1.4.5 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.5.1.4.5.1 TACTILE
~5.4.1.8.4.14

1.5.1.4.5.2 AUDIBLE
~5.3.3,5.15.3.9

1.5.1.4.5.3 VISUAL
~5.2.1.4

1.5.2 ENTER SUBSEQUENT WAYPOINTS TO DESTINATION
~STDCAT

1.5.2.1 SYSTEM CHARACTERISTICS
~SC1.5.2.1

1.5.2.2 CONTROLS
~CONTROLS

1.5.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.5.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.5.2.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.5.2.2.4 FUNCTION KEYS
~5.15.2.3

1.5.2.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.5.2.2.5.1 CONTROLS
~5.4

1.5.2.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.5.2.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.5.2.3 DISPLAYS
~DISPLAYS

1.5.2.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.5.2.3.2 DISPLAYS OF SELECTED WAYPOINTS IN LAT/LON OR RADIAL AND DISTANCE
~DD

1.5.2.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.5.2.3.2.2 LED
~5.2.6.7,5.2.6.8

1.5.2.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.5.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.5.2.3.4.1 VISUAL DISPLAYS
~5.2

1.5.2.3.4.2 AUDIO DISPLAYS
~5.3

1.5.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.5.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.5.2.4 OPERATIONAL CHARACTERISTICS
~OC

1.5.2.4.1 DIRECT DATA ENTRY
~5.15.2

1.5.2.4.2 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.5.2.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.5.2.4.4 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.5.2.4.5 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.5.2.4.5.1 TACTILE
~5.4.1.8.4.14

1.5.2.4.5.2 AUDIBLE
~5.3.3.5.15.3.9

1.5.2.4.5.3 VISUAL
~5.2.1.4

1.5.3 INSERT, DELETE, OR ADD WAYPOINTS TO STORED FLIGHT PLAN
~STDCAT

1.5.3.1 SYSTEM CHARACTERISTICS
~SC1.5.3.1

1.5.3.2 CONTROLS
~CONTROLS

1.5.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.5.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.5.3.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.5.3.2.4 FUNCTION KEYS
~5.15.2.3

1.5.3.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.5.3.2.5.1 CONTROLS
~5.4

1.5.3.2.5.2 CONTROLS/DISPLAYS INTEGRATION
~5.1

1.5.3.2.5.3 CONTROLS/DISPLAYS LABELING
~5.5.6.2

1.5.3.3 DISPLAYS
~DISPLAYS

1.5.3.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.5.3.3.2 DISPLAYS OF DELETED AND ADDED WAYPOINTS
~DD

1.5.3.3.2.1 LCD
~5.2.6.9.5.2.6.8

1.5.3.3.2.2 LED
~5.2.6.7.5.2.6.8

1.5.3.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.5.3.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.5.3.3.4.1 VISUAL DISPLAYS
~5.2

1.5.3.3.4.2 AUDIO DISPLAYS
~5.3

1.5.3.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.5.3.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.5.3.4 OPERATIONAL CHARACTERISTICS
~OC

1.5.3.4.1 DIRECT DATA ENTRY
~5.15.2

1.5.3.4.2 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.5.3.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4

1.5.3.4.4 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.5.3.4.5 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.5.4.4.5.1 TACTILE
~5.4.1.8.4.14

1.5.4.4.5.2 AUDIBLE
~5.3.3,5.15.3.9

1.5.4.4.5.3 VISUAL
~5.2.1.4

1.6 NONNORMAL OR ANOMALY
~OPS

1.6.1 LOSS OF SIGNAL
~STDCAT

1.6.1.1 SYSTEM CHARACTERISTICS
~SC1.6.1.1

1.6.1.2 CONTROLS
~CONTROLS

1.6.1.2.1 NONE

1.6.1.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

1.6.1.2.2.1 CONTROLS
~5.4

1.6.1.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.6.1.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.6.1.3 DISPLAYS
~DISPLAYS

1.6.1.3.1 ANNUNCIATORS
~5.2.2

1.6.1.3.2 INDICATORS
~5.2.2,5.2.2.3

1.6.1.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.6.1.3.3.1 VISUAL DISPLAYS
~5.2

1.6.1.3.3.2 AUDIO DISPLAYS
~5.3

1.6.1.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.6.1.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.6.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.6.1.4.1 ANNUNCIATORS AND INDICATORS LOCATED WITHIN A 35 DEGREE LATERAL VISUAL ANGLE
~5.2.6.8.6

1.6.1.4.2 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.6.1.4.3 FLASHING OR BLINKING FEATURE TO ATTRACT ATTENTION
~5.2.2.1.19

1.6.2 AMBIGUOUS POSITION SOLUTION (DISPLAYED POSITION NOTABLY ERRONEOUS)
~STDCAT

1.6.2.1 SYSTEM CHARACTERISTICS
~SC1.6.2.1

1.6.2.2 CONTROLS
~CONTROLS

1.6.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.6.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.6.2.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.6.2.2.4 FUNCTION KEYS
~5.15.2.3

1.6.2.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.6.2.2.5.1 CONTROLS
~5.4

1.6.2.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.6.2.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.6.2.3 DISPLAYS
~DISPLAYS

1.6.2.3.1 SWITCH POSITION ILLUMINATED
~5.2.2.4

1.6.2.3.2 DISPLAYS OF LAT/LON POSITIONS
~DD

1.6.2.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.6.2.3.2.2 LED
~5.2.6.7,5.2.6.8

1.6.2.3.2.3 FIBER OPTICS
~5.2.2

1.6.2.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.6.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.6.2.3.4.1 VISUAL DISPLAYS
~5.2

1.6.2.3.4.2 AUDIO DISPLAYS
~5.3

1.6.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.6.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.6.2.4 OPERATIONAL CHARACTERISTICS
~OC

1.6.2.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.6.2.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.6.2.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.6.2.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.6.2.4.4.1 TACTILE
~5.4.1.8.4.14

1.6.2.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.6.2.4.4.3 VISUAL
~5.2.1.4

1.7 DESCENT/APPROACH
~OPS

1.7.1 SELECT WAYPOINTS/ROUTE FOR ARRIVAL ROUTING INSTRUCTIONS
~STDCAT

1.7.1.1 SYSTEM CHARACTERISTICS
~SC1.7.1.1

1.7.1.2 CONTROLS
~CONTROLS

1.7.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

1.7.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.7.1.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.7.1.2.4 FUNCTION KEYS
~5.15.2.3

1.7.1.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.7.1.2.5.1 CONTROLS
~5.4

1.7.1.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.7.1.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.7.1.3 DISPLAYS
~DISPLAYS

1.7.1.3.1 SWITCH POSITIONS ILLUMINATED
~5.2.2.4

1.7.1.3.2 DISPLAY OF ROUTING FOR ARRIVAL
~DD

1.7.1.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.7.1.3.2.2 LED
~5.2.6.7,5.2.6.8

1.7.1.3.2.3 FIBER OPTICS
~5.2.2

1.7.1.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.7.1.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.7.1.3.4.1 VISUAL DISPLAYS
~5.2

1.7.1.3.4.2 AUDIO DISPLAYS
~5.3

1.7.1.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.7.1.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.7.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.7.1.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.7.1.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.7.1.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.7.1.4.4 CONTROL ACTUATION FEEDBACK

1.7.1.4.4.1 TACTILE
~5.4.1.8.4.14

1.7.1.4.4.2 AUDIBLE
~5.3.3.5.15.3.9

1.7.1.4.4.3 VISUAL
~5.2.1.4

1.7.2 SELECT DESIRED CROSSTRACK ERROR/DEVIATION DISPLAY SENSITIVITY
~STDCAT

1.7.2.1 SYSTEM CHARACTERISTICS
~SC1.7.2.1

1.7.2.2 CONTROLS
~CONTROLS

1.7.2.2.1 ROTARY SELECTOR SWITCH
~5.4.2.1.1

1.7.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.7.2.2.3 ALPHANUMERIC KEYPAD
~5.4.3.1.3,5.15.2.2

1.7.2.2.4 FUNCTION SWITCHES
~5.15.2.3

1.7.2.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

1.7.2.2.5.1 CONTROLS
~5.4

1.7.2.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.7.2.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.7.2.3 DISPLAYS
~DISPLAYS

1.7.2.3.1 SWITCH POSITIONS ILLUMINATED
~5.2.2.4

1.7.2.3.2 DISPLAY OF CROSSTRACK DISTANCE SENSITIVITY
~DD

1.7.3.2.3.1 LCD
~5.2.6.9,5.2.6.8

1.7.3.2.3.2 LED
~5.2.6.7,5.2.6.8

1.7.3.2.3.3 FIBER OPTICS
~5.2.2

1.7.2.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.7.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.7.2.3.4.1 VISUAL DISPLAYS
~5.2

1.7.2.3.4.2 AUDIO DISPLAYS
~5.3

1.7.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.7.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.7.2.4 OPERATIONAL CHARACTERISTICS
~OC

1.7.2.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

1.7.2.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.7.2.4.3 ADEQUATE DISPLAY BRIGHTNESS
~5.2.1.2,5.2.2.1.10,5.1.1.5

1.7.2.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

1.7.2.4.4.1 TACTILE
~5.4.1.8.4.14

1.7.2.4.4.2 AUDIBLE
~5.3.3,5.15.3.9

1.7.2.4.4.3 VISUAL
~5.2.1.4

1.8 LANDING
~OPS

1.8.1 MONITOR COURSE GUIDANCE UNTIL RUNWAY IS IN SIGHT FOR LANDING
~STDCAT

1.8.1.1 SYSTEM CHARACTERISTICS
~SC1.8.1.1

1.8.1.2 CONTROLS
~CONTROLS

1.8.1.2.1 FLIGHT CONTROLS (NO REFERENCE DATA)

1.8.1.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

1.8.1.2.2.1 CONTROLS
~5.4

1.8.1.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.8.1.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.8.1.3 DISPLAYS
~DISPLAYS

1.8.1.3.1 FLIGHT DISPLAYS (NO REFERENCE DATA)

1.8.1.3.2 DISPLAY OF APPROPRIATE NAV DATA
~DD

1.8.1.3.2.1 LCD
~5.2.6.9,5.2.6.8

1.8.1.3.2.2 LED
~5.2.6.7,5.2.6.8

1.8.1.3.2.3 FIBER OPTICS
~5.2.2

1.8.1.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.8.1.3.3.1 VISUAL DISPLAYS
~5.2

1.8.1.3.3.2 AUDIO DISPLAYS
~5.3

1.8.1.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.8.1.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.8.1.4 OPERATIONAL CHARACTERISTICS
~OC

1.8.1.4.1 DISPLAYS WITHIN PRIMARY AND SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

1.8.2 AFTER LANDING, POWER OFF WITH AVIONICS SHUTDOWN
~STDCAT

1.8.2.1 SYSTEM CHARACTERISTICS
~SC1.8.2.1

1.8.2.2 CONTROLS
~CONTROLS

1.8.2.2.1 PUSHBUTTON SWITCHES
~5.4.3.1.1

1.8.2.2.2 ROTARY SELECTOR SWITCH
~5.4.2.1.1

1.8.2.2.3 PUSH-PULL SWITCHES
~5.4.3.1.8

1.8.2.2.4 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

1.8.2.2.5 TOGGLE SWITCHES
~5.4.3.1.5

1.8.2.2.6 GENERAL INFORMATION ON CONTROLS
~GIOC

1.8.2.2.6.1 CONTROLS
~5.4

1.8.2.2.6.2 CONTROL/DISPLAY INTEGRATION
~5.1

1.8.2.2.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

1.8.2.3 DISPLAYS
~DISPLAYS

1.8.2.3.1 INDICATORS
~5.2.2,5.2.2.3

1.8.2.3.2 ANNUNCIATORS
~5.2.2

1.8.2.3.3 DISPLAYS OF ALPHANUMERIC DATA
~DD

1.8.2.3.3.1 LCD
~5.2.6.9,5.2.6.8

1.8.2.3.3.2 LED
~5.2.6.7,5.2.6.8

1.8.2.3.3.3 FIBER OPTICS
~5.2.2

1.8.2.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

1.8.2.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

1.8.2.3.5.1 VISUAL DISPLAYS
~5.2

1.8.2.3.5.2 AUDIO DISPLAYS
~5.3

1.8.2.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

1.8.2.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

1.8.2.4 OPERATIONAL CHARACTERISTICS
~OC

1.8.2.4.1 PROTECTION FROM INADVERTENT CONTROL ACTUATION—TURN OFF
~5.4.1.8

2.0 OMEGA/VLF
~FLTPHASES

2.1 BEFORE ENGINE START
~OPS

2.1.1 POWER ON
~STDCAT

2.1.1.1 SYSTEM CHARACTERISTICS
~SC2.1.1.1

2.1.1.2 CONTROLS
~CONTROLS

2.1.1.2.1 ROTARY KNOBS
~5.4.2.2

2.1.1.2.2 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.1.1.2.3 TOGGLE SWITCHES
~5.4.3.1.4

2.1.1.2.3.1 PUSH
~5.4.3.1.4.2

2.1.1.2.3.2 TURN
~5.4.3.1.4.2

2.1.1.2.3.3 PULL AND TURN
~5.4.3.1.4.2

2.1.1.2.4 LOCKING TOGGLE SWITCHES
~5.4.3.1.4

2.1.1.2.5 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.1.1.2.6 GENERAL INFORMATION ON CONTROLS
~GIOC

2.1.1.2.6.1 CONTROLS
~5.4

2.1.1.2.6.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.1.2.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.1.3 DISPLAYS
~DISPLAYS

2.1.1.3.1 CRTs
~5.2.4

2.1.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.1.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.1.1.3.4 INCANDESCENT
~5.2.2

2.1.1.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.1.1.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.1.1.3.6.1 VISUAL DISPLAYS
~5.2

2.1.1.3.6.2 AUDIO DISPLAYS
~5.2

2.1.1.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.1.3.6.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.1.1.4.1 PROTECTION FROM INADVERTENT CONTROL ACTUATION
~5.4.1.8

2.1.1.4.2 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

2.1.1.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

2.1.1.4.4 CONTROL ACTUATION FEEDBACK
~5.1.1.4

2.1.1.4.5.1 TACTILE
~5.4.1.8.4.14

2.1.1.4.5.2 AUDIBLE
~5.3.3,5.15.3.9

2.1.1.4.5.3 VISUAL
~5.3.3,5.15.3.9

2.1.2 PERFORM DISPLAY TEST
~STDCAT

2.1.2.1 SYSTEM CHARACTERISTICS
~SC2.1.2.1

2.1.2.2 CONTROLS
~CONTROLS

2.1.2.2.1 ROTARY KNOB
~5.4.2.2

2.1.2.2.2 ROTARY SELECTOR SWITCH-DISCRETE ACTION
~5.4.2.1.1

2.1.2.2.3 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.1.2.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

2.1.2.2.4.1 CONTROLS
~5.4

2.1.2.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.2.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.2.3 DISPLAYS
~DISPLAYS

2.1.2.3.1 CRTs
~5.2.4

2.1.2.3.2 LCDs
~5.2.6.9,5.2.6.8

2.1.2.3.3 LEDs
~5.2.6.7,5.2.6.8

2.1.2.3.4 INCANDESCENT
~5.2.2

2.1.2.3.5 ILLUMINATING SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.1.2.3.6 ANNUNCIATORS
~5.2.2

2.1.2.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.1.2.3.7.1 VISUAL DISPLAYS
~5.2

2.1.2.3.7.2 AUDIO DISPLAYS
~5.3

2.1.2.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.2.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.2.4 OPERATIONAL CHARACTERISTICS
~OC

2.1.2.4.1 INDICATION OF SELF-TEST/BUILT-IN TEST IN PROGRESS
~5.2.2.1.14

2.1.2.4.2 INDICATION OF SELF-TEST/BUILT-IN TEST PASS OR FAIL
~5.2.1.3.6,5.2.1.3.7

2.1.2.4.3 DISPLAY BRIGHTNESS CONTROL
~5.1.1.5,5.2.1.2

2.1.2.4.3.1 DISCRETE STEPS
~5.2.2.1.10

2.1.2.4.3.2 CONTINUOUS ADJUSTMENT
~5.2.2.1.10

2.1.2.4.3.3 AUTOMATIC
~5.2.2.1.10

2.1.3 ENTER DATE, TIME, VARIATION AND PRESENT POSITION COORDINATES
~STDCAT

2.1.3.1 SYSTEM CHARACTERISTICS
~SC2.1.3.1

2.1.3.2 CONTROLS
~CONTROLS

2.1.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.1.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.2.2.2,5.2.2.4

2.3.2.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.3.2.2.3.1 CONTROLS
~5.4

2.3.2.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.3.2.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.3.3 DISPLAYS
~DISPLAYS

2.1.3.3.1 CRTs
~5.2.5.1

2.1.3.3.2 LCDs
~5.2.6.9,5.2.6.8

2.1.3.3.3 LEDs
~5.2.6.7,5.2.6.8

2.1.3.3.4 INCANDESCENT
~5.2.2

2.1.3.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.1.3.3.6 ANNUNCIATORS
~5.2.2

2.1.3.3.7 GENERAL INFORMATION DISPLAYS
~GIOD

2.1.3.3.7.1 VISUAL DISPLAYS
~5.2

2.1.3.3.7.2 AUDIO DISPLAYS
~5.3

2.1.3.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.3.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.3.4 OPERATIONAL CHARACTERISTICS
~OC

2.1.3.4.1 SCROLLING OF DISPLAY PAGES/LINES
~5.15.3.1.11

2.1.3.4.2 DISPLAY BRIGHTNESS CONTROL
~5.2.1.2,5.2.2.1.10,5.1.1.5

2.1.4 ENTER WAYPOINTS FOR ROUTE OF FLIGHT
~STDCAT

2.1.4.1 SYSTEM CHARACTERISTICS
~SC2.1.4.1

2.1.4.2 CONTROLS
~CONTROLS

2.1.4.2.1 ROTARY SELECTOR SWITCHES—DISCRETE ACTION
~5.4.2.1.1

2.1.4.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.1.4.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.1.4.2.3.1 CONTROLS
~5.4

2.1.4.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.4.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.4.3 DISPLAYS
~DISPLAYS

2.1.4.3.1 CRTs
~5.2.5.1

2.1.4.3.2 LCDs
~5.2.6.9,5.2.6.8

2.1.4.3.3 LEDs
~5.2.6.7,5.2.6.8

2.1.4.3.4 INCANDESCENT
~5.2.2

2.1.4.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.1.4.3.6 ANNUNCIATORS
~5.2.2

2.1.4.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.1.4.3.7.1 VISUAL DISPLAYS
~5.2

2.1.4.3.7.2 AUDIO DISPLAYS
~5.3

2.1.4.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.4.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.4.4 OPERATIONAL CHARACTERISTICS
~OC

2.1.4.4.1 DIRECT DATA ENTRY
~5.15.2

2.1.4.4.2 CONTROL ACTUATION FEEDBACK
~5.1.1.4,5.15.3.9.1

2.1.4.4.3 CONTROLS AND DISPLAYS ASSOCIATED WITH A SPECIFIC FUNCTION ARE CO-LOCATED
~5.4.1.3

2.1.4.4.4 NO CONFUSION WITH ADJACENT UNIT CONTROL/DISPLAY
~5.1.2.3.7

2.1.4.4.5 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

2.1.4.4.6 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

2.1.5 CHECK WAYPOINTS AND ROUTE SEQUENCE
~STDCAT

2.1.5.1 SYSTEM CHARACTERISTICS
~SC2.1.5.1

2.1.5.2 CONTROLS
~CONTROLS

2.1.5.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.1.5.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.1.5.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.1.5.2.3.1 CONTROLS
~5.4

2.1.5.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.5.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.5.3 DISPLAYS
~DISPLAYS

2.1.5.3.1 CRTs
~5.2.5.1

2.1.5.3.2 LCDs
~5.2.6.9,5.2.6.8

2.1.5.3.3 LEDs
~5.2.6.7,5.2.6.8

2.1.5.3.4 INCANDESCENT
~5.2.2

2.1.5.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.1.5.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.1.5.3.6.1 VISUAL DISPLAYS
~5.2

2.1.5.3.6.2 AUDIO DISPLAYS
~5.3

2.1.5.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.5.3.6.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.5.4 OPERATIONAL CHARACTERISTICS
~OC

2.1.5.4.1 DIRECT DATA ENTRY
~5.15.2

2.1.5.4.2 CONTROL ACTUATION FEEDBACK
~5.1.1.4,5.15.3.9.1

2.1.5.4.3 SCROLLING OF DISPLAY PAGES/LINES
~5.15.3.1.11

2.1.6 TEST AUTOPILOT AND NAV DISPLAY INTERFACE
~STDCAT

2.1.6.1 SYSTEM CHARACTERISTICS
~SC2.1.6.1

2.1.6.2 CONTROLS
~CONTROLS

2.1.6.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.1.6.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.1.6.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.1.6.2.3.1 CONTROLS
~5.4

2.1.6.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.6.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.6.3 DISPLAYS
~DISPLAYS

2.1.6.3.1 CRTs
~5.2.6.9,5.2.6.8

2.1.6.3.2 LCDs
~5.2.6.9,5.2.6.8

2.1.6.3.3 LEDs
~5.2.6.7,5.2.6.8

2.1.6.3.4 INCANDESCENT
~5.2.2

2.1.6.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.1.6.3.6 ANNUNCIATORS
~5.2.2

2.1.6.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.1.6.3.7.1 VISUAL DISPLAYS
~5.2

2.1.6.3.7.2 AUDIO DISPLAYS
~5.3

2.1.6.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.1.6.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.1.6.4 OPERATIONAL CHARACTERISTICS
~OC

2.1.6.4.1 FEEDBACK FROM CONTROL ACTION
~5.1.1.4

2.1.6.4.1.1 TACTILE
~5.4.1.8.4.14

2.1.6.4.1.2 AUDIBLE
~5.3.3,5.15.3.9

2.1.6.4.1.3 VISUAL
~5.2.1.4

2.2 AFTER ENGINE START AND TAXI
~OPS

2.2.1 SELECT NAV MODE AND MONITOR FOR PROPER TRACKING INDICATIONS
~STDCAT

2.2.1.1 SYSTEM CHARACTERISTICS
~SC2.2.1.1

2.2.1.2 CONTROLS
~CONTROLS

2.2.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.2.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.2.1.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.2.1.2.1 CONTROLS
~5.4

2.2.1.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.2.1.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.2.1.3 DISPLAYS
~DISPLAYS

2.2.1.3.1 CRTs
~5.2.5.1

2.2.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.2.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.2.1.3.4 INCANDESCENT
~5.2.2

2.2.1.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.2.1.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.2.1.3.6.1 VISUAL DISPLAYS
~5.2

2.2.1.3.6.2 AUDIO DISPLAYS
~5.3

2.2.1.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.2.1.3.6.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.2.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.2.1.4.1 CONFUSION WITH ADJACENT UNIT CONTROL/DISPLAY
~5.1.2.3.7

2.3 CLIMB AND DEPARTURE
~OPS

2.3.1 MODIFY INTERIM WAYPOINTS AS REQUIRED TO COMPLY WITH DEPARTURE ROUTING INSTRUCTIONS
~STDCAT

2.3.1.1 SYSTEM CHARACTERISTICS
~SC2.3.1.1

2.3.1.2 CONTROLS
~CONTROLS

2.3.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.3.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.3.1.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

2.3.1.2.2.1 CONTROLS
~5.4

2.3.1.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.3.1.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.3.1.3 DISPLAYS
~DISPLAYS

2.3.1.3.1 CRTs
~5.2.5.1

2.3.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.3.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.3.1.3.4 INCANDESCENT
~5.2.2

2.3.1.3.5 ANNUNCIATORS
~5.2.2

2.3.1.3.6 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.3.1.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.3.1.3.6.1 VISUAL DISPLAYS
~5.2

2.3.1.3.6.2 AUDIO DISPLAYS
~5.3

2.3.1.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.3.1.3.6.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.3.2 OPERATIONAL CHARACTERISTICS
~OC

2.3.2.1 DIRECT DATA ENTRY
~5.15.2

2.3.2.2 DATA ENTRY PROMPTING
~5.15.6,5.15.6.1

2.3.2.3 SCROLLING OF DISPLAY PAGES/LINES
~5.15.3.1.11

2.3.2.4 FEEDBACK FROM CONTROL ACTION
~5.1.1.4

2.3.2.4.1 TACTILE
~5.4.1.8.4.14

2.3.2.4.2 AUDIBLE
~5.3.3,5.15.3.9

2.3.2.4.3 VISUAL
~5.2.1.4

2.3.3 SELECT AUTOPILOT COUPLING AS APPROPRIATE
~STDCAT

2.3.3.1 SYSTEM CHARACTERISTICS
~SC2.3.3.1

2.3.3.2 CONTROLS
~CONTROLS

2.3.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.3.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.3.3.2.3 GENERAL INFORMATION ON CONTROLS
~G10C

2.3.3.2.3.1 CONTROLS
~5.4

2.3.3.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.3.3.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.3.3.3 DISPLAYS
~DISPLAYS

2.3.3.3.1 CRTs
~5.2.5.1

2.3.3.3.2 LCDs
~5.2.6.9,5.2.6.8

2.3.3.3.3 LEDs
~5.2.6.7,5.2.6.8

2.3.3.3.4 INCANDESCENT
~5.2.2

2.3.3.3.5 ILLUMINATING SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.3.3.3.6 ANNUNCIATORS
~5.2.2

2.3.3.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.3.3.3.7.1 VISUAL DISPLAYS
~5.2

2.3.3.3.7.2 AUDIO DISPLAYS
~5.3

2.3.3.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.3.3.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.3.4 OPERATIONAL CHARACTERISTICS
~OC

2.3.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

2.3.4.2 CONFUSION WITH ADJACENT UNIT CONTROL/DISPLAY
~5.1.2.3.7

2.4 EN ROUTE
~OPS

2.4.1 MODIFY INTERIM WAYPOINTS AS REQUIRED TO COMPLY WITH DEPARTURE ROUTING INSTRUCTIONS
~STDCAT

2.4.1.1 SYSTEM CHARACTERISTICS
~SC2.4.1.1

2.4.1.2 CONTROLS
~CONTROLS

2.4.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.4.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.4.1.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.4.1.2.3.1 CONTROLS
~5.4

2.4.1.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.4.1.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.4.1.3 DISPLAYS
~DISPLAYS

2.4.1.3.1 CRTs
~5.2.5.1

2.4.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.4.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.4.1.3.4 INCANDESCENT
~5.2.2

2.4.1.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.4.1.3.6 ANNUNCIATORS
~5.2.2

2.4.1.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.4.1.3.7.1 VISUAL DISPLAYS
~5.2

2.4.1.3.7.2 AUDIO DISPLAYS
~5.3

2.4.1.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.4.1.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.4.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.4.1.4.1 DIRECT DATA ENTRY
~5.15.2

2.4.1.4.2 DATA ENTRY PROMPTING
~5.15.6,5.15.6.1

2.4.1.4.3 CONTROL ACTUATION FEEDBACK
~5.1.1.4

2.4.1.4.4 CONTROLS AND DISPLAYS ASSOCIATED WITH A SPECIFIC FUNCTION ARE CO-LOCATED
~5.1.2.2

2.4.1.4.5 NO CONFUSION WITH ADJACENT CONTROL/DISPLAY
~5.1.2.3.7

2.4.1.4.6 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

2.4.1.4.7 DISPLAYS WITHIN PRIMARY AND SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

2.4.2 MONITOR OMEGA/VLF STATION AND SIGNAL STATUS
~STDCAT

2.4.2.1 SYSTEM CHARACTERISTICS
~SC2.4.2.1

2.4.2.2 CONTROLS
~CONTROLS

2.4.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.4.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.4.2.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.4.2.2.3.1 CONTROLS
~5.4

2.4.2.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.4.2.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.4.2.3 DISPLAYS
~DISPLAYS

2.4.2.3.1 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.4.2.3.2 ANNUNCIATORS
~5.2.2

2.4.2.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.4.2.3.3.1 VISUAL DISPLAYS
~5.2

2.4.2.3.3.2 AUDIO DISPLAYS
~5.3

2.4.2.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.4.2.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.4.2.4 OPERATIONAL CHARACTERISTICS
~OC

2.4.2.4.2 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4,5.2.6.8.6

2.4.2.4.3 COLOR CODING OF ANNUNCIATORS
~5.2.1.5,5.2.2.1.18

2.4.3 ENTER GRID MODE IF REQUIRED BY UNRELIABLE MAGNETIC REFERENCE
~STDCAT

2.4.3.1 SYSTEM CHARACTERISTICS
~SC2.4.3.1

2.4.3.2 CONTROLS
~CONTROLS

2.4.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.4.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.4.3.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.4.3.2.3.1 CONTROLS
~5.4

2.4.3.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.4.3.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.4.3.3 DISPLAYS
~DISPLAYS

2.4.3.3.1 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.4.3.3.2 ANNUNCIATORS
~5.2.2

2.4.3.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.4.3.3.3.1 VISUAL DISPLAYS
~5.2

2.4.3.3.3.2 AUDIO DISPLAYS
~5.3

2.4.3.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.4.3.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.4.3.4 OPERATIONAL CHARACTERISTICS
~OC

2.4.3.4.1 DIRECT DATA ENTRY
~5.15.2

2.5 REROUTE
~OPS

2.5.1 ENTER PRESENT POSITION TO NEXT DESIRED WAYPOINT
~STDCAT

2.5.1.1 SYSTEM CHARACTERISTICS
~SC2.5.1.1

2.5.1.1.1 PREFLIGHT PLANNING AND EDITING

2.5.1.1.2 UNIT ASSUMES LOGICAL MODE OF ENTRY-ALPHA MODE AND NUMERICAL MODE

2.5.1.1.3 FLY-TO OR DIRECT-TO WAYPOINT SELECTION

2.5.1.2 CONTROLS
~CONTROLS

2.5.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.5.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.5.1.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.5.1.2.3.1 CONTROLS
~5.4

2.5.1.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.5.1.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.5.1.3 DISPLAYS
~DISPLAYS

2.5.1.3.1 CRTs
~5.2.5.1

2.5.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.5.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.5.1.3.4 INCANDESCENT
~5.2.2

2.5.1.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.5.1.3.6 ANNUNCIATORS
~5.2.2

2.5.1.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.5.1.3.7.1 VISUAL DISPLAYS
~5.2

2.5.1.3.7.2 AUDIO DISPLAYS
~5.3

2.5.1.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.5.1.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.5.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.5.1.4.1 DIRECT DATA ENTRY
~5.15.2

2.5.1.4.2 DATA ENTRY PROMPTING
~5.15.6,5.15.6.1

2.5.1.4.3 CONTROL ACTUATION FEEDBACK PROVIDED
~5.1.1.4

2.5.1.4.3.1 TACTILE
~5.4.1.8.4.14

2.5.1.4.3.2 AUDIBLE
~5.3.3,5.15.3.9

2.5.1.4.3.3 VISUAL
~5.2.1.4

2.5.2 ENTER SUBSEQUENT WAYPOINTS TO DESTINATION OR MODIFY STORED FLIGHT PLAN
~STDCAT

2.5.2.1 SYSTEM CHARACTERISTICS
~SC2.5.2.1

2.5.2.2 CONTROLS
~CONTROLS

2.5.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.5.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.5.2.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.5.2.2.3.1 CONTROLS
~5.4

2.5.2.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.5.2.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.5.2.3 DISPLAYS
~DISPLAYS

2.5.2.3.1 CRTs
~5.2.1.5

2.5.2.3.2 LCDs
~5.2.6.9,5.2.6.8

2.5.2.3.3 LEDs
~5.2.6.7,5.2.6.8

2.5.2.3.4 INCANDESCENT
~5.2.2

2.5.2.3.5 ILLUMINATING SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.5.2.3.6 ANNUNCIATORS
~5.2.2

2.5.2.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.5.2.3.7.1 VISUAL DISPLAYS
~5.2

2.5.2.3.7.2 AUDIO DISPLAYS
~5.3

2.5.2.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.5.2.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.5.2.4 OPERATIONAL CHARACTERISTICS
~OC

2.5.2.4.1 DIRECT DATA ENTRY
~5.15.2

2.5.2.4.2 DATA ENTRY PROMPTING
~5.15.6,5.15.6.1

2.5.2.4.3 SCROLLING OF DISPLAY PAGES/LINES
~5.15.3.1.11

2.6 NONNORMAL OR ANOMALY
~OPS

2.6.1 SYSTEM WARNING INDICATION: DISPLAY OF STATUS CODES, ACCOMPLISH ACTIONS DICTATED IN PILOT HANDBOOK
~STDCAT

2.6.1.1 SYSTEM CHARACTERISTICS
~SC2.6.1.1

2.6.1.2 CONTROLS
~CONTROLS

2.6.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.6.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.6.1.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.6.1.2.3.1 CONTROLS
~5.4

2.6.1.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.6.1.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.6.1.3 DISPLAYS
~DISPLAYS

2.6.1.3.1 CRTs
~5.2.5.1

2.6.1.3.2 LCD
~5.2.6.9,5.2.6.8

2.6.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.6.1.3.4 INCANDESCENT
~5.2.2

2.6.1.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.6.1.3.6 ANNUNCIATORS
~5.2.2

2.6.1.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.6.1.3.7.1 VISUAL DISPLAYS
~5.2

2.6.1.3.7.2 AUDIO DISPLAYS
~5.3

2.6.1.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.6.1.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.6.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.6.1.4.1 COLOR CODING OF ANNUNCIATORS
~5.2.1.5,5.2.2.1.18

2.6.1.4.2 OUTPUTS TO EXTERNAL ANNUNCIATORS
~5.2.2

2.6.1.4.3 DIRECT DATA ENTRY
~5.15.2

2.6.1.4.4 DATA ENTRY PROMPTING
~5.15.6.5.15.6.1

2.6.2 POWER INTERRUPTION: RE-ENTER PRESENT POSITION, DATE, TIME, AND WAYPOINTS
~STDCAT

2.6.2.1 SYSTEM CHARACTERISTICS
~SC2.6.2.1

2.6.2.2 CONTROLS
~CONTROLS

2.6.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.6.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.6.2.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.6.2.2.3.1 CONTROLS
~5.4

2.6.2.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.6.2.2.3.2 CONTROL/DISPLAY LABELING
~5.5.6.2

2.6.2.3 DISPLAYS
~DISPLAYS

2.6.2.3.1 CRTs
~5.2.5.1

2.6.2.3.2 LCDs
~5.2.6.9,5.2.6.8

2.6.2.3.3 LEDs
~5.2.6.7,5.2.6.8

2.6.2.3.4 INCANDESCENT
~5.2.2

2.6.2.3.5 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.6.2.3.6 ANNUNCIATORS
~5.2.2

2.6.2.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.6.2.3.7.1 VISUAL DISPLAYS
~5.2

2.6.2.3.7.2 AUDIO DISPLAYS
~5.3

2.6.2.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.6.2.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.6.2.4 OPERATIONAL CHARACTERISTICS
~OC

2.6.2.4.1 COLOR CODING OF ANNUNCIATORS
~5.2.1.5,5.2.2.1.18

2.6.2.4.2 OUTPUT TO EXTERNAL ANNUNCIATORS
~5.2.2

2.6.2.4.3 DIRECT DATA ENTRY
~5.15.2

2.6.2.4.4 DATA ENTRY PROMPTING
~5.15.6,5.15.6.1

2.6.3 AMBIGUITY OR LANE RESOLUTION: ACCOMPLISH ACTIONS DICTATED IN PILOT HANDBOOK
~STDCAT

2.6.3.1 SYSTEM CHARACTERISTICS
~SC2.6.3.1

2.6.3.2 CONTROLS
~CONTROLS

2.6.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.6.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.6.3.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.6.3.2.3.1 CONTROLS
~5.4

2.6.3.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.6.3.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.6.3.3 DISPLAYS
~DISPLAYS

2.6.3.3.1 CRTs
~5.2.5.1

2.6.3.3.2 LCDs
~5.2.6.9,5.2.6.8

2.6.3.3.3 LEDs
~5.2.6.7,5.2.6.8

2.6.3.3.4 INCANDESCENT
~5.2.2

2.6.3.3.5 ILLUMINATING SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.6.3.3.6 ANNUNCIATORS
~5.2.2

2.6.3.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.6.3.3.7.1 VISUAL DISPLAYS
~5.2

2.6.3.3.7.2 AUDIO DISPLAYS
~5.3

2.6.3.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.6.3.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.6.3.4 OPERATIONAL CHARACTERISTICS
~OC

2.6.3.4.1 COLOR CODING OF ANNUNCIATORS
~5.2.1.5,5.2.2.1.18

2.6.3.4.2 DIRECT DATA ENTRY
~5.15.2

2.6.3.4.3 DATA ENTRY PROMPTING
~5.15.6,5.15.6.1

2.7 DESCENT/APPROACH
~OPS

2.7.1 DESELECT AUTOPILOT AND NAV DISPLAY COUPLING
~STDCAT

2.7.1.1 SYSTEM CHARACTERISTICS
~SC2.7.1.1

2.7.1.2 CONTROLS
~CONTROLS

2.7.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.7.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.2.2.2,5.2.2.4

2.7.1.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

2.7.1.2.3.1 CONTROLS
~5.4

2.7.1.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.7.1.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.7.1.3 DISPLAYS
~DISPLAYS

2.7.1.3.1 CRTs
~5.2.5.1

2.7.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.7.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.7.1.3.4 INCANDESCENT
~5.2.2

2.7.1.3.5 ILLUMINATING SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

2.7.1.3.6 ANNUNCIATORS
~5.2.2

2.7.1.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.7.1.3.7.1 VISUAL DISPLAYS
~5.2

2.7.1.3.7.2 AUDIO DISPLAYS
~5.3

2.7.1.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.7.1.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.7.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.7.1.4.1 CONTROLS WITHIN REACH AND VISION
~5.4.1.3

2.7.1.4.2 CONFUSION WITH ADJACENT UNIT CONTROL/DISPLAY
~5.1.2.3.7

2.8 LANDING
~OPS

2.8.1 POWER OFF BEFORE AIRCRAFT POWER IS REMOVED
~STDCAT

2.8.1.1 SYSTEM CHARACTERISTICS
~SC2.8.1.1

2.8.1.2 CONTROLS
~CONTROLS

2.8.1.2.1 ROTARY KNOBS
~5.4.2.2

2.8.1.2.2 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

2.8.1.2.3 TOGGLE SWITCHES
~5.4.3.1.4

2.8.1.2.3.1 TURN
~5.4.3.1.4.2

2.8.1.2.3.2 PULL
~5.4.3.1.4.2

2.8.1.2.3.3 PUSH
~5.4.3.1.4.2

2.8.1.2.4 LOCKING TOGGLE SWITCHES
~5.4.3.1.4.2

2.8.1.2.5 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

2.8.1.2.6 GENERAL INFORMATION ON CONTROLS
~GIOC

2.8.1.2.6.1 CONTROLS
~5.4

2.8.1.2.6.2 CONTROL/DISPLAY INTEGRATION
~5.1

2.8.1.2.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

2.8.1.3 DISPLAYS
~DISPLAYS

2.8.1.3.1 CRTs
~5.2.5.1

2.8.1.3.2 LCDs
~5.2.6.9,5.2.6.8

2.8.1.3.3 LEDs
~5.2.6.7,5.2.6.8

2.8.1.3.4 INCANDESCENT
~5.2.2

2.8.1.3.5 INDICATORS
~5.2.2

2.8.1.3.6 EXTINGUISHED LEGEND SWITCHES
~5.2.2.2,5.2.2.4

2.8.1.3.7 GENERAL INFORMATION ON DISPLAYS
~GIOD

2.8.1.3.7.1 VISUAL DISPLAYS
~5.2

2.8.1.3.7.2 AUDIO DISPLAYS
~5.3

2.8.1.3.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

2.8.1.3.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

2.8.1.4 OPERATIONAL CHARACTERISTICS
~OC

2.8.1.4.1 PROTECTION FROM INADVERTENT POWER OFF ACTUATION
~5.4.1.8

2.8.1.4.2 CONTROL ACTUATION FEEDBACK PROVIDED
~5.1.1.4

2.8.1.4.3 TACTICAL
~5.4.1.8.4.14

2.8.1.4.4 AUDIBLE
~5.3.3,5.15.3.9

2.8.1.4.5 VISUAL
~5.2.1.4

3.0 RNAV
~FLTPHASES

3.1 BEFORE ENGINE START
~OPS

3.1.1 POWER ON
~STDCAT

3.1.1.1 SYSTEM CHARACTERISTICS
~SC3.1.1.1

3.1.1.2 CONTROLS
~CONTROLS

3.1.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.1.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.1.1.2.3 GENERAL INFORMATION ON CONTROL
~GIOC

3.1.1.2.3.1 CONTROLS
~5.4

3.1.1.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.1.1.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.1.1.3 DISPLAYS
~DISPLAYS

3.1.1.3.1 ANNUNCIATORS
~5.2.2

3.1.1.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.1.1.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.1.1.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.1.1.3.4.1 VISUAL DISPLAYS
~5.2

3.1.1.3.4.2 AUDIO DISPLAYS
~5.3

3.1.1.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.1.1.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.1.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.1.1.4.1 PREVENTION OF ACCIDENTAL ACTIVATION
~5.4.1.8,5.4.1.8.1,5.4.1.8.2,5.4.1.8.3,5.4.1.8.4

3.1.2 PERFORM SELF-TEST
~STDCAT

3.1.2.1 SYSTEM CHARACTERISTICS
~SC3.1.2.1

3.1.2.2 CONTROLS
~CONTROLS

3.1.2.2.1 ROTARY SELECTOR SWITCHES
~2.4.2.1.1

3.1.2.2.2 ILLUMINATED LEGEND SWITCHES
~5.4.3.1.5

3.1.2.2.3 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.1.2.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

3.1.2.2.4.1 CONTROLS
~5.4

3.1.2.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.1.2.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.1.2.3 DISPLAYS
~DISPLAYS

3.1.2.3.1 ANNUNCIATORS
~5.2.2

3.1.2.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.1.2.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.1.2.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.1.2.3.5 FLAG DISPLAY
~5.2.6.5

3.1.2.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.1.2.3.6.1 VISUAL DISPLAYS
~5.2

3.1.2.3.6.2 AUDIO DISPLAYS
~5.3

3.1.2.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.1.2.3.6.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.1.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.1.2.4.1 INDICATION OF SELF-TEST IN PROGRESS
~5.2.2.1.4

3.1.2.4.2 INDICATION OF SELF-TEST PASS OR FAIL
~5.2.1.3.6,5.2.1.3.7

3.1.2.4.3 PREVENTION OF ACCIDENTAL ACTIVATION
~5.4.1.8,5.4.1.8.1,5.4.1.8.2,5.4.1.8.3,5.4.1.8.4

3.1.3 SELECT AND LOAD WAYPOINT INFORMATION FOR ROUTE OF FLIGHT
~STDCAT

3.1.3.1 SYSTEM CHARACTERISTICS
~SC3.1.3.1

3.1.3.2 CONTROLS
~CONTROLS

3.1.3.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.1.3.2.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.1.3.2.3 THUMBWHEEL SWITCHES—NONILLUMINATING
~5.4.2.1.3

3.1.3.2.4 PUSH-PULL SWITCHES
~5.4.3.1.8

3.1.3.2.5 STACKED KNOB SWITCHES
~5.4.2.2.2

3.1.3.2.6 GENERAL INFORMATION ON CONTROLS
~GIOC

3.1.3.2.6.1 CONTROLS
~5.4

3.1.3.2.6.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.1.3.2.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.1.3.3 DISPLAYS
~DISPLAYS

3.1.3.3.1 ANNUNCIATORS
~5.2.2

3.1.3.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.1.3.3.3 LED DISPLAYS
~5.2.6.9,5.2.6.8

3.1.3.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.1.3.4.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.1.3.4.5.1 VISUAL DISPLAYS
~5.2

3.1.3.4.5.2 AUDIO DISPLAYS
~5.3

3.1.3.4.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.1.3.4.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.1.3.4 OPERATIONAL CHARACTERISTICS
~OC

3.1.3.4.1 SCRATCHPAD FEATURE
~5.15.8.1,5.1.1.4

3.1.3.4.2 CODING—FLASHING/BLINKING
~5.2.2.1.19,5.15.3.3.2

3.1.3.4.3 CONTROL ACTUATION FEEDBACK
~5.1.1.4

3.1.3.4.3.1 TACTILE
~5.4.1.8.4.14

3.1.3.4.3.2 AUDIBLE
~5.3.3,5.15.3.9

3.1.3.4.3.3 VISUAL
~5.2.1.4

3.1.3.4.4 GROUPING AND ARRANGEMENT OF CONTROL/DISPLAY
~5.1.2.2

3.1.3.4.5 REACH ENVELOPE—CONTROLS WITHIN REACH AND VISION
~5.4.1.3

3.1.3.4.6 NO CONFUSION WITH ADJACENT CONTROL/DISPLAY
~5.1.2.3.7

3.1.3.4.7 PARALLEL DISPLAYS
~5.2.1.3.4,5.1.2.3.4

3.2 AFTER ENGINE START AND TAXI
~OPS

3.2.1 TUNE VORTAC FREQUENCY FOR FIRST WAYPOINT AND VERIFY AURAL STATION IDENTIFIER IF POSSIBLE
~STDCAT

3.2.1.1 SYSTEM CHARACTERISTICS
~SC3.2.1.1

3.2.1.2 CONTROLS
~CONTROLS

3.2.1.2.1 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.2.1.2.2 PUSH-PULL SWITCHES
~5.4.3.1.8

3.2.1.2.3 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.2.1.2.4 KEYBOARD/KEYPAD
~5.4.3.1.3,5.15.2.2

3.2.1.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

3.2.1.2.5.1 CONTROLS
~CONTROLS

3.2.1.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.1.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.1.3 DISPLAYS
~DISPLAYS

3.2.1.3.1 ANNUNCIATORS
~5.2.2

3.2.1.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.2.1.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.2.1.3.4 AURAL DISPLAY—MORSE CODE RECEIVED VIA HEADSET
~5.3.9,5.3.9.1,5.3.9.2,5.3.9.3

3.2.1.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.2.1.3.5.1 VISUAL DISPLAYS
~5.2

3.2.1.3.5.2 AUDIO DISPLAYS
~5.3

3.2.1.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.1.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.2.1.4.1 COLOR CODING OF INPUT CONTROLS
~5.4.1.4.5

3.2.1.4.2 AUTOMATIC DIMMING FEATURE
~5.2.2.1.10

3.2.1.4.3 DISPLAYS WITHIN THE PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4

3.2.2 ACTIVATE FIRST WAYPOINT
~STDCAT

3.2.2.1 SYSTEM CHARACTERISTICS
~SC3.2.2.1

3.2.2.2 CONTROLS
~CONTROLS

3.2.2.2.1 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.2.2.2.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.2.2.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

3.2.2.2.3.1 CONTROLS
~5.4

3.2.2.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.2.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.2.3 DISPLAYS
~DISPLAYS

3.2.2.3.1 ANNUNCIATORS
~5.2.2

3.2.2.3.2 LED DISPLAYS
~5.2.2.6.9,5.2.2.6.8

3.2.2.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.2.2.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.2.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.2.2.3.4.1 VISUAL DISPLAYS
~5.2

3.2.2.3.4.2 AUDIO DISPLAYS
~5.3

3.2.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.2.2.4.1 CONFUSION WITH ADJACENT CONTROL/DISPLAY
~5.4.2.3.7

3.2.3 VERIFY CORRECT BEARING (USE ALTERNATE NAV SYS OR CHARTS
~STDCAT

3.2.3.1 SYSTEM CHARACTERISTICS
~SC3.2.3.1

3.2.3.2 CONTROLS
~CONTROLS

3.2.3.2.1 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

NOTE CENTER LATERAL DEVIATION BAR ON HSI

3.2.3.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

3.2.3.2.2.1 CONTROLS
~5.4

3.2.3.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.3.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.3.3 DISPLAYS
~DISPLAYS

3.2.3.3.1 LED DISPLAYS
~5.2.2.6.9,5.2.2.6.8

3.2.3.3.2 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.2.2.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.2.2.3.3.1 VISUAL DISPLAYS
~5.2

3.2.2.3.3.2 AUDIO DISPLAYS
~5.3

3.2.2.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.2.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.3.4 OPERATIONAL CHARACTERISTICS
~OC

3.2.3.4.1 FUNCTION SPECIFIC KEYS
~5.15.2.3

3.2.3.4.2 DISPLAYS WITHIN THE PRIMARY AND SECONDARY VISUAL ENVELOPE
~5.2.1.4

3.2.4 MONITOR COURSE GUIDANCE AND DEPARTURE ROUTING PROGRESS
~STDCAT

3.2.4.1 SYSTEM CHARACTERISTICS
~SC3.2.4.1

3.2.4.2 CONTROLS
~CONTROLS

3.2.4.2.1 NO ASSOCIATED CONTROLS, MONITOR ONLY

3.2.4.3 DISPLAYS
~DISPLAYS

3.2.4.3.1 ANNUNCIATORS
~5.2.2

3.2.4.3.2 LED DISPLAYS
~5.2.2.6.9,5.2.2.6.8

3.2.4.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.2.4.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.2.4.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.2.4.3.5.1 VISUAL DISPLAYS
~5.2

3.2.4.3.5.2 AUDIO DISPLAYS
~5.3

3.2.4.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.2.4.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.2.4.4 OPERATIONAL CHARACTERISTICS
~OC

3.2.4.4.5 INDICATION OF AUTOMATIC MODE CHANGES
~5.15.5.5

3.2.4.4.6 CONFUSION WITH ADJACENT CONTROL/DISPLAY
~5.12.3.7

3.2.5 ENGAGE AUTOPILOT IN VOR/LOC COUPLED MODE
~STDCAT

3.2.5.1 SYSTEM CHARACTERISTICS
~SC3.2.5.1

3.2.5.2 CONTROLS
~CONTROLS

NOTE ENGAGE AUTOPILOT VIA AUTOPILOT MSU

3.2.5.3 DISPLAYS
~ DISPLAYS

3.2.5.3.1 LED DISPLAYS
~ 5.2.6.7,5.2.6.8

3.2.5.3.2 GAS DISCHARGE DISPLAYS
~ 5.2.6.9,5.2.6.9.1,5.6.9.2

NOTE MONITOR FLIGHT PERFORMANCE DATA

3.2.5.3.2 GENERAL INFORMATION ON DISPLAYS
~ GIOD

3.2.5.3.2.1 VISUAL DISPLAYS
~ 5.2

3.2.5.3.2.2 AUDIO DISPLAYS
~ 5.3

3.2.5.3.2.3 CONTROL/DISPLAY INTEGRATION
~ 5.1

3.2.5.3.2.4 CONTROL/DISPLAY LABELING
~ 5.5.6.2

3.2.5.4 OPERATIONAL CHARACTERISTICS
~ OC

3.2.5.4.1 CONTROL ACTUATION FEEDBACK
~ 5.1.1.4

3.2.5.4.1.1 TACTILE
~ 5.4.1.8.4.14

3.2.5.4.1.2 AUDIBLE
~ 5.3.3,5.15.3.9

3.2.5.4.1.3 VISUAL
~ 5.2.1.4

3.2.5.4.2 CONFUSION WITH ADJACENT CONTROL/DISPLAY
~ 5.1.2.3.7

3.3 EN ROUTE
~ OPS

3.3.1 MONITOR COURSE GUIDANCE AND ROUTE PROGRESS
~ STDCAT

3.3.1.1 SYSTEM CHARACTERISTICS
~SC3.3.1.1

3.3.1.2 CONTROLS
~CONTROLS

3.3.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.3.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.3.1.2.3 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.4

3.3.1.2.4 TOGGLE SWITCHES
~5.4.3.1.4

3.3.1.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

3.3.1.2.5.1 CONTROLS
~5.4

3.3.1.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.1.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.1.3 DISPLAYS
~DISPLAYS

3.3.1.3.1 ANNUNCIATORS
~5.2.2

3.3.1.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.3.1.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9-5.2.6.9.2

3.3.1.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.3.1.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.3.1.3.5.1 VISUAL DISPLAYS
~5.2

3.3.1.3.5.2 AUDIO DISPLAYS
~5.3

3.3.1.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.1.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.3.1.4.1 INDICATION OF AUTOMATIC MODE CHANGE—VISUAL OR AUDITORY
~5.15.5.5

3.3.1.4.2 PARALLEL DATA DISPLAY
~5.2.1.3.4

3.3.2 AT WAYPOINT PASSAGE, TUNE NEXT VORTAC FREQUENCY AND IDENTIFY
~STDCAT

3.3.2.1 SYSTEM CHARACTERISTICS
~SC3.3.2.1

3.2.7.1.1 WAYPOINT PASSAGE ALERT

3.2.7.1.2 AUTO TUNING OF VOR AND DME WITH WAYPOINT SELECTION

3.2.7.1.3 WAYPOINT PROGRAMMING WHILE NAVIGATING UNLESS THE ACTIVE RNAV WAYPOINT IS BEING PROGRAMMED
~SC3.3.2.1

3.3.2.2 CONTROLS
~CONTROLS

3.3.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.3.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.3.2.2.3 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.3.1.1

3.3.2.2.4 KEYBOARD/KEYPAD
~5.4.3.1.3,5.15.2.2

3.3.2.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

3.3.2.2.5.1 CONTROLS
~5.4

3.3.2.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.2.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.2.3 DISPLAYS
~DISPLAYS

3.3.2.3.1 ANNUNCIATORS
~5.2.2

3.3.2.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.3.2.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1

3.3.2.3.4 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.3.4

3.3.2.3.5 AURAL DISPLAY—MORSE CODE RECEIVED VIA HEADSET
~5.3.9,5.3.9.1,5.3.9.2,5.2.9.3

3.3.2.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.3.2.3.6.1 VISUAL DISPLAYS
~5.2

3.3.2.3.6.2 AUDIO DISPLAYS
~5.3

3.3.2.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.2.3.6.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.3.2.4.1 MECHANICAL INTERLOCKS—ONLY ONE KEY ON KEYBOARD CAN BE DOWN AT ANY ONE TIME
~5.4.1.8.4.13

3.3.2.4.2 GUARDED SWITCHES—BARRIERS BETWEEN
~5.4.1.8.4.11

3.3.2.4.3 RECESSED PUSHBUTTON KEYS WITH SURROUNDING BARRIERS
~5.4.1.8.4.11

3.3.3 ACTIVATE NEXT WAYPOINT
~STDCAT

3.3.3.1 SYSTEM CHARACTERISTICS
~SC3.3.3.1

3.3.3.2 CONTROLS
~CONTROLS

3.3.3.2.1 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.3.3.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.3.3.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

3.3.3.2.3.1 CONTROLS
~5.4

3.3.3.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.3.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.3.3 DISPLAYS
~DISPLAYS

3.3.3.3.1 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.3.3.3.2 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.3.3.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.3.3.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.3.3.3.4.1 VISUAL DISPLAYS
~5.2

3.3.3.3.4.2 AUDIO DISPLAYS
~5.3

3.3.3.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.3.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.3.4 OPERATIONAL CHARACTERISTICS
~OC

3.3.3.5 PARALLEL DATA DISPLAYS
~5.2.1.3.4,5.1.2.3.4

3.3.4 VERIFY CORRECT BEARING (USE ALTERNATE NAV SYSTEM OR CHART)
~STDCAT

3.3.4.1 SYSTEM CHARACTERISTICS
~SC3.3.4.1

3.3.4.2 CONTROLS
~CONTROLS

3.3.4.2.1 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

NOTE CENTER LATERAL DEVIATION BAR ON HSI

3.3.4.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

3.3.4.2.2.1 CONTROLS
~5.4

3.3.4.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.4.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.4.3 DISPLAYS
~DISPLAYS

3.3.3.1.1 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.3.3.1.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.3.3.1.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.3.3.1.4.1 VISUAL DISPLAYS
~5.2

3.3.3.1.4.2 AUDIO DISPLAYS
~5.3

3.3.3.1.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.3.1.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.4.4 OPERATIONAL CHARACTERISTICS
~OC

3.3.4.4.1 FUNCTION SPECIFIC KEYS
~5.15.2.3

3.3.4.4.2 DISPLAYS WITHIN THE PRIMARY AND SECONDARY VISUAL ENVELOPE
~5.2.1.4

3.3.5 SELECT AND LOAD ADDITIONAL WAYPOINTS TO COMPLETE EN ROUTE NAVIGATION
~STDCAT

3.3.5.1 SYSTEM CHARACTERISTICS
~SC3.3.5.1

3.3.5.2 CONTROLS
~CONTROLS

3.3.5.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.3.5.2.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.3.5.2.3 THUMBWHEEL SWITCHES
~5.4.2.1.3

3.3.5.2.4 PUSH-PULL SWITCHES
~5.4.3.1.8

3.3.5.2.5 STACKED KNOB SWITCHES
~5.4.2.2.2

3.3.5.2.6 KEYBOARDS/KEYPADS
~5.4.3.9.3,5.15.2.2

3.3.5.6.7 GENERAL INFORMATION ON CONTROLS
~GIOC

3.3.5.6.7.1 CONTROLS
~5.4

3.3.5.6.7.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.5.6.7.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.5.4 DISPLAYS
~DISPLAYS

3.3.5.4.1 ANNUNCIATORS
~5.2.2

3.3.5.4.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.3.5.4.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.3.5.4.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.3.5.4.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.3.5.4.5.1 VISUAL DISPLAYS
~5.2

3.3.5.4.5.2 AUDIO DISPLAYS
~5.3

3.3.5.4.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.3.5.4.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.3.5.5 OPERATIONAL CHARACTERISTICS
~OC

3.3.5.5.1 INHIBITED DATA ENTRY WHEN ERRONEOUS DATA IS PRESENT
~5.15.7.2

3.3.5.5.2 SINGLE KEYBOARD CONTROL
~5.4.3.1.3.2

3.3.5.5.3 SCRATCHPAD FEATURE
~5.15.3.8.1,5.1.1.4

3.3.5.5.4 CODING—FLASHING/BLINKING
~5.15.3.3,5.15.3.3.1,5.15.3.3.2,5.15.3.3.3

3.3.5.5.5 CONTROL ACTUATION FEEDBACK
~5.1.1.4

3.3.5.5.5.1 TACTILE
~5.4.1.8.4.14

3.3.5.5.5.2 AUDIBLE
~5.3.3,5.15.3.9

3.3.5.5.5.3 VISUAL
~5.2.1.4

3.4 REROUTE
~OPS

3.4.1 SELECT AND LOAD NEW WAYPOINTS FOR REVISED ROUTING
~STDCAT

3.4.1.1 SYSTEM CHARACTERISTICS
~SC3.4.1.1

3.4.1.2 CONTROLS
~CONTROLS

3.4.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.4.1.2.1 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.4.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.4.1.2.3 THUMBWHEEL SWITCHES
~5.4..2.1.3

3.4.1.2.4 PUSH-PULL SWITCHES
~5.4.3.1.8

3.4.1.2.5 STACKED KNOB SWITCHES
~5.4.2.2.2

3.4.1.2.6 KEYBOARD/KEYPADS
~5.4.3.1.3,5.15.2.2

3.4.1.2.7 GENERAL INFORMATION ON CONTROLS
~GIOC

3.4.1.2.7.1 CONTROLS
~5.4

3.4.1.2.7.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.4.1.2.7.2 CONTROL/DISPLAY LABELING
~5.5.6.2

3.4.1.3 DISPLAYS
~DISPLAYS

3.4.1.3.1 ANNUNCIATORS
~5.2.2

3.4.1.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.4.1.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.4.1.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.4.1.2.7 GENERAL INFORMATION ON DISPLAYS
~GIOC

3.4.1.2.7.1 VISUAL DISPLAYS
~5.2

3.4.1.2.7.2 AUDIO DISPLAYS
~5.3

3.4.1.2.7.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.4.1.2.7.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.4.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.4.1.4.1 INHIBITED DATA ENTRY WHEN ERRONEOUS DATA ARE PRESENT
~5.15.7.2

3.4.1.4.2 SINGLE KEYBOARD CONTROL
~5.15.2.2,5.15.2.1.1

3.4.1.4.3 SCRATCHPAD FEATURE
~5.15.3.1.8,5.1.1.4

3.4.1.4.4 CODING—FLASHING/BLINKING
~5.15.3.3,5.15.3.3.1,5.15.3.3.2,5.15.3.3.3

3.4.1.4.5 COLOR CODING OF INPUT CONTROLS
~5.4.1.4.5,5.4.1.4.5.1,5.4.1.4.5.3,5.4.1.4.5.4

3.4.1.4.6 CONTROL ACTUATION FEEDBACK
~5.1.1.4

3.4.1.4.6.1 TACTILE
~5.4.1.8.4.14

3.4.1.4.6.2 AUDIBLE
~5.3.3,5.15.3.9

3.4.1.4.6.3 VISUAL
~5.2.1.4

3.4.2 ACTIVATE NEXT WAYPOINT
~STDCAT

3.4.2.1 SYSTEM CHARACTERISTICS
~SC3.4.2.1

3.4.2.2 CONTROLS
~CONTROLS

3.4.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.4.2.2.2 PUSHBUTTON SWITCHES—NONILLUMINATED
~5.4.3.1.1

3.4.2.2.3 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.4.2.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

3.4.2.2.4.1 CONTROLS
~5.4

3.4.2.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.4.2.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.4.2.3 DISPLAYS
~DISPLAYS

3.4.2.3.1 ANNUNCIATORS
~5.2.2

3.4.2.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.4.2.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.4.2.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.4.2.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.4.2.3.5.1 VISUAL DISPLAYS
~5.2

3.4.2.3.5.2 AUDIO DISPLAYS
~5.3

3.4.2.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.4.2.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.4.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.4.2.4.1 FUNCTION SPECIFIC KEYS
~5.15.2.3,5.15.2.3.1,5.15.2.3.2,5.15.2.3.3

3.4.2.4.2 GUARDED SWITCHES—BARRIERS
~5.4.1.8.4.11

3.4.2.4.3 MECHANICAL INTERLOCKS—ONLY ONE KEY CAN BE DOWN AT ANY ONE TIME
~5.4.1.8.4.13

3.4.3 MONITOR COURSE GUIDANCE AND ROUTE PROGRESS
~STDCAT

3.4.3.1 SYSTEM CHARACTERISTICS
~SC3.4.3.1

3.4.4.2 CONTROLS
~CONTROLS

3.4.4.2.1 NO ASSOCIATED CONTROLS, MONITOR ONLY

3.4.4.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

3.4.4.2.2.1 CONTROLS
~5.4

3.4.4.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.4.4.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.4.4.3 DISPLAYS
~DISPLAYS

3.4.4.3.1 ANNUNCIATORS
~5.2.2

3.4.4.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.4.4.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.4.4.3.4 GAS DISCHARGE DISPLAY
~5.2.6.9,5.2.6.9.1,5.6.9.2

3.4.4.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.4.4.3.5.1 VISUAL DISPLAYS
~5.2

3.4.4.3.5.2 AUDIO DISPLAYS
~5.3

3.4.4.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.4.4.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.4.4.4 OPERATIONAL CHARACTERISTICS
~OC

3.4.4.4.1 DISPLAYS WITHIN PRIMARY OR SECONDARY VISUAL ENVELOPE
~5.2.1.4

3.5 NONNORMAL OR ANOMALY
~OPS

3.5.1 UNRELIABLE DISPLAY OR NAV DATA—USE ALTERNATE NAV METHOD
~STDCAT

3.5.1.1 SYSTEM CHARACTERISTICS
~SC3.5.1.1

3.5.1.2 CONTROLS
~CONTROLS

3.5.1.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.5.1.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.5.1.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

3.5.1.2.3.1 CONTROLS
~5.4

3.5.1.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.5.1.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.5.1.3 DISPLAYS
~DISPLAYS

3.5.1.3.1 ANNUNCIATORS
~5.2.2

3.5.1.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.5.1.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.5.1.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9.5.2.6.9.1.5.2.6.9.2

3.5.1.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.5.1.3.5.1 VISUAL DISPLAYS
~5.2

3.5.1.3.5.2 AUDIO DISPLAYS
~5.3

3.5.1.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.5.1.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.5.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.5.1.4.1 INDICATION OF AUTOMATIC MODE CHANGES
~5.15.5.5

3.5.2 UNRELIABLE DISPLAY OF NAV DATA—CHECK WAYPOINT INFO AND VOR/TAC TUNING
~STDCAT

3.5.2.1 SYSTEM CHARACTERISTICS
~SC3.5.2.1

3.5.2.2 CONTROLS
~CONTROLS

3.5.2.2.1 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.5.2.2.2 PUSH-PULL SWITCHES
~5.4.3.1.8

3.5.2.2.3 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.5.2.2.4 KEYBOARD/KEYPAD
~5.4.3.1.3,5.15.2.2

3.5.2.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

3.5.2.2.5.1 CONTROLS
~5.4

3.5.2.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.5.2.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.5.2.3 DISPLAYS
~DISPLAYS

3.5.2.3.1 ANNUNCIATORS
~5.2.2

3.5.2.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.5.2.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9.1,5.2.6.9.2

3.5.2.3.4 AURAL DISPLAY—MORSE CODE RECEIVED VIA HEADSET
~5.3.9,5.3.9.1,5.3.9.2,5.3.9.3

3.5.2.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.5.2.3.5.1 VISUAL DISPLAYS
~5.2

3.5.2.3.5.2 AUDIO DISPLAYS
~5.3

3.5.2.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.5.2.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.5.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.5.2.4.1 RECESSED PUSHBUTTON "KEYS" WITH SURROUNDING BARRIERS
~5.4.1.8.4.11

3.5.2.4.2 LIGHTED KEYPAD
~5.2.2.4.4

3.6 DESCENT/APPROACH
~OPS

3.6.1 SELECT AND LOAD WAYPOINTS FOR ARRIVAL/APPROACH PROCEDURE
~STDCAT

3.6.1.1 SYSTEM CHARACTERISTICS
~SC3.6.1.1

3.6.1.2 CONTROLS
~CONTROLS

3.6.1.2.1 ROTARY SELECTOR SWITCHES—SELECT APPROACH MODE
~5.4.2.1.1

3.6.1.2.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.6.1.2.3 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.6.1.2.4 TOGGLE SWITCHES—SELECT APPROACH MODE
~5.4.3.1.4

3.6.1.2.5 GENERAL INFORMATION ON CONTROLS
~GIOC

3.6.1.2.5.1 CONTROLS
~5.4

3.6.1.2.5.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.1.2.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.1.3 DISPLAYS
~DISPLAYS

3.6.1.3.1 ANNUNCIATORS
~5.2.2

3.6.1.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2.5.2.2.4

3.6.1.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.6.1.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.6.1.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.6.1.3.5.1 VISUAL DISPLAYS
~5.2

3.6.1.3.5.1 AUDIO DISPLAYS
~5.3

3.6.1.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.1.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.6.1.4.1 FUNCTION SPECIFIC KEYS
~5.15.2.3

3.6.2 ACTIVATE WAYPOINTS IN SEQUENCE
~STDCAT

3.6.2.1 SYSTEM CHARACTERISTICS
~SC3.6.2.1

3.6.2.2 CONTROLS
~CONTROLS

3.6.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.6.2.2.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.6.2.2.3 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.6.2.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

3.6.2.2.4.1 CONTROLS
~5.4

3.6.2.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.2.2.4.2 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.2.3 DISPLAYS
~DISPLAYS

3.6.2.3.1 ANNUNCIATORS
~5.2.2

3.6.2.3.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.6.2.3.3 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.6.2.3.4 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.6.2.3.5 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.6.2.3.6 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.6.2.3.6.1 VISUAL DISPLAYS
~5.2

3.6.2.3.6.2 AUDIO DISPLAYS
~5.3

3.6.2.3.6.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.2.3.6.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.6.2.4.1 PARALLEL DATA DISPLAYS
~5.2.1.3.4

3.6.2.4.2 CONTROL ACTUATION FEEDBACK
~5.4.1.4

3.6.2.4.2.1 TACTILE
~5.4.1.8.4.14

3.6.2.4.2.2 AUDIBLE
~5.3.3.5.15.3.9

3.6.2.4.2.3 VISUAL
~5.2.1.4

3.6.3 MONITOR COURSE GUIDANCE AND ROUTING PROGRESS
~STDCAT

3.6.3.1 SYSTEM CHARACTERISTICS
~SC3.6.3.1

3.6.3.2 CONTROLS
~CONTROLS

3.6.3.2.1 NO ASSOCIATED CONTROLS, MONITOR ONLY

3.6.3.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

3.6.3.2.2.1 CONTROLS
~5.4

3.6.3.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.5.3.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.3.3 DISPLAYS
~DISPLAYS

3.6.3.3.1 ANNUNCIATORS
~5.2.2

3.6.3.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.6.3.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.6.3.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.6.3.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.6.3.3.5.1 VISUAL DISPLAYS
~5.2

3.6.3.3.5.2 AUDIO DISPLAYS
~5.3

3.6.3.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.3.3.5.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.3.4 OPERATIONAL CHARACTERISTICS
~OC

3.6.3.4.1 INDICATION OF AUTOMATIC MODE CHANGES
~5.15.5.5

3.6.4 SELECT APPROACH SENSITIVITY FOR FINAL APPROACH COURSE GUIDANCE
~STDCAT

3.6.4.1 SYSTEM CHARACTERISTICS
~SC3.6.4.1

3.6.4.2 CONTROLS
~CONTROLS

3.6.4.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.6.4.2.2 PUSHBUTTON SWITCHES—NONILLUMINATING
~5.4.3.1.1

3.6.4.2.3 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.6.4.2.4 GENERAL INFORMATION ON CONTROLS
~GIOC

3.6.4.2.4.1 CONTROLS
~5.4

3.6.4.2.4.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.4.2.4.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.4.3 DISPLAYS
~DISPLAYS

3.6.4.3.1 ANNUNCIATORS
~5.2.2

3.6.4.3.2 ILLUMINATED SWITCH LEGENDS/LABELS
~5.2.2.2,5.2.2.4

3.6.4.3.3 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.6.4.3.4 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.6.4.3.5 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.6.4.3.5.1 VISUAL DISPLAYS
~5.2

3.6.4.3.5.2 AUDIO DISPLAYS
~5.3

3.6.4.3.5.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.6.4.3.5.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.6.4.4 OPERATIONAL CHARACTERISTICS
~OC

3.6.4.4.1 FUNCTION SPECIFIC KEYS
~5.1.5.2.3

3.6.4.4.2 INDICATION OF AUTOMATIC MODE CHANGES
~5.15.5.5

3.7 LANDING
~OPS

3.7.1 MONITOR COURSE GUIDANCE UNTIL RUNWAY IS IN SIGHT FOR LANDING
~STDCAT

3.7.1.1 SYSTEM CHARACTERISTICS
~SC3.7.1.1

3.7.1.2 CONTROLS
~CONTROLS

3.7.1.2.1 NO ASSOCIATED CONTROLS, MONITOR ONLY

3.7.1.2.2 GENERAL INFORMATION ON CONTROLS
~GIOC

3.7.1.2.2.1 CONTROLS
~5.4

3.7.1.2.2.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.7.1.2.2.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.7.1.3 DISPLAYS
~DISPLAYS

3.7.1.3.1 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.7.1.3.2 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

NOTE MONITOR FLIGHT INSTRUMENTS, ACQUIRE RUNWAY VISUALLY

3.7.1.3.3 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.7.1.3.3.1 VISUAL DISPLAYS
~5.2

3.7.1.3.3.2 AUDIO DISPLAYS
~5.3

3.7.1.3.3.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.7.1.3.3.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.7.1.4 OPERATIONAL CHARACTERISTICS
~OC

3.7.1.4.1 NO ASSOCIATED OPERATIONAL CHARACTERISTICS

3.7.2 AFTER LANDING, POWER OFF WITH AVIONICS SHUTDOWN
~STDCAT

3.7.2.1 SYSTEM CHARACTERISTICS
~SC3.7.2.1

3.7.2.2 CONTROLS
~CONTROLS

3.7.2.2.1 ROTARY SELECTOR SWITCHES
~5.4.2.1.1

3.7.2.2.2 ILLUMINATING LEGEND SWITCHES
~5.4.3.1.5

3.7.2.2.3 GENERAL INFORMATION ON CONTROLS
~GIOC

3.7.2.2.3.1 CONTROLS
~5.4

3.7.2.2.3.2 CONTROL/DISPLAY INTEGRATION
~5.1

3.7.2.2.3.3 CONTROL/DISPLAY LABELING
~5.5.6.2

3.7.2.3 DISPLAYS
~DISPLAYS

3.7.2.3.1 ANNUNCIATORS
~5.2.2

3.7.2.3.2 LED DISPLAYS
~5.2.6.7,5.2.6.8

3.7.2.3.3 GAS DISCHARGE DISPLAYS
~5.2.6.9,5.2.6.9.1,5.2.6.9.2

3.7.2.3.4 GENERAL INFORMATION ON DISPLAYS
~GIOD

3.7.2.3.4.1 VISUAL DISPLAYS
~5.2

3.7.2.3.4.2 AUDIO DISPLAYS
~5.3

3.7.2.3.4.3 CONTROL/DISPLAY INTEGRATION
~5.1

3.7.2.3.4.4 CONTROL/DISPLAY LABELING
~5.5.6.2

3.7.2.4 OPERATIONAL CHARACTERISTICS
~OC

3.7.2.4.1 PREVENTION OF ACCIDENTAL ACTIVATION
~5.4.1.8,5.4.1.8.1,5.4.1.8.2,5.4.1.8.3,5.4.1.8.4

APPENDIX E

Sample Printed Evaluation Report

PILOT FACTORS EVALUATION REPORT (PFER)

AIRCRAFT:	Malta 727B		
MANUFACTURER:	Marconi II		
SYSTEM TYPE:	Omega/VLF	MODEL:	OMEG-110
INSPECTOR:	J. F. Sadler		
LOCATION:	Boeing Electronic Test Facility		
NOTES:	Cloudy this morning.		
DATE:	07/15/87	TIME:	08:47 A

Response **Inspection Item and Comment**

OMEGA

BEFORE ENGINE START

POWER ON

CONTROLS

ROTARY KNOBS

The power-on knob appears to be quite small. Measure and doublecheck recommendations for size and separation.

Reject ILLUMINATING LEGEND SWITCHES

An illumination legend switch located adjacent to the power-on switch is used to indicate that the power has been applied to the unit. This double duty illumination switch is not good. Recommend that a separate indicator be used for this function.

GENERAL INFORMATION ON CONTROLS

Reject CONTROL/DISPLAY INTEGRATION

The entire logic used for the control and display integration ideas should be reviewed.

CONTROL/DISPLAY LABELING

Labeling appears to be too small. Check size minimum for this unique application.

AFTER ENGINE START AND TAXI

SELECT NAV MODE AND MONITOR FOR PROPER TRACKING INDICATIONS

DISPLAYS

INCANDESCENT

ILLUMINATED SWITCH LEGENDS/LABELS

Back-lit switch legends and switch positions seem quite dim and are marginal in terms of brightness. Check to see if brightness control range is at specification for upper limit.

OPERATIONAL CHARACTERISTICS

Possible confusion of Omega panel with panel immediately above. Same general overall appearance in terms of the switch types.

APPENDIX F

Nav Handbook Users Manual for Operating
the Computerized Checklists

Preliminary Draft

USERS MANUAL
NAVIGATION HANDBOOK

A. INTRODUCTION

This program was designed to streamline the process of inspecting airplane navigation systems. The program combines the functions of checklist, reference manual, notepad, and report writer.

1. Checklist Organization

As a checklist, the items you may want to inspect are presented in a consistent, logical format. For each generic type of navigation system, LORAN-C, OMEGA/VLF, and RNAV, the basic operations are grouped according to the phase of flight in which they occur. Within each phase of flight, the relevant operations are listed. Under each operation, there are four standard categories: system characteristics, controls, displays, and operational characteristics. These are broken down further, depending on the amount of information the system has to offer.

2. Flight Phases and Operations

As you select flight phases and specific operations to look at, the system begins to function as a reference manual. Relevant text is selected from the program's internal text database and displayed on the screen. When there is a variety of reference text available, selections are made from menus.

3. Decision Tree Hierarchy

The phases of flight, operations, characteristics of operations, and reference information are arranged in a decision tree. As you make decisions about what you want to see, you move "down" the tree (the tree is imagined with the leaves at the bottom). When you are finished with an item, you move back up.

4. Recording Responses to Checklist Items

At any point in the tree, you can enter your response to the current item. This means you can, for example, approve or reject the locking toggle switch used to power on the navigation unit. You could also approve all aspects of the power-on function by giving your OK at the functional level of the tree. You could give a response at an even higher level and accept or reject all the functions performed before the engines are started.

In addition to a response of "Accepted," "Rejected," or "Not Applicable," you can enter comments at any point. The program provides a full-featured text editor in a popup window. There is virtually no limit to the amount of text you can enter.

5. Printing an Inspection Report

When you are done with an inspection, you can connect your computer to a printer and have a report printed, showing all your responses and comments. Two reports are available, one showing all items to which you made any response at all, and one showing only those items that you rejected or on which you made comments.

B. STARTING UP THE PROGRAM

1. On a Portable

You should have two disks, one with a large "A," the other with a large "B." Put the disk marked "A" in drive A, which is the left drive on most portables. Put the "B" disk in drive B. When you turn on the computer, the disk activity light for the A drive will come on. After making some noise, the computer will display "A>" on the screen. We will refer to this as the "A prompt."

To run the program, type "NAVHDBK" and a carriage return (the key marked RETURN, ENTER, or an arrow symbol that goes down and then left, " "). The disk drives will make some more noise, and then you will see the Main Program Menu. Select No. 1, Perform Inspection.

2. On a Computer With a Hard Disk

"A" and "B" disks are directly usable on any desktop PC with 3½-inch disk drives. Files may be transferred to a PC with hard drive using the LAP-LINK program and connecting cable. You must pick or make a new directory, copy all files from disks "A" and "B" into one directory and then do some editing. From the PF CONFIG.DAT file, strip out all "A:" and "B:" characters. It is recommended that changes to the program and editing and modifications to the checklist (menu records, choice records, and reference text) be made using a PC with hard drive because of the speed advantage of the hard drive.

C. PERFORMING AN INSPECTION

To begin an inspection, select the "Perform Inspection" option from the Main Program Menu. The program will ask you for information about the inspection. If you have already started on inspection, the information you entered before will be displayed and you will have a chance to edit it. In most of the fields, you can enter anything you want. Some of the fields require a specific format, such as a date or time.

In the free-form fields, you simply type in the information. If you make a mistake, you can use the backspace key or the left arrow to back up and type over the mistake. The HOME and END keys, on the cursor-movement keypad, move the cursor to the beginning and end of the field, respectively. The DEL key deletes the character under the cursor and pulls everything to the right of the cursor one space to the left. The INS (insert) key creates a space under the cursor and moves everything to the right of it one space further right.

In the date field, dates are entered in the form MM-DD-YY. If the day or month number is less than ten, you must enter a leading zero. The cursor will automatically skip over the dashes so to enter May 3, 1987, you would just type "050387," and it would appear "05-03-87." The HOME, END, INS, DEL keys do not work for dates or times.

In the time field, you will also need leading zeros where applicable. The format is HH MM P, where "P" is either "A" or "P," for AM or PM. You can enter times in the 24-hour mode if you like. You will still need to enter something for the AM-PM field, but it can just be a space.

At the end of each field, press the return or enter key and the cursor will move to the next field. Once all the fields have been entered, or if this information was already entered for this inspection, you can move from field to field by pressing the return key, or holding the control key (Ctrl) down and pressing the left or right arrow. To edit a field, simply type over the error, or use the cursor movement keys to position the cursor within the field (arrows, HOME, END), or use the INS and DEL in unformatted fields. Again, just press return when you want to move on to the next field.

When you are done entering and editing the navigation system information, press F10 and you will see the first menu of the inspection checklist. It shows the generic system you are about to inspect.

1. Menus

   a. The screen layout

      (1) History indicator

      The top two lines of the screen show you where you are in the tree. The second line shows the full title of the current menu. The first line shows the abbreviated titles of the choices you made to get to this spot.

      (2) Text box

      Under the history indicator, there is a box in which text is displayed, describing the current menu and giving instructions on what you can do next. If there is more text than will fit in the box, the text can be scrolled up and down using the up and down arrow keys (to scroll one line at a time) or the PgUp and PgDn keys to move the text a box-full at a time.

      (3) Option list

      The options for the current menu are in a vertical list under the text box. They are numbered from one to a maximum of nine. If any of the options has been visited, its status is indicated to the left of the number. If you have entered a comment for that item, there will be a "C" to the left of the number. If you have judged that item Accepted, Rejected, or Not Applicable, there will be an "A," "R," or "N," respectively. If you have just looked at the item but not entered your judgment, there will just be an underscore next to it.

      (4) Status line

      The status line is the second to the last line at the bottom of the screen. It shows the status of the current menu. That is, if any judgment has been entered or a comment has been made on the current menu, it will be indicated in the status line.

      (5) Prompt line

      The prompt line shows you what you can do next. The first letter of each command is in a different color to indicate the key to press to activate that

command. If you are using a monochrome display, this may not show up.

b. What you can do (selections)

(1) Pick an option from the menu

You can select any of the options on the menu by simply typing in the digit next to the option. You will then see the menu or choice screen corresponding to the option you selected.

(2) Scroll the text

As mentioned above, if all of the text in the text box does not fit in the box, you can scroll it using the up and down arrow keys and the PgUp and PgDn keys.

(3) Go back up

If you press "S" for "Step Back," you will go back up the tree to the parent of the current menu. Any comments or judgments you have entered for this menu will be automatically saved.

(4) Go to Main Menu

By pressing "M," for "Main Menu," you can get to the top of the tree without having to step back through all the levels. This command does not take you all the way to the top of the tree, there is no need for you to reselect the type of navigation system you are inspecting. Instead, the flight phases menu will be displayed. If you want to end the inspection, just press "S" from here to get all the way out of the tree.

(5) Make a response

If you want to respond to the current item, you can press "A," "R," or "N," to accept, reject, or define as not applicable. Remember that your response is not to any of the items on the option list, but to the menu as a whole whose topic is summarized by its title on the second line of the screen. For example, if you are on the "Power On" menu, the option list will show:

- SYSTEM CHARACTERISTICS
- CONTROLS
- DISPLAYS
- OPERATIONAL CHARACTERISTICS

If you make a response at this point, it will apply to the power-on function as a whole, not to any of the four aspects on the option list. If you want to respond to the control aspect of the power-on function, you would first choose CONTROLS by pressing "2," and then make your response. To respond to a control type, select that control.

(6) Enter or edit a comment

If you press "C" to enter a comment, a window will open on the screen, giving you a blank page on which to type your comments. The details of the editor will be described in Section D. At the bottom of the popup window, a prompt line shows that you can press F9 to exit the editor without saving your comment, F10 to save the comment and exit, or F1 for help. If you press F1, another window will pop up with a summary of the editor commands.

2. Choices

At the bottom of the tree, the screen is arranged differently. There are no more selections to be made, so there is no option list. Also, this is where the bulk of the reference text appears, so the text box fills most of the screen.

a. The screen layout

(1) History indicator

The history indicator is identical to that on the menus.

(2) Text box

Same as with menus only bigger.

(3) Status line

The status line is the same as for menus.

(4) Prompt line

The prompt line is the same as for the menus except that there is no reference to numbers from the option list.

b. What you can do (selections)

Your possible actions here are the same as with the menus, except that you cannot go further down the tree by typing a digit. After making a selection from the lowest menu you can—

(1) Scroll the text
(2) Go back up the menu tree
(3) Go to main menu
(4) Make a response
(5) Enter or edit a comment

D. USING THE EDITOR

1. Introduction

a. Easy to use but full-featured
b. Uses cursor pad and function keys
c. Similar to SIDEKICK (™Borland)

d. Unlimited storage (virtually)

2. Text Entry

   Insert Versus Overstrike Mode

3. Cursor Movement

   Arrows, PgUp, PgDn, HOME, END, ^QC, ^QR

4. Simple Editing

   Backspace, DEL, ^Y, ^T, ^QY

E. PRINTING THE EVALUATION REPORT

Evaluation reports can be generated automatically by the Nav Handbook program. Two types are available. A complete report that contains all judgments made, the items judged, and comments entered. The second report contains only those items judged Not Acceptable and comments entered. From the Main Program Menu you can select "Print Report." A menu is displayed that permits you to select the type of report desired.

F. EXITING THE NAV HANDBOOK PROGRAM

When you are finished at the end of a work period or completely finished with the program, it is recommended that you call up the Main Program Menu and select "Exit Program." This saves all entries you have made, and the items you viewed are tagged with status. By turning the computer "off," you may lose some of your entries. Use the "Exit Program" feature, wait a minute or two, then turn the computer off.

APPENDIX G

Nav Handbook Database Reference Sources

NAV HANDBOOK DATABASE REFERENCE SOURCES

Reference handbooks, technical publications, and military standards were selected for retrieval of source data for the Nav Handbook Database. These are listed below.

Handbooks and Technical Publications

Human Engineering Guide to Equipment Design, University of California Press, 1964

Human Factors Design Handbook, McGraw-Hill, 1982

NASA-STD-3000, Volumes 1 and 2, Man-System Integration Standards

NASA-SD 3006, Bioastronautics Data Book, Second Edition, 1973

Military Standards and Publications

MIL-M-18012B	Markings of Aircrew Station Displays, Design and Configuration of
MIL-STD-783B	Legends for Use In Aircrew Stations and on Airborne Equipment
MIL-STD-1280	Keyboard Arrangement
MIL-STD-1348	Knobs, Control, Selection of
MIL-STD-4110	Aircrew Station Signals
MIL-STD-0454	Standard General Requirements for Electronic Equipment
MIL-STD-012D	Abbreviations
FED-STD-0595	Colors
MIL-HDBK-759A	Human Factors Engineering Design for Army Material, 1981
MIL-STD-1472C	Human Engineering Design Criteria For Military Systems, Equipment and Facilities, 1981
AFSC DH 1-3	Human Factors Engineering, 1972
MIL-STD-203F	Aircrew Station Controls and Displays: Arrangement, Location, and Actuation of, For Fixed Wing, 1973

APPENDIX H

Operational Suitability Test Plan,
Test Report, and Questionnaire

NAV HANDBOOK OPERATIONAL SUITABILITY TESTING PLAN

OBJECTIVE

Demonstrate the suitability and usability of—

- Lap-top computer (Zenith Z-181)
- Inspection checklist contents
- User procedures
- User acceptance of automated approach

APPROACH

Conduct a runthrough of a selected checklist using navigational system hardware to validate user procedures.

OVERVIEW

Volunteer FAA inspectors will perform an evaluation of a selected navigation unit using the pilot factors automated technique. An automated checklist and a lap-top (portable) computer will be used. The inspector will follow instructions presented by the computer and, guided by a series of menus also presented by the computer, perform an evaluation of Nav hardware. The inspector's judgments and comments will be recorded using the computer keyboard. The computer will generate an evaluation report.

INSPECTOR BRIEFING AND TRAINING

FAA inspectors will be presented an overview of the handbook and their role in its development. They will be briefed on the procedures they will use and then perform practice trials using the computer and the automated checklists. Their practice responses (judgments) and comments will be entered using the computer keyboard, and a sample report will be generated to show them the results of their inputs.

AUTOMATED CHECKLIST DEMONSTRATION

After inspectors have learned to manipulate and respond to checklist items, a timed demonstration of the production navigation hardware and the latest revision of the inspection checklist will be conducted. Verbal comments made during the inspection will be noted and a debriefing will be conducted following completion of the inspection. Of particular interest is the inspector's subjective evaluation of the pilot factors computer-generated final report, its adequacy, format, etc.

OBSERVATIONS AND RESULTS

Observations and results will be used to revise the checklists and the procedures used by the inspectors. Inspector skill and efficiency in operating the computer, manipulating checklist menus, and inputting judgments and comments to the computer are of primary interest. Relevant inspector verbal comments will be recorded and reviewed for insight into improving checklist and user procedures. Inspector opinion of the computer-generated inspection report is a major evaluation parameter.

NAVIGATIONAL HANDBOOK
OPERATIONAL SUITABILITY TESTING REPORT
AUGUST 1987

This report presents the results of an Operational Suitability Test of the OMEGA/VLF Automated Pilot Factors Checklist (APFCL) portion of the Navigation Handbook, Contract NAS1-18027 Task 2.

BACKGROUND

Development of the APFCL has progressed to a point that requires a systematic evaluation of the display formats, user automation technique/tasks, and reference data content. The checklists in the Nav Handbook are organized as a succession of menu formats. As menu options are selected, they lead the user through a multibranched logic tree containing identified System Characteristics, Controls, Displays, and Operational Characteristics of a specific generic navigation system. To date, separate checklists have been developed for the LORAN-C, OMEGA/VLF, and RNAV navigation systems.

EVALUATORS

Two experienced avionics evaluators familiar with the Nav Handbook development program (they were briefed when the program began) were the evaluators. Both are highly qualified to perform the required tasks. The OMEGA/VLF checklist was selected for evaluation and the reference navigation system was a Marconi CMA 711, OMEGA/VLF control/display unit (CDU). A Zenith Model 181 portable lap-top computer was used to present the checklist.

PROCEDURES

Evaluators were briefed on the current development status the program and then received instructions and a demonstration of computer operations and checklist procedures. The evaluators quickly learned how to operate the computer to perform the checklist. The emphasis of the suitability testing was on evaluating the checklist, its procedures and content, and not the reference navigation hardware.

The evaluators' comments and suggestions were recorded and discussed. At the end of the hands-on portion of the testing, they completed questionnaires rating the features of the computerized checklist, compared methodology with current inspection methods, and answered yes/no questions concerning the operational use and value of the automated checklist. The report-writing feature of the APFCL was not working at the time of testing.

RESULTS

Two significant and related factors were identified. They are (1) the type of inspection being conducted and (2) the nature of the reference data included in the APFCL. The data resident in the OMEGA/VLF checklist provided a wide range of design criteria derived from simple subjective observation and complex precise measurements. It was concluded that there need not be more reference data available to the user than that which is required to successfully complete the inspection task. Also, the type of inspection to be performed defines the type and scope of reference data to be included in the APFCL for a generic Nav system.

Areas of Application

Three areas of application were identified.

Ground TIA	Flight TIA	Field approval
Bench testing	Inflight testing	Unit installed in aircraft
New or redesigned equipment	New or redesigned equipment	Aircraft on ground
TSO qualification testing	TSO qualified equipment	TSO equipment
Use of specifications	Analyst on board	Basically an installation inspection
Empirical (instrument) and subjective evaluation	Empirical (instrument) and subjective evaluation	Subjective evaluation

These classifications suggest that three separate inspections are possible for each generic navigation system. It follows that three different checklists are required.

Questionnaires—Rating of Checklist Features, Comparison With Current Methods, and Subjective Evaluation for Future Usage

The evaluators rated APFCL features on a scale of 1 to 10, with 1 being unacceptable and 10 excellent. Ten features were rated by each evaluator.

Total rated above 5	Total rated below 5	Total not rated
8	6	6

For three of the not-rated items, the comment was that they were not evaluated during the course of testing. For five of the six low ratings (below 5), the comments explained that it was not clear which floppy disk, A or B, contained the data in question and that the exact type of inspection was not specified. It appears that the intent of the items was not clearly understood.

The rating scale of 1 through 10 was also used to compare the APFCL with current methods of performing inspections. One was much worse, 5 was the same, and 10 superior. The ratings were done subjectively based on experience, as no two methods were compared. Eleven items were rated by each evaluator.

Total rated over 5	Total rated at 5	Total rated below 5
10	7	5

The APFCL was rated the same or better a total of 17 times and worse five times. The ratings indicate that the APFCL is a potential improvement over currently used inspection methods.

Seven yes/no questions were asked about ease of use of the APFCL and various other factors. One evaluator answered "yes" and one "no" concerning the ease of use for the APFCL. The "no" answer had the comment that there was no clear definition of what type of inspection was being conducted. "Yes" answers were given to questions concerning the ability to follow the menus easily and keep track of where one is going, with the comment that the APFCL has potential for evaluating other systems, such as, automatic flight controls and flight management systems. Both said "yes" to adding figures to the reference data so as to conclusively identify control types and indicated a 70% and 80% improvement in understanding if figures were included. Ratings of 70% and 80% improvement were also given for certification of a new Nav unit using the APFCL.

IMPLEMENTATION OF EVALUATORS' SUGGESTIONS

The following suggestions will be incorporated into the APFCL:

1. An indication of the end of last page of reference data.
2. An indication to the user that the computer is responding or "working" when the screen is blank.
3. Improve and speed up the procedures for filling out the information data sheet at the beginning of the inspection.
4. Capitalize paragraph lead-ins.
5. Improve scrolling of data pages.
6. Incorporate a routine for recording whether or not a unit under inspection has one or more of the features listed under "System Characteristics."
7. Increase display speed. This is a near-term goal because, at present, data retrieval in some cases is objectionably slow.

CONCLUSION AND RECOMMENDATIONS

Several significant conclusions were drawn. It is apparent that there are at least three possible areas of application of the APFCL. Each is defined by the type and content of the reference data resident in the individual APFCL. The three areas are ground TIA, flight TIA, and field approval. Further definition of specific data packages for each of these needs to be pursued.

Clearly the display response times of the Zenith 181-92 Lap-Top computer are slow. The new model 181-93 incorporates a hard drive and should be significantly faster. Disk search is estimated at 10 times faster with the hard drive.

The questionnaires yielded somewhat mixed results. Several items were not completed because the evaluator felt no clear definition of inspection type was indicated and that the item itself was not specifically evaluated. The low ratings for these reasons are not considered a negative response because the intent of the question was not interpreted as intended. The ratings do show that the

APFCL has potential for improvement over currently used inspection methods.

FARs, ACs, TSOs, etc., should not be included in the reference data. Figures should be added to the reference data. Both the evaluators felt strongly that the APFCL could improve the current certification process by as much as 70% or 80% in terms of efficiency and provide standardization.

Several suggestions relating to user-APFCL interface are going to be incorporated. A technique for indicating that the unit under test has features listed under "System Characteristics" will be implemented. A technique for increasing display speed is being investigated.

APFCL EVALUATION QUESTIONNAIRE

Please rate the following features of the APFCL from 1 through 10: 1 = Unacceptable 10 = Excellent

Menu formats. _____

Instruction blocks. _____

Method of recording decisions, accept, reject, etc. _____

Ability to skip around within the APFCL and pick what you want to look at. _____

Availability of Human Factors data information. _____

Method of recording comments. _____

Availability of a printed report. _____

Maintenance of consistency between inspectors. _____

Maintenance of continuity between inspectors, that is, a second inspector could complete the evaluation. _____

Consistency between types of Nav systems. _____

Based on your own experience, compare the Automated Pilot Factors Checklist (APFCL) concepts listed below with the current methods of performing such an evaluation.

1 = much worse 2 = same 10 = superior

Reduction of error potential, that is, making mistakes.

1 2 3 4 5 6 7 8 9 10

Reduction in "overlooking" items that should be included in an evaluation.

1 2 3 4 5 6 7 8 9 10

Performing the evaluation in an aircraft (Nav Hardware installed).

1 2 3 4 5 6 7 8 9 10

Performing the evaluation in the lab (Nav Hardware on the bench).

1 2 3 4 5 6 7 8 9 10

Amount (volume) of information presented.

1 2 3 4 5 6 7 8 9 10

Time required to complete the evaluation.

1 2 3 4 5 6 7 8 9 10

Overall operational complexity of the APFCL.

1 2 3 4 5 6 7 8 9 10

Type of information presented.

1 2 3 4 5 6 7 8 9 10

Number of physical operations required to conduct the APFCL.

1 2 3 4 5 6 7 8 9 10

Number of memory operations required to conduct the APFCL.

1 2 3 4 5 6 7 8 9 10

Amount of training required to effectively use the APFCL.

1 2 3 4 5 6 7 8 9 10

In general, was the APFCL easy to use?

Yes _____ No _____

If yes, please indicate why. If no, please indicate why not.

_____

_____

_____

_____

Is the menu-oriented procedure easy to follow?

Yes _____ No _____

Comment _____

Were you able to keep track of where you were going in the APFCL using the "tree" or "levels" of organization in the APFCL?

Yes _____ No _____

Comment _____

Does the APFCL have potential for evaluating other aircraft systems/subsystems?

Yes _____ No _____

If yes, please list

_____

_____

_____

_____

What percent might the APFCL contribute to the overall effort in certification of a new Nav unit?

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Should applicable FARs, ACs, TSOs, etc. be included?

Yes _____ No _____

Comment _____

Data tables are presently included in the Human Factors information. Should we incorporate figures? How much of an improvement would that contribute to the understanding and clarity of the data?

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

APPENDIX I

Portable Computer Purchase Analysis

PORTABLE COMPUTER PURCHASE ANALYSIS—JUNE 1987

The Nav Handbook contract, Task 2 of NAS1-18027, requires the purchase of two portable computers to support the development and testing of the Nav Handbook. An analysis was conducted to identify the specific computer capability requirements and survey the commercial market.

Computer Requirements:

1. Portability, light weight, small size
2. Battery operating time sufficient to conduct inspection
3. Processing speed adequate
4. Standard 640K memory
5. IBM software compatible
6. Full-size viewing screen (25 x 80)
7. User friendly
8. Connects to printers, modems and other i/o devices including desktop PCs.

NOTE: Hard drive desirable, but not a requirement.

Portable Computers Evaluated:

1. NEC Multi-Speed
2. Toshiba T1100
3. Toshiba T3100
4. Compaq Portable II
5. Zenith 2-181-92
6. Zenith 2-181-93

NOTE: Computers evaluated were resident at Boeing Computer Services (BCS) at Tukwila, Washington.

Conclusions:

The Zenith Z-181-93 was selected for purchase to support the Nav Handbook development because it meets all of our requirements. The deciding features of the -93 from the operator's viewpoint are the legibility, adjustability of contrast and brightness, and electroluminescent back-lit LCD, 25-line by 80-character display with true aspect ratio. The Toshiba T3100 and the Compaq have hard drives and are limited to one hour of operation on batteries. The NEC and Zenith -93 both have high processing speeds, but the NEC has a small display. The Toshiba 1100 is very slow.

Two Zenith Z-181-93 machines with carrying cases and Lap-Link adapters for interface with desktop PCs have been ordered from the local retailer.

A local sole source was chosen because of short leadtime requirements. Computerland in Bellevue, Washington, supplied the units in the shortest period of time.

NASA
National Aeronautics and Space Administration

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA CR-181644		

4. Title and Subtitle
Pilot Factors Guidelines for the Operational Inspection of Navigation Systems

5. Report Date
September 1988

6. Performing Organization Code

7. Author(s)
J. F. Sadler
G. P. Boucek

8. Performing Organization Report No.

10. Work Unit No.

9. Performing Organization Name and Address
Boeing Commercial Airplanes
P. O. Box 3707
Seattle, WA 98124-2207

11. Contract or Grant No.
NAS1-18027

13. Type of Report and Period Covered

12. Sponsoring Agency Name and Address
National Aeronautics & Space Administration
Langley Research Center
Hampton, VA 23665-5225

14. Sponsoring Agency Code

15. Supplementary Notes
Langley Technical Monitor: Cary R. Spitzer
FAA Technical Monitor: Herb Schlickenmaier
Final Report

16. Abstract
The purpose of this study was to develop a computerized human engineered inspection technique for use by FAA inspectors in evaluating the pilot factors aspects of aircraft navigation systems. The shortened title for this project is "Nav Handbook". A menu-driven checklist, computer program and data base (Human Factors Design Criteria) were developed and merged to form a self-contained, portable, human factors inspection checklist tool for use in a laboratory or field setting. The automated checklist is tailored for general aviation navigation systems and can be expanded for use with other aircraft systems, transports or military aircraft. The Nav Handbook inspection concept was demonstrated using a lap-top computer and an Omega/VLF CDU. The program generates standardized inspection reports. Automated checklists for LORAN/C and R NAV were also developed. A Nav Handbook Users Guide is included.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Pilot Factors, Nav Inspection Handbook, Generic Nav Systems, Automated Checklist, LORAN C, OMEGA/VLF, R NAV, Portable Computer.	Unclassified - Unlimited Subject Category04

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified		

NASA FORM 1626 OCT 86