GNS-XLS Enhanced

FLIGHT MANAGEMENT SYSTEM
Operator's Manual
Global

Honeywell

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Revision History and Instructions

Manual   GNS-XLS Enhanced FMS Operator's Manual

Revision   3, November 2004

Part Number   006-18233-0000

This revision adds descriptions of operational procedures required to fly two kinds of SIDs.

Insert the contents of this revision packet according to the following instructions:

Front Cover Page   Remove and Replace

Revision History Pages   Remove and Replace

Section 3   Remove and Replace Pages 3-15 through 3-20

Back Cover Page   Remove and Replace

Back Binder Insert   Remove and Replace

Revision History and Instructions

Manual	GNS-XLS Enhanced FMS Operator's Manual
Revision	2, September 2002
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This revision incorporates GNS-XLS Enhanced Software Mod 3 Wx Graphics, change of the Regional Airline AFIS and miscellaneous corrections.

Insert the contents of this revision packet according to the following instructions:

Front Cover Page	Remove and Replace
Revision History Pages	Remove and Replace
Table of Contents	Remove and Replace Page v and vi, Pages xi through xx
Section 2	Remove and Replace Pages 2-47 through 2-48
Section 3	Remove and Replace Pages 3-9 through 3-12, Add Pages 3-12a through 3-12b, Remove and Replace 3-77 through 3-78
Index	Remove and Replace Pages I-1, I-2, I-7, I-8, I-11, I-12, I-13 and I-14
Back Cover Page	Remove and Replace
Back Binder Insert	Remove and Replace

Revision History and Instructions

Manual   GNS-XLS Enhanced FMS Operator's Manual

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Insert the contents of this revision packet according to the following instructions:

Front Cover Page   Remove and Replace

Revision History Page   Insert Ahead of Existing Revision History Page

Table of Contents   Replace Pages xviii- xx with xvii and xviii.

Section 3   Remove and Replace Pages 3-13 through 3-20, 3-133 through 3-136, 3-141 through 3-146

Section 7   Remove and Replace entire section

Section 8   Remove and Replace entire section

Index   Remove and Replace entire section

Back Cover Page   Remove and Replace

Back Binder Insert   Remove and Replace

Revision History and Instructions

Manual   GNS-XLS Enhanced FMS Operator's Manual

Revision   0, June 2000

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This is the original version of this publication.

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Table of Contents

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GNS-X*LS* Enhanced Flight Management System

SECTION 1

DESCRIPTION

OVERVIEW

The GNS-XLS Flight Management System is an integrated system designed to give the pilot centralized control for the navigation sensors, computer based flight planning, fuel management, and radio management. The GNS-XLS has a full color flat panel LCD display, alpha-numeric and function keys, a Global Positioning Sensor (GPS), and a navigation data base. All these are housed in a panel/pedestal mounted Control Display Unit (CDU).

All aircraft interface requirements are accomplished through the GNS-XLS. The system supports analog and digital inputs in any combination. Specific aircraft requirements are programmed into a Configuration Module. This module mounts directly to the rear connector, thus remaining in the aircraft. This allows hardware to be easily moved between aircraft types without changing system configuration. The following is a summary of the digital and analog interfaces:

DIGITAL	ANALOG
AFIS	Altitude
Air Data Computer	Altitude Rate
EFIS	Cross Track Deviation
Fuel Flow	Discretes
Inertial Navigation Sensor	Dual VOR/DME
Inertial Reference Sensor	Fuel Flow
VOR/DME, ADF, XPDR, COMM	Heading
Radio Tuning	HSI Course & Bearing
External GPS	AFIS Weather Graphics
EGPWS	Roll Steering
Cross Side FMS	True Air Speed
	Vertical Deviation

In addition to the GPS sensor, position information is accepted from up to eight navigation sensors, such as an optional VLF/Omega RPU, inertial position sensors, or VOR/DME radios. These navigation sensor inputs can be blended to form a single composite position. Accuracy of this composite position is enhanced by using the best characteristics of each type of sensor. For example, an Inertial

Reference System (IRS) has excellent short term characteristics while VLF/Omega has excellent long term stability. The internal GPS sensor has excellent overall characteristics and will usually be the dominant sensor during blending. However, when RAIM is available, the GPS sensor is the sole contributor to the composite position.

NOTE: RAIM (Receiver Autonomous Integrity Monitoring) is a quality factor used to determine the accuracy of the GPS position. It is an internal function of the GPS receiver and determines the accuracy of it's navigation solution.

The navigation data base is updated on a 28-day cycle by way of a memory card. This card is inserted in a Personal Computer Memory Card International Association (PCMCIA) slot located under the lower portion of the alpha keyboard. This worldwide database contains over 50,000 waypoints, navaids and airports. It also contains altitudes at appropriate waypoints, SID, STAR, AIRWAY, and APPROACH procedures. In addition to this database, the memory can store up to 999 operator generated waypoints. Individual navigation points can be organized into 56 different stored flight plans, each containing up to 50 waypoints.

Due to the way the GNS-XLS database is structured, waypoints must have unique identifiers. However, some duplicate ICAO identifiers exist for more than one waypoint. In these cases the waypoint identifiers are renamed in the database. Two naming conventions are used, one for four character identifiers and one for five character identifiers.

Four character waypoints keep the first four characters and the last two characters of the ICAO airport identifier as shown in the following example.

MA11 at KPRC becomes MA11**RC** in the database.

Five character waypoints keep the first five characters and add the last character of the ICAO airport identifier as shown in the following example.

MA27L at KOAK becomes MA27L**K** in the database.

Additional capabilities of the GNS-XLS include direct navigation from present position to any waypoint, and data crossfill capability for dual installations. Trip Plan and Fuel Plan functions are also available. There is capability for creating a PSEUDO-VORTAC (selected course) to any waypoint and establishing an offset parallel course. NAVs, COMMs, ADFs and transponders can be tuned through the system or by using the individual control heads.

GENERAL TERMS

FIELD: A line of information.

CURSOR: Yellow rectangular box placed over a field to enter or change the information in that field. The cursor is normally out of view unless brought into view by depressing the Line Select Keys on either side of the screen. When information is entered into a field and the **ENTER** Key is depressed, the cursor will move to the next enterable field or disappear from the screen when the last field is entered. Blinking of a field indicates that the computer has not accepted the entry because of unreasonable or invalid information.

PAGE: Information is arranged in sections and subsections much like chapters in a book. Individual screen displays are referred to as pages. Each section is selected by depressing the appropriate Display Selector Key located at the top of the GNS-XLS. Each subsequent push of the key will select the next page of that section. A subsection page is selected by depressing the Line Select Key next to the topic desired, then depressing the **ENTER** Key. The **PRV, NXT,** or **BACK** Key can be used to move forward or backward through pages of a subsection. If the first page of a subsection is displayed, the **BACK** Key will exit the subsection.

WAYPOINT:A navigation point consisting of 1 to 6 alpha, numeric characters that has a specific latitude and longitude.

CONTROLS AND INDICATORS

ON:

Depress and release the **ON** Key to apply power to the system. There is a warm-up period of approximately 30 seconds. The display illumination will initially be set at 75% of full bright.

Depressing the **ON** Key for approximately three seconds will initiate the system power off sequence. During the sequence the display will show **SYSTEM TURNING OFF.** This is to prevent inadvertent system shutdown.

NOTE: The system is also capable of being turned on and off by cycling aircraft power.
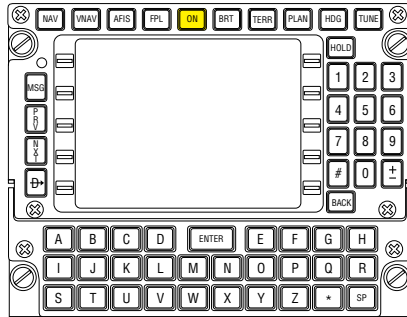
BRIGHTNESS (BRT):

The **BRT** Key is used to change the illumination of the display. This key is also used for parallax adjustment of the Line Select Keys

NOTE: The illumination of the front panel and keyboard is normally controlled through the aircraft panel lighting control.
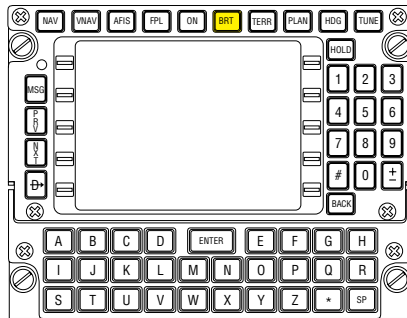
MESSAGE KEY/ANNUNCIA-TOR (MSG):

The **MSG** annunciator will flash to alert the operator that a message needs to be viewed on one of the **SYSTEM MES-SAGES** or **SENSOR MES-SAGES** Pages.
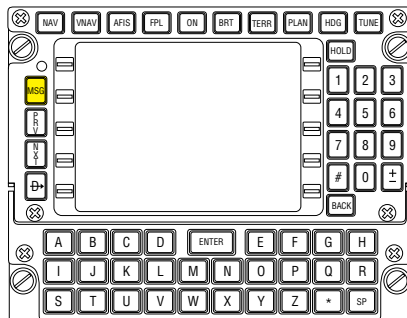
Depressing the **MSG** Key will display the message page. The newest message will be indicated with a flashing asterisk to the left of the message. If the message requires some action be taken by the operator, the **MSG** annunciator will remain on steadily until the action is completed. If no action is required, the **MSG** annunciator will extinguish when the message page is exited.

ALPHA KEYS:

The alpha keys are used to enter the 26 letters of the alphabet and an asterisk.
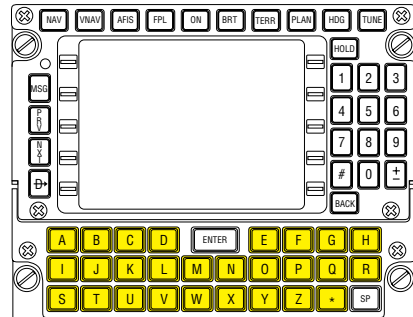
NUMERIC KEYS:

The numeric keys are used to enter numbers 0 to 9, # and ±.
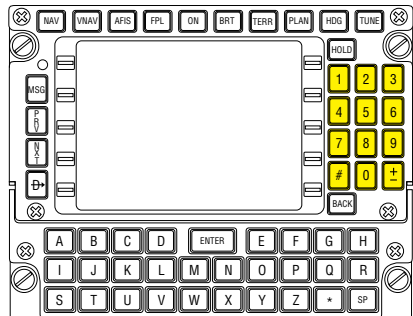
HOLD KEY:

If the cursor is positioned over a waypoint identifier, and it is appropriate to program a Holding Pattern at that waypoint, depressing the **HOLD** Key accesses the Holding Pattern page.

If the cursor is not displayed, depressing the **HOLD** Key accesses the **POSITION FIX** Page and is used for position updates and verification as well as entering the primary navigation mode.
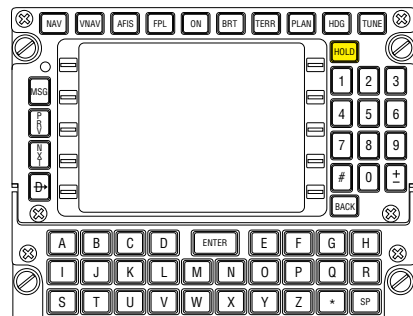
Description

BACK KEY:

The **BACK** Key is used to erase errors and page backward when the cursor is not displayed. It can also be used to change data in a field if the cursor is present.
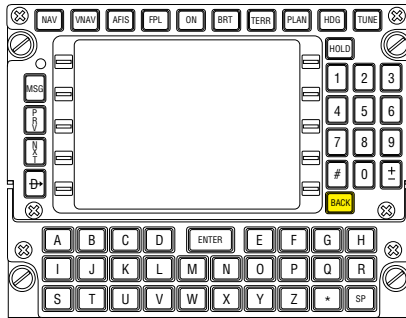
SPACE (SP) KEY:

The **SP** Key is used to enter a space when entering a message on an AFIS Page. This key is not functional if AFIS is not installed in the system.
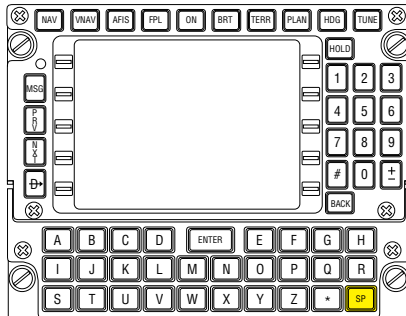
ENTER KEY:

When the **ENTER** Key is depressed, data is entered into the computer memory.
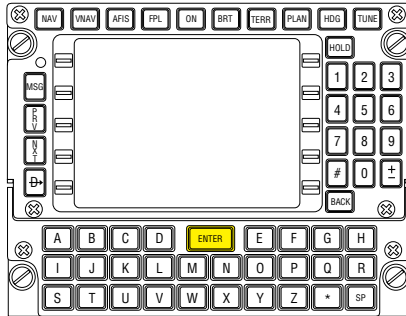
DISPLAY SELECTOR KEYS:

NAV (Navigation), **VNAV** (Vertical Navigation), **FPL** (Flight Plan), **PLAN** (Planning), **HDG** (Heading), **TUNE** (Radio Tuning), and **⭢** (Direct) are used to select the pages pertaining to that particular section. The first page of a section is displayed first when a Display Selector Key is pressed. With each subsequent press of the Key, the next sequential page will be displayed.

1-6

GNS-XLs Enhanced Flight Management System

Rev. 0
Jun/00
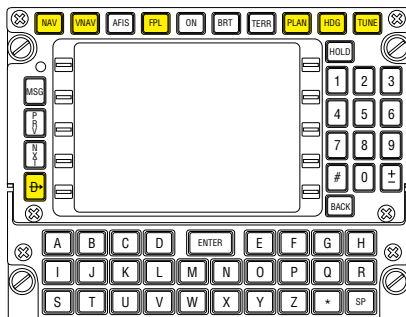
AFIS KEY:

The **AFIS** (Airborne Flight Information System) key is used to access the optional AFIS weather, graphical weather, messaging and flightplanning functions. When graphical weather is being displayed, line select keeys may be used to select functions on the weather display.
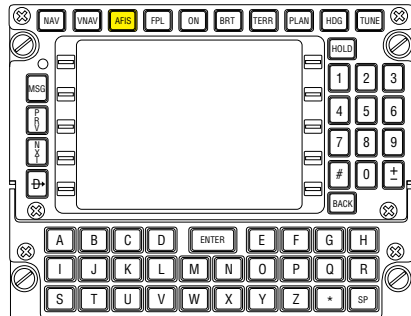
TERRAIN (TERR) KEY:

The **TERR** Key is used to turn the XLS display into an Enhanced GPWS terrain display. When terrain data is being displayed, line select keys may be used to select functions on the terrain display.
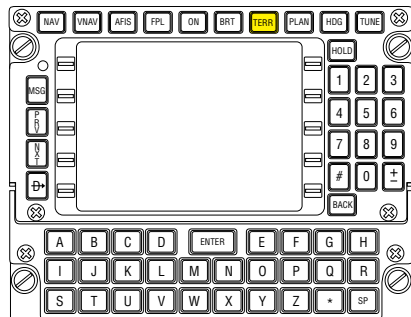
PREVIOUS (PRV) KEY:

The **PRV** Key is used to display the previous page of a section or subsection. This key also allows the operator to remain in a section or subsection by looping from the first to the last and back to the first page of that section or subsection.
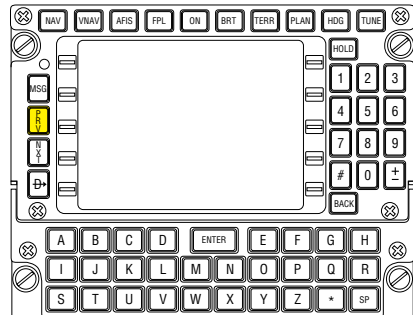
NEXT (NXT) KEY:

The **NXT** Key is used to display the next page of a section or subsection. This key also allows the operator to remain in a section or subsection by looping from the first to the last and back to the first page of that section or subsection.
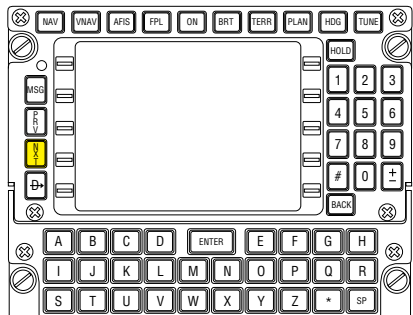
LINE SELECT KEYS:

These keys are used to place the cursor in the field next to that key. Each line select key controls 2 lines of text. White symbols (< or >) displayed on either side of the display indicate active Line Select Keys for each individual page.
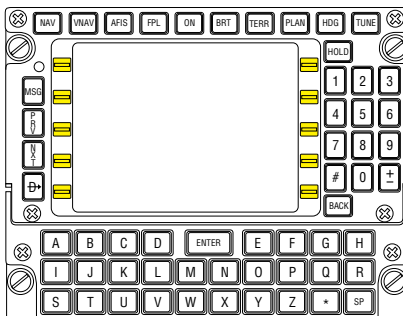
COLORS:

The CDU displays are color coded to assist the operator in recognizing information. The following is a list of these colors and their meanings:

Magenta	**Lateral TO Waypoint, Vertical TO Waypoint, and TO Waypoint**
Yellow	**FROM Waypoint** **Caution Messages** **Data entered, but not yet accepted by the computer.**
Cyan	**Date and Times** **Tuned Frequencies or Codes** **Altitudes**
Green	**Navigation and Fuel Data** **General Page Data**
White	**Page Titles and Prompts**
Red	**Warnings**
Blue	**Number of Waypoints Available**

SECTION 2

PAGE DISPLAY DEFINITIONS

The following section contains definitions pertaining to information and format seen when a particular function key is depressed.

PAGE DISPLAYS AT POWER-UP

For a better understanding of the GNS-XLS functions, this section should be reviewed prior to operating the system.

SELF TEST PAGE

For the first 30 seconds after the system if is turned on, the computer performs extensive internal tests that must be successfully completed before proceeding further. If the system detects a problem the **SELF TEST** display may be replaced by a **NO DATA RECEIVED** message. The unit may have to be removed for service.

```
          SELF TEST

           GLOBAL

          HONEYWELL
      INTERNATIONAL INC.


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      ALL RIGHTS RESERVED
```

Figure 2-1

INITIALIZATION PAGE

After the Self Test is success-fully completed, the **INITIAL-IZATION** Page will be dis-played. Refer to Figure 2-2.
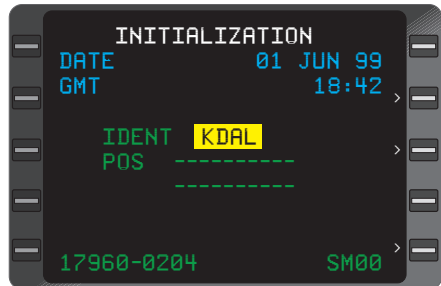
DATE:

The current Greenwich Date is displayed as day, month and year.

```
       INITIALIZATION
  DATE         01 JUN 99
  GMT             18:42

     IDENT   KDAL
     POS   ----------
           ----------

  17960-0204        SM00
```

Figure 2-2

GMT:

Time of day is displayed in Greenwich Mean Time hours and minutes.

IDENT:

Displays the airport identifier for the airport closest to the system shut down position. Dashes will be displayed when the cursor is placed over the position **(POS)** field.

POS:

Displays the last system position at shut down. Dashes are displayed when the cursor is over the **IDENT** field.

PART NUMBER AND SOFTWARE MODIFICATION STATUS:

The bottom line of the display shows the unit part number and the software level of the unit.

*NOTE: This page cannot be recalled once **DATE, GMT,** and **POS** have been entered. In order to display this again, the system must be turned off and then turned back on.*

FLIGHT PLAN SECTION (FPL KEY)

Upon pressing the **FPL** Key the **FLIGHT PLAN LIST 1/1** Page will be displayed and the following can be observed.

*NOTE: The **FLIGHT PLAN LIST** page may automatically be displayed if the **ENTER** key is depressed at least three times while on the initialization page.*

FLIGHT PLAN PAGES

*NOTE: If AFIS equipped the first page displayed after system initialization will be the **AFIS FPL LIST** page in lieu of the **FLIGHT PLAN LIST** page.*

*NOTE: If the data base contains company routes, the first page displayed after system initialization will be the **COMPANY ROUTES** page in lieu of the **FLIGHT PLAN LIST** page. If both AFIS and Company Routes are present, the **COMPANY ROUTES** page is displayed first.*

FLIGHT PLAN LIST 1/1 (Page 1 of 1)

If the initialization airport matches a departure airport on the **FLIGHT PLAN LIST**, the cursor will automatically be positioned over the first matching Flight Plan.

There are seven pages pos-
sible with a maximum of 56
flight plans stored in non-
volatile memory.   Each
stored flight plan's origin and
destination points are listed
in alphabetical order. (Figure
2-3)

```
    FLIGHT PLAN LIST 1/1

  KABQ     KMSY          1
  KDAL     KHPN          6  >
  KDAL     KSFO          8
  KHPN     KORD          2  >
  KHPN     KORD          9
  KLAX     KSTL          4  >
  KPRC     KSNA          3
  KSFO     KHPN          7  >
```

Figure 2-3

A new **FLIGHT PLAN LIST**
Page is created when the
previous page has eight flight
plan origin-destination pairs
on it. Using the **PRV** or **NXT** Key pages through the Flight Plan List
subsection. (Figure 2-3)

FLIGHT PLAN "X" 1/1 (Page 1 of 1)

"X" can be Flight Plan num-
bers 1 through 56. (Figure
2-4)

This stored flight plan page is
accessed   through   the
FLIGHT PLAN LIST Page
by pressing the Line Select
Key corresponding to the
desired flight plan number,
thus, placing the cursor over
that number, then pressing
ENTER. (Figure 2-3)

```
<    FLIGHT PLAN 6 1/1
<     KDAL
      BUJ
      HOT
<     BWZ
       ISLET

<DEPART          XFILL
<ARRIVE          SELECT  >
<APPROACH        ERASE  >
```

Figure 2-4

Waypoint Identifiers:

Waypoint identifiers may consist of from one to six alphanumeric
characters. Up to 50 waypoint identifiers may be placed on each
stored Flight Plan. An identifier may be used more than once on the
same Flight Plan. (Figure 2-4) Other indications can be as follows:

• Indented Waypoints: Indicates a SID, STAR, or APPROACH pro-
cedure is part of the Flight Plan. (Figure 2-4)

• **HP** (Holding Pattern): Indicates a holding pattern is programmed at a particular waypoint. (Figure 2-5)

• **PT** (Procedure Turn): Indicates a procedure turn is programmed at a particular waypoint.

Figure 2-5

• **+++++:** A flight plan discontinuity "fence" separating the missed approach waypoint from the rest of the approach (Figure 2-5). The system will fly current track beyond the last waypoint prior to the fence but no Auto Leg change will occur. No Altitude constraints will be displayed beyond the fence. This type of fence will not cause waypoints of the active flight plan to be deleted prior to the fence if a waypoint beyond the fence is selected using the ⎯ᴅ➔ function.

• **IAF** (Initial Approach Fix): Automatically loaded from the data base when a non-precision approach is selected.

• **ARC** (DME Arc end waypoint): Automatically loaded from the data base when a non-precision approach is selected.

• **FAF** (Final Approach Fix): Automatically loaded from the data base when a non-precision approach is selected.

• **MAP** (Missed Approach Point): Automatically loaded from the data base when a non-precision approach is selected.

• **------:** "fence" indicating a discontinuity in the flight plan. No Auto Leg changes will take place beyond the last waypoint prior to the frence and no **ALT, ETE, ETA,** or **DIS** will be displayed. If a ⎯ᴅ➔ is performed to a waypoint beyond this type of fence all waypoints prior to the fence will be deleted from the active flight plan.

• ********** : Follows the last waypoint on the Flight Plan and indicates where the next waypoint entry will normally begin.

DEPART:

Used to access the **DEPARTURE** Page to enter a Standard Instrument Departure (SID). (Figure 2-5)

ARRIVE:

Used to access the **Arrival** Page to enter a Standard Terminal Arrival (STAR) or Profile Descent. (Figure 2-5)

APPROACH:

Used to access the **APPROACH** Page to enter a non-precision approach. (Figure 2-5)

XFILL: Used to transfer information between systems in a dual system installation. In a single system installation, this prompt will not be displayed.

SELECT or **INVERT:**

Used to transfer a Stored Flight Plan to the **ACTIVE FLIGHT PLAN** Page. Depressing the **BACK** Key when the cursor is over this field brings up **INVERT?**, which is used to transfer the waypoints of a Stored Flight Plan to the **ACTIVE FLIGHT PLAN** Page in reverse order. (Figure 2-5)

ERASE:

Used to clear an entire flight plan. (Figure 2-5)

DEPARTURE Page

Accessed by pressing the Line Select Key adjacent to **DEPART** on the **FLIGHT PLAN** Page. With the cursor over **DEPART** press **ENTER.**

*NOTE: Each field will prefill if there is only one choice for that particular field or **DEPARTURE** airport field will flash if no Departure is available. A **NO SIDS AVAILABLE** message will appear at the bottom of the screen.*

DEPARTURE:

Departure airport identifier. This field prefills if first waypoint on the flight plan is an airport or runway, or it can be manually entered. (Figure 2-6)

RUNWAY:

Departing runway. This field prefills if first waypoint on the flight plan is a runway, or it can be selected from a list made available by pressing the Line Select Key adjacent to the **RUNWAY** field. (Figure 2-6)


```
DEPARTURE   KLAX  1/1  ›
    RUNWAY       ------
    SID          ------ ›
    TRANSITION   ------
‹ RW06L
  RW06R
‹ RW07L
  RW07R
```

Figure 2-6

SID:

The Standard Instrument Departure (SID) can be selected from a list made available by pressing the Line Select Key adjacent to the **SID** field.

TRANSITION:

The Transition waypoint can be selected from a list made available by pressing the Line Select Key adjacent to the **TRANSITION** field.

WAYPOINTS OF SID:

The waypoints that constitute the SID**.** (Figure 2-7)

SELECT?:

Used to select the defined SID. (Figure 2-7)

ERASE:

Used to erase a SID. (Figure 2-7)
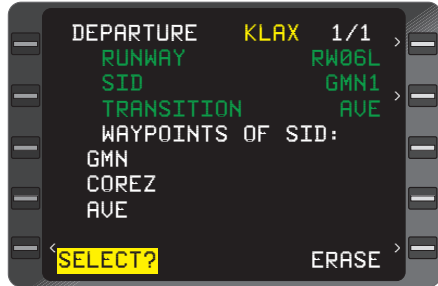
Figure 2-7

ARRIVAL Page

Accessed by pressing the Line Select Key adjacent to **ARRIVE** on the **FLIGHT PLAN** Page. With the cursor over **ARRIVE** press **ENTER.**

*NOTE: Each field will prefill if there is only one choice for that particular field or **ARRIVAL** field will flash if no Arrival is available, and a **NO STARS AVAILABLE** message will appear at the bottom of the screen.*

ARRIVAL:

Arrival airport identifier. This field prefills if the last waypoint on the flight plan is an airport or runway, or can be manually entered. (Figure 2-8)

RUNWAY:

Arriving runway. This field prefills if the last waypoint on the flight plan is a runway, or can be selected from a list made available by pressing the Line Select Key adjacent to the **RUNWAY** field. (Figure 2-8)

Figure 2-8

TRANSITION:

The Transition waypoint may be prefilled or selected from a list made available by pressing the Line Select Key adjacent to the **TRANSI-TION** field.

STAR:

The Standard Terminal Arrival (STAR) can be selected from a list made available by pressing the Line Select Key adjacent to the **STAR** field.

WAYPOINTS OF STAR:

The waypoints that constitute the STAR. (Figure 2-9)

SELECT?:

Used to select the defined STAR. (Figure 2-9)

ERASE:

Used to erase a STAR. (Figure 2-9)

Figure 2-9

APPROACH Page

Accessed by pressing the Line Select Key adjacent to **APPROACH** on the **FLIGHT PLAN** Page. With the cursor over **APPROACH** press **ENTER.**

*NOTE: Each field will prefill if there is only one choice for that partic-ular field or Approach Airport field will flash if no Approach is avail-able and a **NO APPROACH AVAILABLE** message will appear at the bottom of the screen.*

APCH:

Approach airport identifier. This field prefills if last way-point on the flight plan is an airport or runway, or can be manually entered. (Figure 2-10)

Figure 2-10

RUNWAY:

Approach runway prefills if only one runway is available, last waypoint on Flight Plan is a runway, or can be select-ed from a list made available by pressing the Line Select Key adjacent to the **RUN-WAY** field. (Figure 2-11)

```
APCH  KLAX      1/1
  RUNWAY         RW24R
  TYPE            NDB
  TRANSITION     LAHAB
   WPTS OF APPROACH:
  IAF  LAHAB  MAP RW24R
       LAX16      +++++
       DOWNE   HP RAFFS
  FAF  OSNB
 SELECT?          ERASE
```

Figure 2-11

TYPE (Circle, VOR, NDB, or RNAV):

Type may be prefilled or selected from a list made available by press-ing the Line Select Key adjacent to the **TYPE** field.

*NOTE: If the runway selected on the Approach Page differs from the runway dictated by the STAR, **"SEL RWY FROM STAR PG"** is dis-played at the bottom of the screen.*

TRANSITION:

The Transition waypoint may be prefilled or selected from a list made available by pressing the Line Select Key adjacent to the **TRANSI-TION** field. (Figure 2-10)

WAYPOINTS OF APPROACH:

 The waypoints that constitute the **APPROACH.** (Figure 2-11)

• **HP** (Holding Pattern):
 Indicates a holding pattern is programmed at a particular waypoint. (Figure 2-11)

• **PT** (Procedure Turn):
 Indicates a Procedure Turn is programmed at a particular waypoint.

• **ARC** (DME ARC):
 Indicates a DME ARC is programmed at a particular waypoint.

• **IAF:**
 Indicates the Initial Approach Fix.

• **FAF:**
 Indicates the Final Approach Fix.

• **MAP:**
 Indicates the Missed Approach Fix.

• FCF :

Indicates Final Approach Course Alignment Fix.

• ++++++:

Separates the missed approach procedure waypoint from the rest of the approach. When the approach is flown, the system will continue to provide guidance along the final approach course and beyond the **MAP** until the pilot manually sequences to the missed approach waypoint by using a **DIRECT TO** or **HEADING** mode procedure. (Figure 2-11) No Auto Leg changes will occur beyond the last waypoint prior to the fence. This type of fence will not cause waypoints of the active flight plan to be deleted prior to the fence if a waypoint beyond the fence is selected using the ⇥ function.

SELECT?:

Used to select the defined **APPROACH**. (Figure 2-11)

ERASE:

Used to erase an **APPROACH.** (Figure 2-11)

AIRWAY Page

Enroute Airways may be manually entered on a Flight Plan Page by preceding the route or airway ident with a pound sign **(#),** e.g., **#J** (Jet Airway), **#V** (VOR Airway), **#UG** (Upper Green) or **#R** (Red Airway). The preceding waypoint on the Flight Plan must be part of the Airway being entered in order for the Airway to be accepted. This waypoint will normally be the From waypoint on the AIRWAY Waypoint Page.

AIRWAY:

Airway identifier. (Figure 2-12)

FR:

Starting point on airway. (Figure 2-12)

TO:

Ending point on airway as selected by the operator. (Figure 2-12)
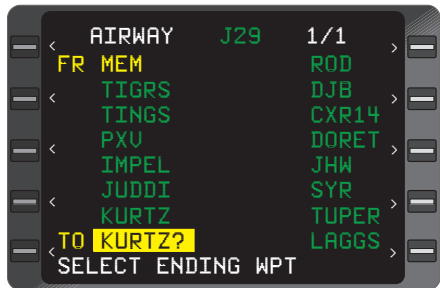
Figure 2-12

SELECT ENDING WPT:

Select the desired ending waypoint on the airway, by moving the cursor up or down and depress **ENTER.** (Figure 2-12)

ACTIVE FPL (Flight Plan)Page

FR:

Current FROM waypoint. May also display **DIRECT, PSEUDO VORTAC, DME ARC,** or **PROCEDURE TURN.** (Figure 2-13)

TO:

Current **TO** waypoint. (Figure 2-13)

```
     ACTIVE FPL     1/2
 FR MEM
 TO BWG           205 11

      ------
    KDAL      -CMK
      DFW
      KHART
 DEPART
 ARRIVE                DIS
```

Figure 2-13

Waypoint Identifiers:Up to **100** waypoint identifiers may be placed on the Active Flight Plan Pages. An identifier may be used more than once on the same Flight Plan.

- Indented Waypoints: indicate a **SID, STAR,** or **APPROACH** Procedure is part of the Flight Plan. (Figure 2-13, **DFW**)

- **HP** (Holding Pattern): indicates a holding pattern is programmed at a particular waypoint. (Figure 2-14)
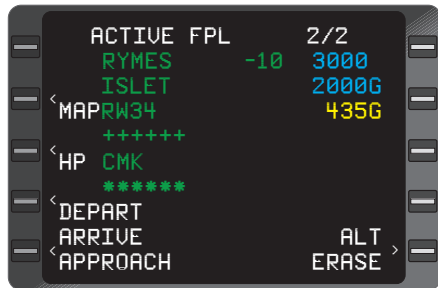
- **PT** (Procedure Turn): indicates a procedure turn is programmed at a particular waypoint.

```
     ACTIVE FPL     2/2
    RYMES      -10  3000
    ISLET          2000G
 MAPRW34            435G
    ++++++
 HP CMK
    ******
 DEPART
 ARRIVE                ALT
 APPROACH           ERASE
```

Figure 2-14

------:

A "fence" separating the current FR/TO leg from the originally selected Active Flight Plan when the TO waypoint is not on the original Flight Plan. Also separates non-continuous Flight Plan segments. (Figure 2-13) No Auto Leg change will occur to waypoints that appear after the fence. This type of fence will not cause waypoints of the active flight plan to be deleted prior to the fence if a waypoint beyond the fence is selected using the ↦ function.

NOTE: When a "fence" (++++++) appears in an Approach it separates the missed approach holding fix from the rest of the approach. (Figure 2-14) No Auto Leg change will occur to waypoints beyond the fence.

******.

Same as stored Flight Plan Page.

GNS-XLS Enhanced Flight Management System

DEPART:

Same as stored Flight Plan Page.

ARRIVE:

Same as stored Flight Plan Page.

APPROACH:

Same as stored Flight Plan Page.

ETA: (ETE/DIS/ALT)

Estimated Time of Arrival at each waypoint on the Active Flight Plan based on current groundspeed. (Figure 2-15)

*NOTE: When the cursor is placed over the **ETA** field and the **BACK** Key is pressed, **ETE, DIS,** or **ALT** can be displayed. Press **ENTER** to select the desired option. No **ETE, ETA, ALT** or **DIS** information is displayed for waypoints beyond the missed approach "fence" (++++++) or the flight plan discontinuity (------).*

```
    ACTIVE FPL    1/2
 DIRECT
 TO KHART      19:37
    19DFW      19:49
    ELD        20:13
    MEI        21:03
    DELBE      21:22
<DEPART
 ARRIVE              ETA
 APPROACH           ERASE
```
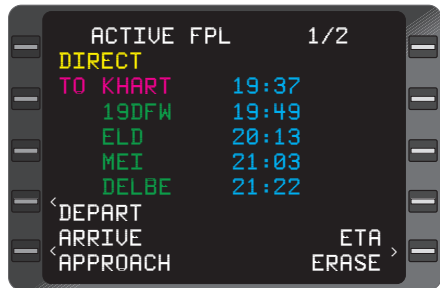
Figure 2-15

ETE:

Estimated Time Enroute between waypoints on the Active Flight Plan based on current groundspeed.

DIS:

Distance between each waypoint on the Active Flight Plan.

ALT:

Constraint altitude and waypoint offset of programmed VNAV waypoints for applicable waypoints on the Active Flight Plan (Figure 2-16).

```
    ACTIVE FPL    2/2
    RYMES    -10   3000
    ISLET          2000G
<MAPRW34          435G
    ++++++
<HP CMK
    ******
<DEPART
 ARRIVE              ALT
 APPROACH           ERASE
```

Figure 2-16

*NOTE: No database altitude constraints will be displayed at the **MAP** if the **MAP** is abeam or beyond the runway threshold . No altitude constraints are displayed on an approach if a **PT** is part of the approach procedure.*

The following may appear in the waypoint altitude field:

• **FL:** Flight Level

• **A:** at or above

• **B:** at or below

• **G:** glide path (programmed Flight Path Angle)

NOTE: If an approach is programmed at the destination airport, and the MAP is the end of the runway, the altitude value displayed next to the MAP is approximately 50 feet above the runway threshold elevation. If the MAP is prior to the end of the runway and the approach is straight-in, the altitude displayed at the MAP is computed based on a line drawn from the FAF through the MAP to a point 50 feet above the runway threshold. The altitude may not be the MDA (Figure 2-16). If no approach is programmed, the altitude value will be the airport elevation regardless of runway selection. The MAP altitude is shown in yellow.

*The Waypoint VNAV offset is given in nautical miles where a negative (-)offset is prior to the waypoint (Figure 2-16, interpreted as "cross ten miles before **RYMES** at **3000** feet") and a positive offset is after the waypoint. If dashes appear in the altitude constraint field, NO altitude is programmed at that waypoint.*

ERASE:

Same as for Stored Flight Plans except the current FROM/TO leg cannot be erased. The Active Flight Plan is automatically erased upon system shut-down.

NAVIGATION SECTION (NAV KEY)

Upon pressing the **NAV** Key the **NAVIGATION 1/4** Page will be displayed and the following can be observed.

NAVIGATION PAGES

*NOTE: If AFIS is installed in the system, the **NAV** section will consist of five pages.*

NAVIGATION 1/4 (Page 1 of 4)

FR:

The FROM waypoint identifier is displayed on the left. If the system has a valid ground speed, the time of departure or time overhead at that waypoint displayed on the right. This line can also display **DIRECT, HOLD, PROCEDURE TURN, DME ARC** or **PSEUDO VORTAC.** (Figure 2-17)
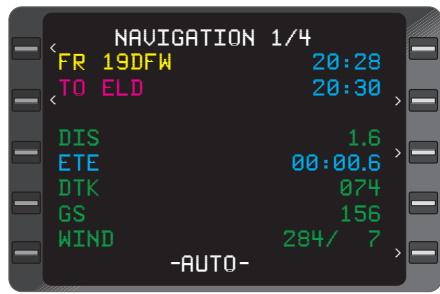
Figure 2-17

TO:

The **TO** waypoint identifier is displayed on the left. If the system has a valid ground speed, the ETA at that waypoint is displayed on the right. The **TO** field may also display **AR, HP** or **PT** if the waypoint indicates a DME ARC, Holding Pattern or Procedure Turn. The ETA field can be changed to display constraint altitude and waypoint offset distance if an altitude constraint has been programmed at the current **TO** waypoint by placing the cursor over this field and dressing the **BACK** Key (Figure 2-17) See Section 3 for the procedure.

NX:

This line is normally blank (Figure 2-18) except during Waypoint Alert (30 seconds prior to crossing the **TO** waypoint). In this case the next (**NX**) waypoint identifier on the Active FlightPlan and the ETA at that waypoint is displayed (Figure 2-19). When a Procedure Turn, Holding Pattern, Heading, or Heading Intercept mode is in use, appropriate information pertaining to that mode will be displayed in this field.

DIS:

The distance in nautical miles and tenths from the aircraft present position to the **TO** waypoint. During Waypoint Alert, the distance in whole nautical miles to the **NX** waypoint on the Active Flight Plan is displayed in parentheses. (Figure 2-18)

```
     NAVIGATION 1/4
‹
 FR 19DFW          20:28
 TO ELD            20:30 ›
‹NX MEI            21:49
 DIS   (42)           1.6
 ETE              00:00.6
 DTK   (90)           074
 GS                   156 ›
 WIND           284/  7 ›
         -AUTO-
```
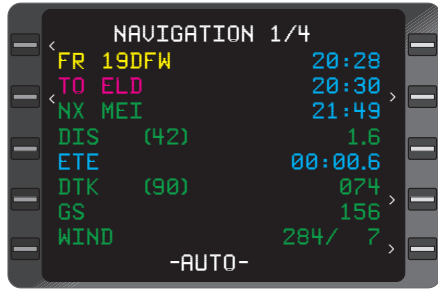
Figure 2-18

ETE:

The estimated time enroute in hours, minutes and tenths, from the aircraft present position to the **TO** waypoint based on current groundspeed. (Figure 2-18)

DTK:

The desired track is the Great Circle course in whole degrees between the FROM and TO waypoints. When in the **PSEUDO VORTAC** mode, the **DTK** is entered by the operator. During the Waypoint Alert, desired track to the next (**NX**) waypoint on the Active Flight Plan is displayed in parentheses. (Figure 2-18)

*NOTE: The **DTK** field will be dashes if the FROM waypoint or present position are north of N 70° or south of S 60° Latitude, unless a manual MAG VAR is entered or a discrete MAG/True switch is moved to the True position.*

GS:

The current groundspeed. (Figure 2-19)

```
     NAVIGATION 1/4
‹
 FR KHART          20:02
 TO 19DFW     -10 15000A ›
‹
 DIS                 47.3
 ETE              00:19.4
 DTK                  079
 GS                   146 ›
 WIND          160/ 14 ›
 XFILL?  -AUTO-
```

Figure 2-19

WIND:

The current wind direction referenced to True North and speed in knots. (Figure 2-19)
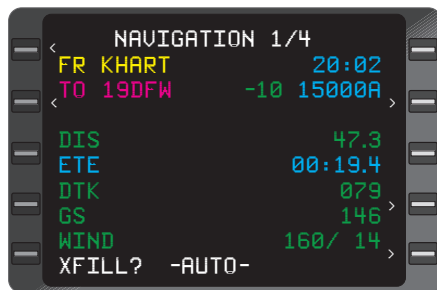
XFILL:

If the aircraft is configured for dual systems, the **XFILL** prompt will appear on line 10 indicating the systems contain dissimilar data.

*NOTE: **XFILL** will not appear when DME ARC, ARC Intercept, Procedure Turn or Holding Pattern are in progress on the system performing the procedure.*

AUTO:

The leg change mode. **AUTO** or **MAN,** may be selected if the cursor is over this field using the **BACK** Key. (Figure 2-19) If **Auto** is selected the system will sequence to the next leg on the FPL. If **MAN** is selected the system will not sequence to the next leg on the FPL and fly the current track.

NAVIGATION 1/4 with a Holding Pattern, Procedure Turn, Heading, or Heading Intercept Programmed.

HOLD:

Indicates that a Holding Procedure has been initiated and is displayed 30 seconds prior to crossing the HP waypoint. (Figure 2-20)
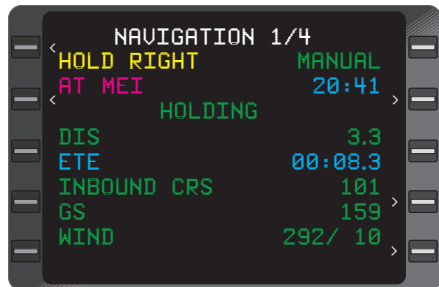
Figure 2-20

• RIGHT or LEFT:

Indicates the programmed turn direction around the holding pattern as entered on the **HOLD** Page. (Figure 2-20)

• MANUAL or AUTO:

Indicates the programmed exit mode as entered on the Hold Page. Selecting **MANUAL** initiates a continuous hold at the fix until some action is taken by the pilot to exit the hold. Selecting **AUTO** will cause the aircraft to **EXIT HOLD** the next time the aircraft passes over the fix (Figure 2-21). If **AUTO** is programmed during the hold procedure, the aircraft will sequence to the next waypoint on the Active Flight Plan the next time the hold fix is crossed. This field can be edited using the **BACK** Key when the cursor is over this field. (Figure 2-20)

AT:

The Holding Pattern procedure is in progress at the **TO** waypoint and the ETA next time over the holding fix if ETA has been selected and the system has a valid ground speed. This field can also display the following: (Figure 2-20)

• **HP** (Holding Pattern):

Indicates a holding pattern is programmed at the **TO** waypoint.

• **PT** (Procedure Turn):

Indicates a procedure turn is programmed from the database at the **TO** waypoint. The airplane will fly the procedure turn. The next time over the **PT** waypoint, the system will sequence to the following waypoint on the flight plan.

• **AR** (DME Arc)

Indicates a DME Arc is programmed at the **TO** waypoint.

HOLDING STATUS MESSAGE: (Line 4)

• **DIRECT ENTRY:**

Indicates the system will use a direct entry to the holding pattern. (This message appears 30 seconds prior to entering the holding procedure and changes to **HOLDING** after crossing the fix.) (Figure 2-20)

• **TEARDROP ENTRY:**

Indicates the system will use a teardrop entry to the holding pattern. (This message appears 30 seconds prior to entering the hold procedure and changes to **HOLDING** after crossing the fix the second time.)

• **PARALLEL ENTRY:**

Indicates the system will use a parallel entry to the holding pattern. (This message appears 30 seconds prior to entering the hold procedure and changes to **HOLDING** after crossing the fix the second time.)

• **HOLDING:**

Normal status while holding.

• **EXIT HOLD:**

Indicates the system will exit the holding pattern the next time over the holding fix. The **ETE** to the holding fix is also displayed.

DIS:

The direct distance in nautical miles and tenths from the aircraft present position to the holding fix. (Figure 2-21)

ETE:

The estimated time enroute to the next time over holding fix based on the path around the Hold "racetrack". (Figure 2-21)

```
        NAVIGATION 1/4
‹ HOLD RIGHT          AUTO ›
‹ AT MEI             20:41 ›
  EXIT HOLD         00:07.9
  DIS                   4.8
  ETE              00:07.9
  INBOUND CRS          101
  GS                   154
  WIND             286/ 12
```
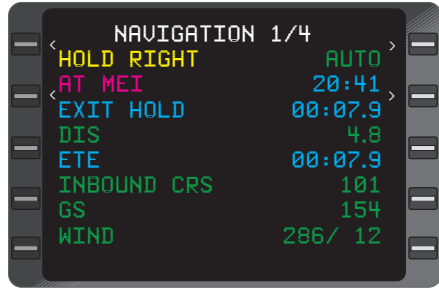
Figure 2-21

INBOUND CRS (course):

The inbound holding course in whole degrees. (Figure 2-21)

GS:

The current groundspeed. (Figure 2-21)

WIND:

The current wind direction referenced to True North and speed in knots. (Figure 2-21)

*NOTE: The leg change mode (**AUTO** or **MAN** normally displayed on the last line of **NAVIGATION** Page 1) is not displayed while holding.*

NAVIGATION 2/4 (Page 2 of 4)

Pressing the **NAV** Key again will display the second **NAVIGATION** Page and the following can be observed.

FR/DIRECT/HOLD/PROCEDURE TURN/DME ARC:

Same as discussed for **NAVIGATION 1/4.**

TO/AT/AR/HP/PT:

Same as discussed for **NAVIGATION 1/4.**

NX/Holding Status:

Same as discussed for **NAVIGATION 1/4.**

WIND:

The first field displays head-wind/tailwind in knots with an up arrow (↑) for tailwind or a down arrow (↓) for headwind. The second field displays the crosswind component in knots with a right pointing arrow (→) for a left cross-wind or a left pointing arrow (←) for a right crosswind. (Figure 2-22)

```
      NAVIGATION 2/4
‹ DIRECT              09:20
  AT D259J            09:44

  WIND    ↓ 11            8←
  ETA-RW11RC         09:54
  FUEL-RW11RC         1727
  TKE                R  008
  XTK      TRMNL    L 0.06
‹ SXTK              ------
```
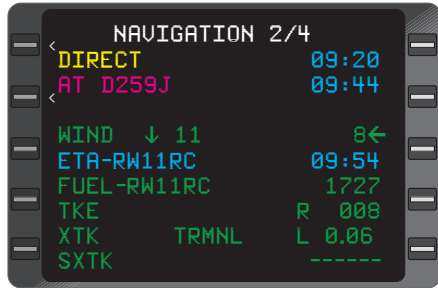
Figure 2-22

ETA:

Estimated Time of Arrival at the last waypoint on the Active Flight Plan prior to a "fence" (- - - - - or ++++++). A "fence" is a discontinu-ity in the flight plan. No data is computed beyond the fence and there is no Auto Leg change across the fence. (Figure 2-22)

FUEL:

Estimated fuel remaining at destination. (Figure 2-22)

TKE:

The Track Angle Error as defined as the difference between the desired track and the actual track in degrees. **R** (right) and **L** (left) are displayed to show the direction of error in relation to the desired track.

XTK:

The crosstrack distance is the lateral displacement of the aircraft in nautical miles and tenths left or right of the desired track (125 NM maximum). **TRMNL, APRCH** or **ENRTE** is displayed to indicate the current CDI sensitivity. A parenthesis around any of these indicates the displayed sensitivity has been selected manually. See Section 3 for operating procedures (Figure 2-22). Scaling for the **TRMNL, APPR,** and **ENRTE** CDI sensitivity is as follows:

Enroute: 5NM full scale deflection.
Terminal: 1NM full scale deflection.
Approach: 0.3NM full scale deflection.

SXTK:

The selected crosstrack distance entered by the pilot to provide steering to an offset course parallel to the desired track (99.9 NM maximum). (Figure 2-22)

NAVIGATION 3/4 (Page 3 of 4)

Pressing the **NAV** Key again will display the third **NAVIGATION** Page and the following can be observed.

FR/DIRECT/HOLD/PROCEDURE TURN/DME ARC:

Same as **NAVIGATION 1/4.**

TO/AT/AR/HP/PT:

Same as **NAVIGATION 1/4.**

NX/Holding Status:

Same as **NAVIGATION 1/4.**

DRIFT:

The drift angle, in whole degrees, left or right of aircraft heading compared to current track. (Figure 2-23)

VAR:

The magnetic variation value in whole degrees computed automatically between N70 00.0 and S 60 00.0 latitude. Manual variation can be entered and overrides the automatic computation. Manual entry of variation is required north of N70:00.0 and south of S60:00.0 latitude. **(MAN)** will be displayed in the **VAR** field after a manual entry is made. See Section 3 for procedures. (Figure 2-23)

```
      NAVIGATION 3/4
FR VUZ              19:36
TO UXU              20:04

DRIFT            R  001
VAR     (MAN)    E    2
TAS                 420
HDG                 044
BRG                 045
TK                  045
```

Figure 2-23

TAS:

The aircraft true airspeed in knots received from the Air Data Computer. If **TAS** is manually inserted, **MAN** will be displayed. (Figure 2-23)

*NOTE: The maximum enterable manual **TAS** is 850 knots. The **TAS** field is enterable only if airdata is invalid.*

HDG:

The heading input received from an IRS or the aircraft compass sys-
tem. If **HDG** can be manually inserted, **MAN** will be displayed.
(Figure 2-23)

BRG:

The bearing in whole degrees from the aircraft present position to
the TO waypoint. (Figure 2-23)

TK:

The track angle in whole degrees. (Figure 2-23)

NAVIGATION 4/4 (Page 4 of 4)

Pressing the **NAV** Key again will display the fourth **NAVIGATION**
Page and the following can be observed.

IDENT:

A waypoint identifier of a fix to
be overflown can be entered
here to update the system
position. (Figure 2-24)

POS:

The current composite posi-
tion (latitude and longitude)
computed in degrees, min-
utes, and hundredths of min-
utes. (Figure 2-24)
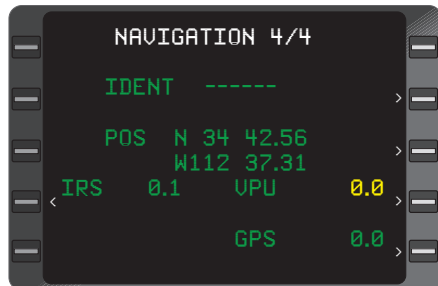
Figure 2-24

IRS/INS, VPU, and **GPS:**

A listing of all interfaced sensors. The radial difference between the
individual sensor position and the composite position is displayed in
nautical miles and tenths. Sensors not being used in the composite
position solution will display the radial difference in yellow. Sensors
being used will display the radial difference in green. The internal
GPS sensor will normally be the sole contributing sensor to the com-
posite position as long as RAIM is available. (Figure 2-24)

*NOTE: IRS radial error is always green because velocity values are
used to aid GPS position.*

IRS/INS SUBSECTION PAGES

IRS (or INS) SUBSECTION 1/2 (Page 1 of 2)

POS:

The position in this field is the same as **POS** on **NAVI-GATION 4/4.** (Figure 2-29)

IRS/INS:

The actual position computed by the specified sensor when in NAV mode. (Figure 2-29)

```
IRS   SUBSECTION    1/2

   POS  N 49 50.20
        W111 41.60
   IRS  N 38 50.10
        W094 55.20


   DIF  N 11 00.10
        W 16 46.30
```

Figure 2-29

DIF:

The difference between the composite position and the sensor computed position in degrees, minutes, and hundredths. (Figure 2-29)

IRS SUBSECTION 2/2 (Page 2 of 2)

TIME TO NAV:

The time remaining until alignment is complete. (Figure 2-30)

CURRENT MODE:

This field annunciates the current mode of the IRS. The messages that can appear are **ATTITUDE, ALIGN,** or **NAV.** (Figure 2-30)

NOTE: Page 2 is only displayed with an IRS.

```
IRS   SUBSECTION    2/2

        IRS STATUS
TIME  TO NAV         ----

CURRENT MODE:


       NAV
```

Figure 2-30

VPU SUBSECTION PAGES

Accessed through the **NAVIGATION 4/4** Page (if AFIS is installed in the system, access is through the **NAVIGATION 4/5** Page) by pressing the Line Select Key corresponding to the VPU sensor, then pressing **ENTER**.

VPU SUBSECTION 1/4 (Page 1 of 4)

POS:

The position in this field is the same as **POS** on **NAVIGATION 4/4.** (Figure 2-31)

```
VPU   SUBSECTION    1/4

   POS  N 38 49.90
        W094 53.40
   VPU  N 38 49.90
        W094 53.40


   DIF  N     0.00
        E     0.00
```

VPU:

The actual position computed by the sensor, when in the NAV mode. (Figure 2-31)
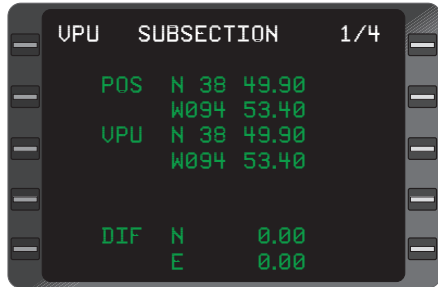
Figure 2-31

DIF:

The difference between the composite position and the sensor computed position in degrees, minutes and hundredths. (Figure 2-31)

VPU SUBSECTION 2/4 (Page 2 of 4)

Pressing the **NXT** Key again will display the second **VPU SUBSECTION** Page and the following can be observed.

QUALITY:

The numerical display in this field indicates the reliability of the position data from the VPU. The number will range from 2 to 99 (with 2 being optimum and 99 as dead reckoning). (Figure 2-32)

ADVISE IF>:

This field is an enterable field in which the operator may input a quality factor value from 2 to 98. If the VPU **QUALITY** exceeds this value a message is displayed on **SENSOR MESSAGES** Page. (Figure 2-32)

```
VPU   SUBSECTION    2/4

QUALITY             99  >
   ADVISE IF >      --

CURRENT MODE:


   NO MEASURMENTS
```
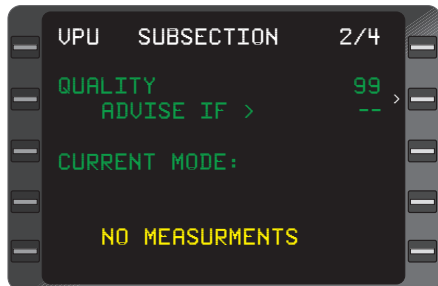
Figure 2-32

*NOTE: Entering 99 in this field will eliminate any previously entered value and no **CHECK QUALITY** message will appear.*

CURRENT MODE: Indicates the current mode of VPU navigation. The messages that can appear under it: (Figure 2-32)

- **NO MEASUREMENTS** indicates that VPU is not receiving valid data for navigation.

- **VOR/DME** indicates that distance and bearing (rho/theta) information is used to generate VPU position.

- **DME/DME** indicates distance (rho/rho) data is received and used to generate VPU position.

- **BAD GEOMETRY** indicates that station geometry is inadequate for navigation.

NAV 1 - CONFLICT or **NAV 2 - CONFLICT:**

The VPU is not using a manually or keyboard tuned station because of a possible station frequency conflict within the aircraft's current line-of-sight. (Figure 2-32)

VPU SUBSECTION 3/4 (Page 3 of 4)

Pressing the **NXT** Key again will display the third **VPU SUBSECTION** Page and the following can be observed.

VPU Sensor With Single Channel DME Inputs (Figure 2-33)

NAV 1 and NAV 2:

The station identifier and frequency being used for navigation.

RNG:

The range in nautical miles and tenths from aircraft present position to the DME station.

BRG:


```
VPU   SUBSECTION   3/4

        VPU STATIONS
NAV 1    PRX        113.60
   RNG                51.2
   BRG                 304
NAV 2    UIM        114.00
   RNG                34.7
   BRG                 252
```

Figure 2-33

Bearing in whole degrees from aircraft present position to the VOR.

VPU with Multiple Channel DME Inputs (Figure 2-34)

NAV 1:

The stations received by the NAV 1 VOR/DME receivers. The station identifier is shown adjacent to the field with the ACTIVE frequency.

```
VPU    SUBSECTION    3/4

        VPU STATIONS
NAV 1      TCL       117.00
   RNG               83.4
   BRG               315
CH 2       MXF       113.70
   RNG               10.6
CH 3       TGE       117.30
   RNG               42.5
```

Figure 2-34

RNG:

Same as above.

BRG:

Same as above.

CH 2:

The station identifier and frequency for an additional station that the multiple channel DME is receiving. This frequency may or may not be displayed on the control head.

RNG:

The range in nautical miles and tenths from the aircraft's present position to the Channel 2 DME station.

CH 3:

The station identifier and frequency for the third station that is being received. This frequency is not displayed on the control head, and is automatically tuned by the system.

RNG:

Same as for CH 2.
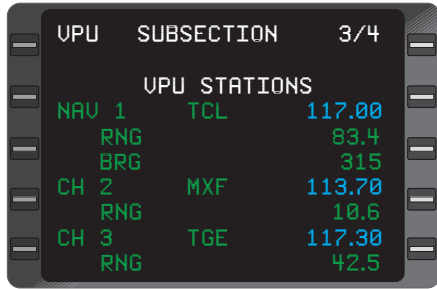
*NOTE: When the DM441B DME, dedicated DM441B, or dedicated DME42 is configured, the **VPU SUBSECTION 3/4** page is different. The bearing information is suppressed and DME is annunciated instead of NAV.*

VPU SUBSECTION 4/4 (Page 4 of 4)

Pressing the **NXT** Key again will display the fourth VPU SUBSECTION Page and the following can be observed. If the VPU has multiple channel DME inputs **VPU SUBSECTION 4/4** appears and displays NAV 2 data. The page appears the same as **VPU SUBSECTION 3/4.**

GPS SUBSECTION PAGES

The GNS-XLS has an internal GPS receiver that is the main navigation sensor of the system. External GPS sensors are optional.

Accessed through the **NAVIGATION 4/4** Page (if AFIS is installed in the system, access is through the **NAVIGATION 4/5** Page) by pressing the Line Select Key corresponding to the GPS sensor, then pressing **ENTER.**

GPS SUBSECTION 1/3 (Page 1 of 3)

See Figure 2-35.

POS:

The current composite position (latitude and longitude) computed in degrees, minutes, and hundredths of minutes.

```
GPS    SUBSECTION     1/3


     POS   N 34 38.83
           W112 25.08
     GPS   N 34 38.82
           W112 25.10

     DIF   N      0.01
           E      0.02
```

Figure 2-35

GPS:

The current GPS position.
This information is only displayed when GPS is in the NAV mode.

DIF:

The difference between the composite position and sensor computed position in degrees, minutes and hundredths.
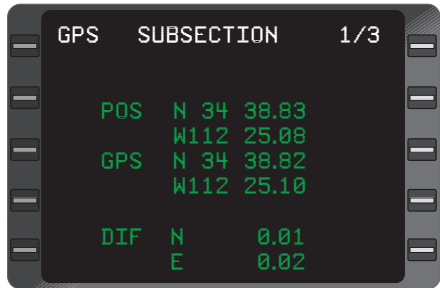
GPS SUBSECTION 2/3 (Page 2 of 3)

Pressing the **NEXT** Key will display the second **GPS SUBSECTION** Page and the following can be observed. See Figure 2-36.

NOTE: All references to FDE prediction do not apply to 17960-0101 units. FDE prediction is only available in 17960-0102, 17960-0203 and 17960-0204 units.

```
GPS    SUBSECTION     2/3

HPE                 0.01NM
POS UNCERT          0.03NM
GPS TIME          23:43:55
STATE           NAVIGATION
MODE      OCEANIC/REMOTE
ALT AIDED?            YES
RAIM/FDE         YES/YES
SATS TRACKED           8
```

Figure 2-36

HPE:

Horizontal Position Error displayed in nautical miles as a measure of GPS accuracy.
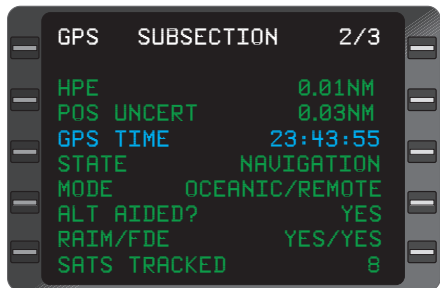
POS UNCERT:

Estimated Position Uncertainty, in nautical miles, when GPS is in navigation mode.

GPS TIME:

GPS Time in hours, minutes and seconds. The advisory time is displayed when at least one satellite is being tracked, other-wise the time field displays dashes.

NOTE: GPS TIME may vary several seconds from GMT due to leap second input of UTC.

STATE: The GPS receiver state can be one of the following:

Dashes: Idle or no mode data.

INITIALIZE: The receiver is updated with initial position and time information.

SKY SEARCH: No almanac is available. The system searches for any satellite in the visible table based on the internal or external time, data, and position and then assigns channels in order received.

ACQUISITION: Constellation selection and channel assignments are being done. Carrier and code lock are in progress.

TRANSITION: The receiver is transitioning from one state, such as **ACQUISITION,** to another state, such as **NAVIGA-TION.**

NAVIGATION: The GPS receiver is in navigation mode and has at least a two dimensional position fix.

DR: The system is in dead reckon mode. When the position is valid and sufficient satellite measurements are unavailable, the receiver will continue to output valid position for a maximum of 30 seconds while using the last known velocity and track information. The position is invalid after 30 seconds.

MODE:

Possible receiver modes are **ENROUTE, OCEANIC/REMOTE**, **TER-MINAL,** and **APPROACH.** These modes are used to determine what accuracy parameters should be used for a particular phase of flight.

ALT AIDED?:

Indicates the GPS receiver is using an externally supplied altitude input for position calculation.

RAIM/FDE?:

Indicates **RAIM** and/or **FDE** is **AVAIL**able or **UNAVAIL**able.
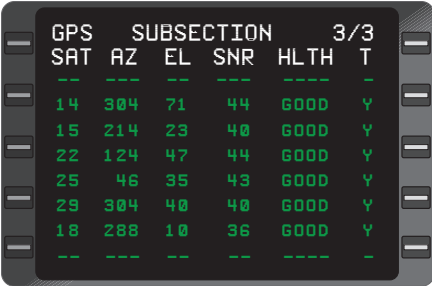
SATS TRACKED:

Indicates the number satellites presently being tracked.

GPS SUBSECTION 3/3 (Page 3 of 3)

Pressing the **NXT** Key again will display the third **GPS SUBSECTION** Page and the following can be observed.

This page displays the GPS receiver status. The GPS receiver is an 8 channel receiver, therefore, up to 8 lines of satellite information is displayed. The information displayed is as follows: (Figure 2-37)


```
GPS   SUBSECTION    3/3
SAT  AZ   EL  SNR  HLTH  T
--  ---  --  ---  ----  -
14  304  71   44  GOOD  Y
15  214  23   40  GOOD  Y
22  124  47   44  GOOD  Y
25   46  35   43  GOOD  Y
29  304  40   40  GOOD  Y
18  288  10   36  GOOD  Y
--  ---  --  --  ----  -
```

Figure 2-37

GPS SAT:

This is the satellite (PRN) number.

AZ:

This is the satellite azimuth position displayed in degrees.

EL:

Satellite elevation displayed in degrees above the horizon.

SNR:

This the received signal-to-noise ratio for each satellite.

HLTH:

Satellite health is displayed as **BAD** or **GOOD.**

T:

YES or **NO** displayed as to whether this satellite is presently being tracked.

EXTERNAL GPS SENSOR SUBSECTION PAGES

Optional external GPS sensors may also be connected to the GNS-XLS. The external sensors do not provide RAIM functions and the external sensor may not be used as the primary navigation source for GPS/GPS Overlay approaches per TSO C129.

The external GPS sensor will be displayed as **GPS1** on **NAV PAGE 4/4**. If two external GPS sensors are installed, the second will be displayed as **GPS2**. The internal GPS receiver is displayed as **GPS**.

GPS1 SUBSECTION 1/2 (Page 1 of 2)

See Figure 2-37a.

POS:

The current composite position (latitude and longitude) computed in degrees, minutes, and hundredths of minutes.

GPS1:

The current GPS1 position. This information is only displayed when GPS1 is in the NAV mode.

```
GPS1  SUBSECTION      1/2


    POS  N 34 38.83
         W112 25.08
    GPS1 N 34 38.82
         W112 25.10

    DIF  N     0.01
         E     0.02
```
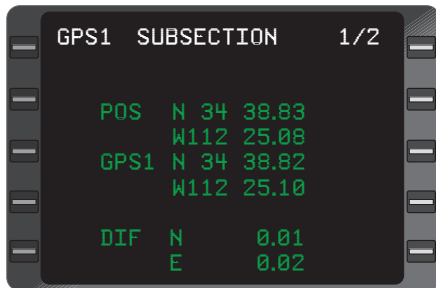
Figure 2-37a

DIF:

The difference between the composite position and sensor computed position in degrees, minutes and hundredths.

GPS SUBSECTION 2/2 (Page 2 of 2)

Pressing the **NEXT** Key will display the second **GPS1 SUBSECTION** Page and the following can be observed. See Figure 2-37b.

The following information is displayed for the external GPS:

```
GPS1  SUBSECTION      2/2

GPS HDOP            0.1
GPS HFOM            0.1
GPS TIME       13:25:32
SATS TRACKED        10
CURRENT MODE:


        NAVIGATION
```
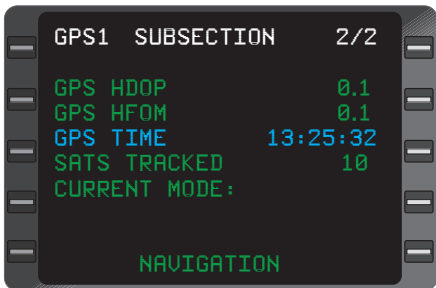
Figure 2-37b

GPS HDOP:

The GPS Horizontal Dilution of Precision. HDOP is a statistical measure of GPS navigation quality. The lower the HDOP, the greater the precision.

GPS HFOM:

Estimated horizontal GPS position accuracy, in nm, with 95% probability.

GPS TIME:

GPS Time in hours, minutes and seconds.

SATS TRACKED:

The number of satellites presently tracked.

MODE:

The mode of the GPS receiver. Possible modes are:

SELF TEST   Receiver is in self test.

INITIALIZATION   Receiver initializing position information.

ACQUISITION   Receiver acquiring satellite information.

NAVIGATION   Receiver in normal navigation mode.

ALTITUDE/CLOCK AIDED   Receiver using altitude for navigation.

DIFFERENTIAL Receiver applying differential corrections.

AIDED   Receiver using other navigation information besides satellite.

FAULT   Receiver has detected a fault and is unusable.

LINK FAIL   No communications between the FMS and external GPS

VERTICAL NAVIGATION SECTION (VNAV KEY)

Upon pressing the **VNAV** Key the **VNAV 1/3** Page will be displayed and the following can be observed.

VNAV PAGES

NOTE: AFIS flight plans do not support any altitudes, including airport elevation. As a result no altitude constraints will be provided for SIDS, STARS or Approaches. If the airport, SIDs, STARS or Approaches are obtained from the database altitudes will be provided.

In some programmed approaches, the altitude associated with the MAP waypoint is computed from the FAF through the MAP waypoint to a point 50 feet above the runway threshold. MDA may be reached prior to the MAP waypoint. The MDA must be observed if the runway is not in sight.

VNAV 1/3 (Page 1 of 3)

VNAV MODE:

Mode required to fly to the vertical TO waypoint and Baro Altitude in feet. Can display one of the following:

• **INVALID:** Indicates **VNAV** function is invalid. In order to be set valid the following must be met:

1. Air Data valid (baro altitude and altitude rate)

2. Valid lateral TO Waypoint

3. Valid vertical TO waypoint

4. NO SXTK programmed

5. Crosstrack **(XTK)** < 12.5NM

• **INACTIVE:** VNAV system is not activated because non-volatile memory was erased during software update or it was manually set inactive before shutdown. Using **BACK** Key with the cursor over the inactive field can display one of the following:

NOTE: When VNAV Mode is inactive, all external VNAV outputs are disabled, including VERT DEV, EFIS altitude constraints at waypoints and VNAV WPT ALERT annunciation.

• **CLIMB:** Indicates climb required to cruise altitude or to next altitude restriction. (Figure 2-38)
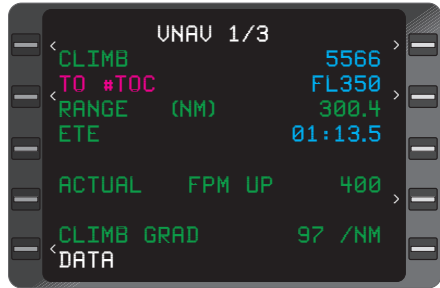
• **CRUISE:** Indicates holding altitude while enroute to Top of Descent **(#TOD)** point. (Figure 2-39)
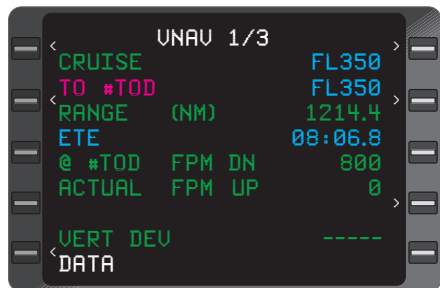
• **PATH DESCENT:** Indicates descent via programmed Flight Path Angle. Vertical Deviation will be enabled on the Vertical Deviation needle and the **VERT DEV** field is active. The VERT DEV field will not be displayed if there is no vertical path programmed. (Figure 2-40)
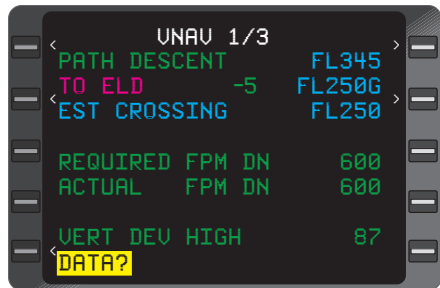
• **DESCENT:** Indicates non-path or Air Mass descent to altitude restriction.

• **LEVEL:** Indicates aircraft should fly level to next constraint.

TO Waypoint:

Vertical **TO** waypoint with constraint altitude and applicable waypoint offset. Letters preceding or following the altitude constraint have the following meaning: **FL**=Flight Level, **A**= At or Above, **B**=At or Below, **G**=Glide Path, and a blank space=At constraint.

One of the following system generated VNAV profile points may also appear as the **TO** waypoint:

• **#TOC:** Indicates the Top of Climb target altitude. This point becomes the Vertical TO Waypoint once the aircraft has passed the final climb constraint waypoint and is climbing. (Figure 2-40)

Figure 2-38

Figure 2-39

Figure 2-40

• **#TOD:** Indicates the Top of Descent target altitude where the aircraft should begin its descent in order to arrive at the Descent Reference Waypoint at the required altitude. (Figure 2-39)

NOTE: If no Descent Reference Waypoint with crossing altitude is programmed, the system will use the arrival airport elevation to fix the #TOD as long as an airport is the last waypoint on the Active FPL.

EST CROSSING:

Altitude trajectory computed by the system to the Vertical **TO** waypoint based on current groundspeed and vertical speed (Figure 2-40). This field will display **RANGE (NM)** in miles and tenths when the Vertical **TO** Waypoint is a **#TOD** or **#TOC** profile point. (Figure 2-39)

ETE:

The estimated time enroute in hours, minutes and tenths, from the aircraft present position to the Vertical **TO** Waypoint **#TOC** or **#TOD**. (Figure 2-39)

REQUIRED FPM:

Required vertical speed in feet per minute to make the altitude constraint based on current ground speed. **UP** indicates a positive vertical speed and **DN** indicates a negative vertical speed (Figure 2-40). This field will display **@#TOD FPM DN** when the Vertical **TO** Waypoint is the Top of Descent and indicate the descent target vertical speed. (Figure 2-39)

ACTUAL FPM:

Actual vertical speed in feet per minute. **UP** indicates a positive vertical speed and **DN** indicates a negative vertical speed. (Figures 2-39 and 2-40)

VERT DEV:

Vertical deviation of aircraft from this descent path in feet. **HIGH** indicates aircraft is above the path (Figure 2-40); **LOW** indicates aircraft is below path. **CLIMB GRAD xxx/NM** is displayed during **CLIMB** mode to indicate current aircraft climb performance in feet per nautical mile. (Figure 2-38)

NOTE: VERT DEV data field is dashes if the ETE to descent path intercept is greater than one minute. This line will be blank if no FPA is programmed at descent reference waypoint. In this case #TOD will be determined using the default FPA from the VNAV DATA Page. However the FPA must still be entered for the system to provide a path.

DATA:

A prompt to access the **VNAV DATA** Page, by placing the cursor over the **DATA** field and pressing the **ENTER** Key. (Figure 2-40)

Figures 2-41 and 2-42 further illustrate the meanings of the fields on **VNAV** Page 1.
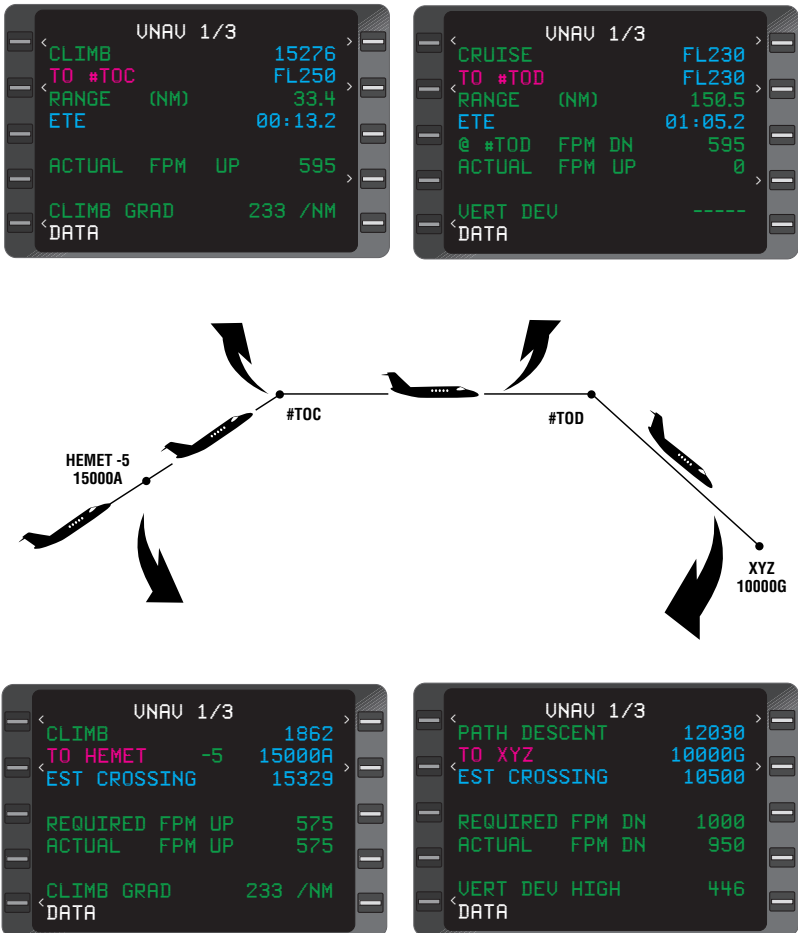
Progression of Vertical Waypoints from Climb to
Path Decent on VNAV 1/1
Figure 2-41

CLIMB

```
        VNAV 1/3
CLIMB              15276
TO #TOC            FL250
RANGE  (NM)         33.5
ETE              00:13.2

ACTUAL  FPM  UP      595

CLIMB GRAD      233 /NM
DATA
```

#TOC   **Cruise Altitude =FL250**

Vertical Speed

Last Departure altitude constraint waypoint

Groundspeed

#TOC Range

◄─1nm─►
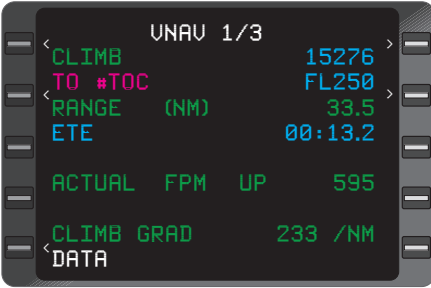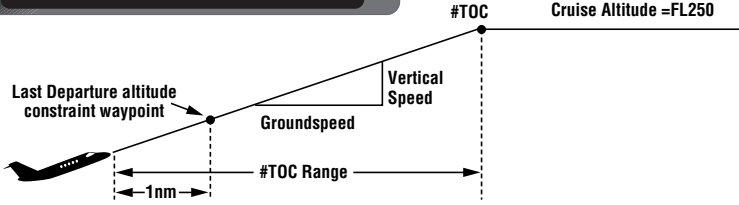
NOTE: Top of Climb appears as a Vertical Waypoint on the
        VNAV FPL Page when the aircraft is within 1 NM of
        the last departure waypoint that has an altitude
        constraint programmed

```
        VNAV 1/3
PATH DESCENT       12030
TO XYZ            10000G
EST CROSSING       10500

REQUIRED FPM DN     1000
ACTUAL  FPM DN       950

VERT DEV HIGH        446
DATA
```

DESCENT

Vert Dev

Actual Vert Spd

Required Vert Spd

Programmed Descent Path

Est Crossing Alt

Direct FPA

Programmed FPA

XYZ 10000G
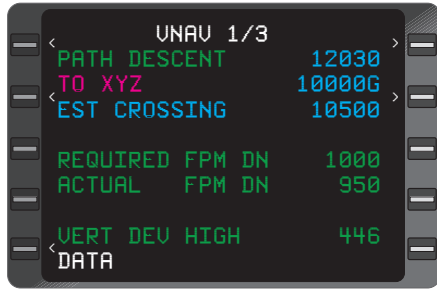
Descent Reference Wpt (at altitude constraint)
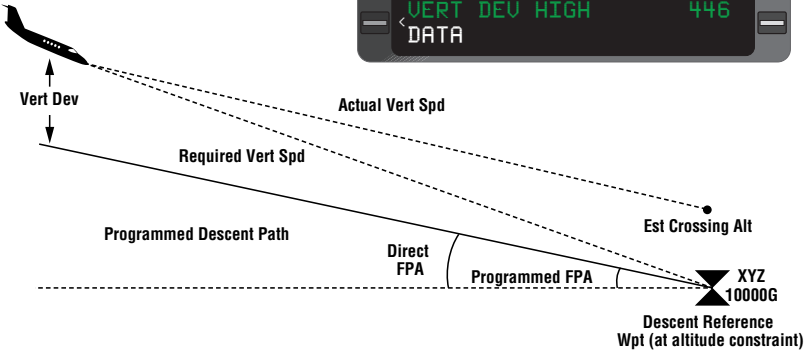
Definition of Climb and Decent on VNAV 1/1
Figure 2-42

GNS-XLS Enhanced Flight Management System

VNAV 2/3 (Page 2 of 3) - FLIGHT PLAN WayPoint

Pressing the **VNAV** Key will display the second VNAV Page and the following can be observed.

VNAV MODE: Mode required to fly to the vertical TO waypoint and Baro Altitude in feet. Can display one of the following:

• **INVALID:** Same as on **VNAV 1/1.**

• **INACTIVE:** Same as on **VNAV 1/1.**

• **CLIMB:** Same as on **VNAV 1/1.**

• **CRUISE:** Same as on **VNAV 1/1.**

• **PATH DESCENT:** Same as on **VNAV 1/1.**

• **DESCENT:** Same as on **VNAV 1/1.**

• **LEVEL:** Same as on **VNAV 1/1.**

WAYPOINTS:

Lateral and Vertical way-points listed in order of occurrence with respect to the vertical profile, with constraint altitude and applicable waypoint offset, where **FL**=Flight Level, **A**= At or Above, **B**=At or Below, **G**=Glide Path, and a blank space=At constraint. (Figure 2-43)
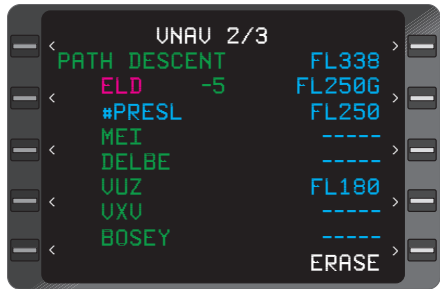
One of the following system generated VNAV profile points may also appear:

• **#TOC:** Indicates the Top of Climb target altitude.

• **#TOD:** Indicates the Top of Descent target altitude. (Figure 2-44)
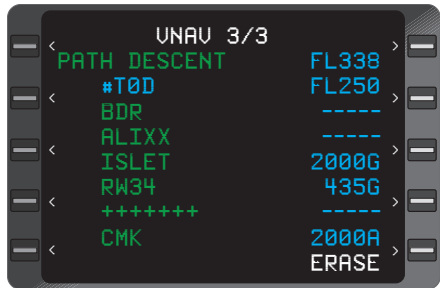
Figure 2-43

Figure 2-44

• **#PRESL:** Indicates the estimated position where the aircraft will arrive at the altitude shown on the Altitude Pre-Selector. Field does not appear unless the system is configured for an altitude preselector and the aircraft is flying toward this altitude. (Figure 2-44)

++++++ :

A discontinuity in the flight plan that separates the missed approach waypoint from the rest of the approach. (Figure 2-43) No Auto Leg change will occur beyond this point.

WAYPOINT IDENTIFIERS:

May consist of from one to six alphanumeric characters. If more identifiers are present than can be listed on this page, subsequent pages will list the remaining waypoints. (Figure 2-45)
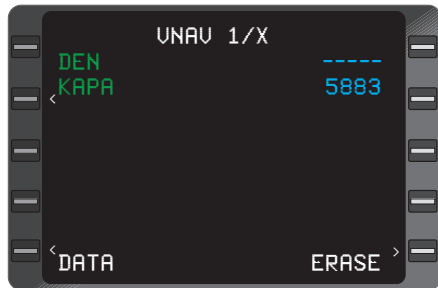
NOTE: Waypoints cannot be added to the active flight plan from the VNAV section. Enter new waypoints on ACTIVE FLIGHT PLAN Page.

Figure 2-45

ERASE:

Used to erase all altitude constraints, except the altitude constraint at the current lateral **TO** Waypoint.

VNAV DATA 1/1 (Page 1 of 1)

NOTE: This page is accessed by using the Line Select Key to place the cursor over the DATA prompt on VNAV Page 1/X and pressing ENTER Key.

CRUISE ALT:

Manually entered cruise altitude in feet or Flight Level (FL). Any altitude entered greater than the transition level is converted and displayed as flight level (rounded off to the nearest hundred feet). An altitude less than 1000 feet must be entered with a preceding zero. (Figure 2-46)

NOTE: In a climb, when the aircraft is within 200ft of the Preselect Altitude, the CRUISE ALT changes to the same value as the PRE-SEL ALT.

The field also goes to dashes during a descent (digital systems only) when the aircraft is 200ft lower than the **CRUISE ALT** and the Preselect is set to a lower value. If the **PRESEL** is analog the altitude value will remain in the **CRUISE ALT** field. When the aircraft is within 200ft of the **PRESEL ALT** the **CRUISE ALT** changes again to the same value as the **PRESEL ALT**.

TRANS LEVEL:

Transition Level used to determine the altitude at which the system converts altitudes to Flight Levels. This field defaults to **FL180** if the pilot does not enter a value. (Figure 2-46)

DEFAULT FPA:

The FPA defaults to the 3.0 unless it is manually entered. The default descent Flight Path Angle can be manually

Figure 2-46

entered in degrees and tenths (0.1 to 6.0 range) (Figure 2-46). **DEFAULT FPA** is used to calculate **#TOD** to the first altitude constraint on the Active Flight Plan. However an FPA must be entered on the VNAV waypoint page to establish a **PATH DESCENT** and for Vert Dev or vertical deviations to be valid.

NOTE: Pilot enters numbers only, as the decimal point (.) prefills as a default.

PRESEL ALT:

If configured, Preselected Altitude input from system, in feet or Flight Level. (Figure 2-46)

*NOTE: An analog type preselector only displays **PRESEL ALT** when the aircraft is within 1000ft of actual altitude.*

RANGE (NM):

If configured, Range to Pre-selected Altitude in nautical miles and tenths (0.0 to 999.9 range). (Figure 2-46)

ETE:

If configured, the estimated time enroute to the Pre-selected Altitude in hours, minutes and tenths. (Figure 2-46)
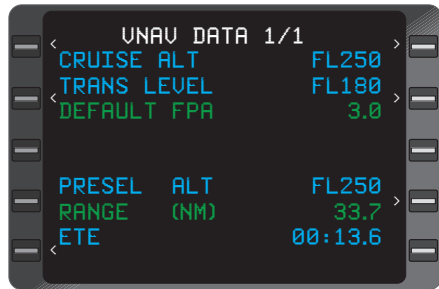
VNAV WAYPOINT 1/1 (Page 1 of 1)

Accessed by placing the cursor over a lateral WPT and pressing the **VNAV** Key or by placing the cursor over a WPT in the VNAV section and pressing **ENTER** key.

WAYPOINT:

VNAV waypoint will consist of from one to six alphanumeric characters.

ALT:

Constraint altitude prefills from database or can be manually entered. Any altitude entered greater than the transition level (from the **VNAV DATA** Page) is converted and displayed as flight level rounded off to the nearest hundred feet. An altitude less than 1000 feet must be entered with a preceding zero. Altitudes below sea level are limited to -1000 feet. The following may appear in the altitude field:

• **FL:** Flight Level (Preceding the Altitude Value)

• **A:** At or Above (Following the Altitude Value)

• **B:** At or Below (Following the Altitude Value)

• **Blank space:** At (Following the Altitude Value)

NOTE: If the destination airport or runway is manually entered, or if the airport/runway is loaded from the database, the airport elevation will be displayed in the altitude field. If the flight plan is loaded through AFIS, the airport elevation will not be available.

EST CROSSING:

Altitude trajectory computed by the system to the Vertical **TO** Waypoint based on current groundspeed and Vertical speed. (Figure 2-47) This field is displayed for the active vertical waypoint.


```
    VNAV WAYPOINT 1/1
       WAYPOINT ISTET
ALT                   2000
EST CROSSING         FL250
OFFSET                 ---
REQ FPM       DN       825
FPA   (AUTO) DN        3.0

DIRECT FPA    DN       2.8
```
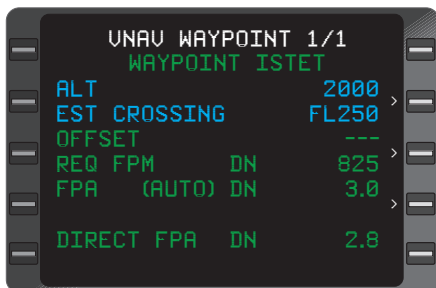
Figure 2-47

PLAN CROSSING:

System determined crossing based on programmed constraints and flight path angles for descent. (Figure 2-48) This field is displayed for other than the Active Vertical Waypoint and will be displayed in place of **EST crossing.**

```
      VNAV WAYPOINT 1/1
        WAYPOINT VUZ
ALT                 FL180
EST CROSSING        FL180  ›
OFFSET                ---
REQ FPM      DN       825  ›
FPA   (AUTO) DN       3.0
                           ›
DIRECT FPA   DN       0.4
```
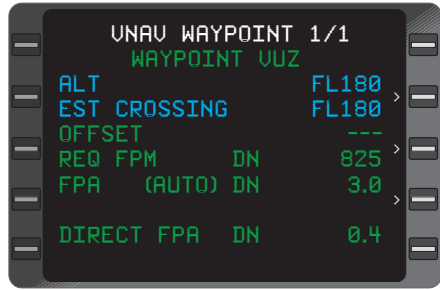
Figure 2-48

OFFSET:

Pilot entered value in nautical miles (-99 to +99 range) where a positive entry (+) indicates an offset beyond the waypoint and a negative (-) entry is prior to the waypoint.

NOTE: Pilot must enter the leading (+) sign for the offset to be beyond the fix, but a (-) prefills as a default to cross prior to the fix.

REQ FPM (Required Feet Per Minute):

Required vertical speed in feet per minute the aircraft must maintain to reach the Vertical waypoint. **UP** indicates a positive vertical speed and **DN** indicates a negative vertical speed is required.

*NOTE: If **PLAN CROSSING** is displayed, then the **REQ FPM** is the planned vertical speed for the waypoint. **REQ FPM** will be dashes if ground speed or air data is not valid.*

FPA (Flight Path Angle):

Flight Path Angle for path descent to waypoint in degrees and tenths with valid range 0.1 to 6.0. The following may appear in parentheses:

• **DB:** Indicates **FPA** from database.

• **MAN:** Indicates manually entered **FPA.**

• **DIR:** Indicates direct **FPA** programmed. (Figure 2-49)

• **AUTO:** Indicates system computed **FPA**.

```
      VNAV WAYPOINT 1/1
        WAYPOINT ELD
ALT                 FL250  ›
EST CROSSING        FL254  ›
OFFSET                 -5
REQ FPM      DN        625  ›
FPA   (DIR)  DN         23  ›
DIRECT FPA   DN         23
```
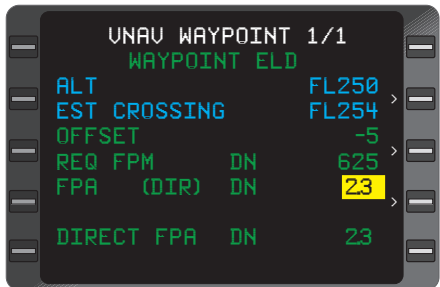
Figure 2-49

• **DEF:** Indicates **FPA** default from **VNAV DATA** Page.

*NOTE: **DIR, AUTO,** and **DEF** can be accessed using the **BACK** Key.*

DIRECT FPA:

Direct Flight Path Angle from the current aircraft altitude to the Vertical waypoint in degrees and tenths (valid range 0.0 to 90.0), where **DN** indicates negative **FPA** and **UP** indicates positive **FPA.**

AFIS SECTION (AFIS KEY)

Refer to Section 7 for description and operation of AFIS.

PLANNING SECTION (PLAN KEY)

Upon pressing the **Plan** Key the **PLAN 1/8** Page will be displayed and the following can be observed.

PLAN PAGES

PLAN 1/8 (Page 1 of 8) FUEL STATUS

FUEL STATUS LB:

Indicates that fuel is being computed in pounds. This unit can be manually changed to **KG** if desired, using the **BACK** Key when the cursor is over the **LB** field. (Figure 2-50)

*NOTE: the cursor must first be placed over the remaining field so the **LB** field can be activated.*


```
        PLAN  1/8
      FUEL STATUS    LB
   REMAINING        2990  ›
   RESERVE          1000
   FLOW             1200  ›

      HOURS        01+39
      RANGE          229
      NM/LB        0.115
```
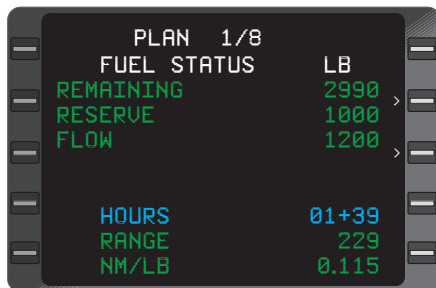
Figure 2-50

REMAINING:

The total fuel on board in pounds or kilograms. This quantity must be initially entered or verified by the pilot and may require periodic verification or update. (Figure 2-50)

RESERVE:

The desired reserve, as entered or verified by the operator, displayed in pounds or kilograms. This may require periodic verification or update. (Figure 2-50)

FLOW:

The current fuel flow in pounds or kilograms input automatically from fuel flow indicators. **(MAN)** indicates a pilot manual entry and the entry must be manually verified and periodically updated. (Figure 2-51)

```
      PLAN  1/8
    FUEL STATUS      LB
  REMAINING        2990
  RESERVE          1000
  FLOW    (MAN)    1200
  LAST INPUT:     00:15

  HOURS          01+39
  RANGE            229
  NM/LB          0.115
```
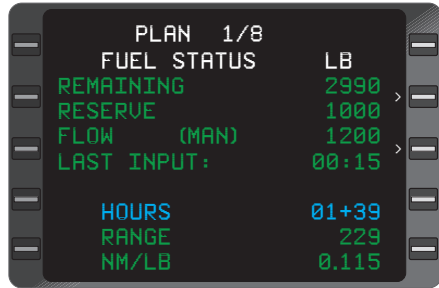
Figure 2-51

*NOTE: The above three quantities will flash after 15 minutes and will require verification by using the Line Select and **ENTER** Keys if **MAN** fuel flow was selected.*

VERIFY INPUTS:

Each of the flashing values must be verified or entered by pressing the **ENTER** Key when the cursor is over each field. This field is only displayed after the system is turned on and will be displayed in place of the **Last Input** field on line 6. (Figure 2-51)

LAST INPUT:

The time in hours and minutes since the above three quantities were verified. This field only appears if fuel flow is input manually. (Figure 2-51)

*NOTE: This field displays **VERIFY INPUTS** at system turn-on since **REMAINING** and **RESERVE** are stored in non-volatile memory during system shut-down.*

HOURS:

The hours and minutes of fuel remaining until the reserve fuel quantity is reached. (Figure 2-50) Fuel flow and ground speed must be valid.

RANGE:

The nautical mile range available until the reserve fuel quantity is reached. (Figure 2-50) Fuel flow and ground speed must be valid.

NM/LB:

The number of nautical miles for each pound (or kilogram) of fuel consumed. (Figure 2-50)Fuel flow and ground speed must be valid.

PLAN 2/8 (Page 2 of 8) TRIP PLAN

Pressing the **PLAN** Key again will display the **PLAN 2/8** Page.

This page may be used to monitor the Active Flight Plan progress or a stored flight plan may be loaded on this page for planning purposes.

TRIP PLAN:

The flight plan selected will be designated by an **"A"** for the Active Flight Plan, a number (1 to 56) for a stored flight plan, or - - - dashes if no active Flight Plan is loaded. (Figure 2-52)

FR:

The **FROM** waypoint identifier is followed on the same line by the first waypoint (origin) on the selected flight plan (**KDAL**). The **FROM** waypoint is usually replaced by **DIRECT.** (Figure 2-52)

TO:

The **TO** waypoint identifier is followed on the same line by the last waypoint (destination) on the selected flight plan (**RW34**). (Figure 2-52)

GS:

The groundspeed in knots is input automatically when the groundspeed is valid or can be inserted manually which is indicated by **(MAN)**. The **GS** value, **(MAN)** and ETA


```
        PLAN  2/8
      TRIP PLAN    A
DIRECT        KDAL
TO ELD        RW34
GS      (MAN)        254
DIS/DTK      21.0/T073
ETE           00:16.5
FPL        1346/05+18
ETA @ LIT        16:18
RAIM @ LIT       AVAIL
```

Figure 2-52

value will change to yellow. **(CALC)** will replace **(MAN)** field if a manual ETA is entered on line 9. (Figure 2-52)
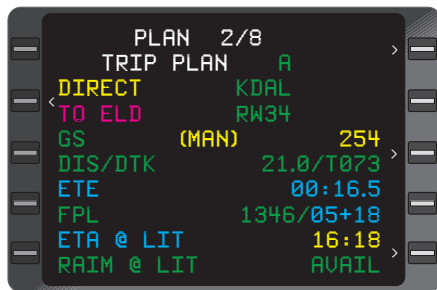
DIS/DTK:

The distance in nautical miles and tenths between either the **FROM** and **TO** waypoints or between the aircraft's present position and the **TO** waypoint. The desired track is the Great Circle course between the **FROM** and **TO** waypoints. The **DTK** will have a **T** adjacent to it if a true heading input is received or if the **FROM** waypoint is north N 70° or south S 60° latitude. (Figure 2-52)

ETE:

The estimated time enroute in hours, minutes and tenths of minutes between the aircraft's present position and the **TO** waypoint or the **FROM** and **TO** waypoints based on the **GS** value. (Figure 2-52)

FPL:

The total active or stored flight plan distance and time remaining via the Flight Planned route from the **FROM** waypoint, (or the aircraft's present position when a Direct To leg is displayed), to the last waypoint on the selected flight plan that precedes a "fence". Distance is displayed in whole miles and time is in hours and minutes. (Figure 2-52)

ETA @:

Estimated time of arrival at the destination, or last waypoint on the Active Flight Plan that precedes a "fence", appears when a **DIRECT TO** leg is displayed. (Figure 2-52)

*NOTE: The **ETA** value field will turn yellow if a ground speed is entered manually, indicating that the **ETA** is calculated based on the manual ground speed value. The **GS** field will turn yellow and **(CALC)** will be displayed if a manual ETA value is entered.*

RAIM @:

Receiver Autonomous Integrity Monitoring at the last flight plan way-point will display **AVAIL** (available) or **NOT AVAIL** (not available) at the ETA. If a manual ground speed or ETA has been entered, **STANDB**Y will be displayed momentarily while the system calculates RAIM availability. If **GPS** is not functioning, **NO NAV** will be dis-played.

PLAN 3/8 (Page 3 of 8) FUEL PLAN

Pressing the **FPL** Key again will display the **PLAN 3/8** Page.

FUEL PLAN:

The **"A"** indicates that Active Flight Plan information is being displayed. A numeric entry in the field provides fuel planning for stored flight plans. (Figure 2-53) Dashes are displayed if there is no active Flight Plan.
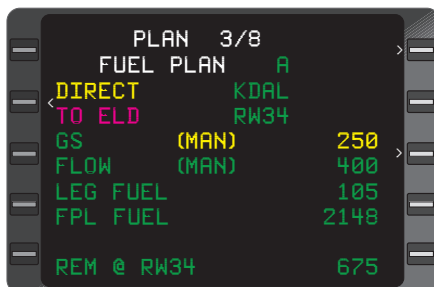
```
        PLAN  3/8
       FUEL PLAN    A
 DIRECT          KDAL
 TO ELD          RW34
 GS       (MAN)      250
 FLOW     (MAN)      400
 LEG FUEL            105
 FPL FUEL           2148

 REM @ RW34          675
```

Figure 2-53

FR:

The **FROM** waypoint identifier is followed on the same line by the first waypoint (origin) on the selected flight plan. The **FROM** waypoint is usually replaced by **DIRECT.** (Figure 2-53)

TO:

The **TO** waypoint identifier is followed on the same line by the last waypoint (destination) on the selected flight plan. (Figure 2-53)

GS:

The ground speed in knots is input automatically when the ground-speed is valid or can be input manually, which is indicated by **(MAN).** **GS** value and **(MAN)** will be yellow. (Figure 2-53)

FLOW:

The fuel flow in pounds or kilograms is input automatically from fuel flow indicators/transmitters or can be inserted manually, which is indicated by **(MAN)**. (Figure 2-53)

LEG FUEL:

The amount of fuel in pounds (or kilograms) used on the current FROM/TO leg or from the aircraft's present position to the current **TO** waypoint, based on groundspeed, fuel flow and distance. (Figure 2-53)

FPL FUEL:

The total amount of fuel anticipated to be consumed to the last way-point on the flight plan that precedes a "fence". This calculated value

is based on the current fuel flow, groundspeed values and distance. (Figure 2-53)

REM @:

Appears only if a DIRECT TO leg is displayed. It indicates the amount of fuel remaining overhead at destination, or the last way-point on the Flight Plan that precedes a "fence", under current conditions. This value is based on the **REMAINING** fuel quantity from the **FUEL STATUS** page minus the total FPL fuel (Figure 2-53). The entire **REM @** field will turn yellow if the **REM @** value is less than the programmed reserve on **PLAN 1/8** Page.

PLAN 4/8 (Page 4 of 8) FUEL FLOW

Pressing the **FPL** Key again will display the **PLAN 4/8** Page.

ENGINE:

The fuel flow, in pounds or kilograms per hour, for each engine as taken from the fuel flow indication system. the number of engines shown will depend on system configuration. (Figure 2-54).
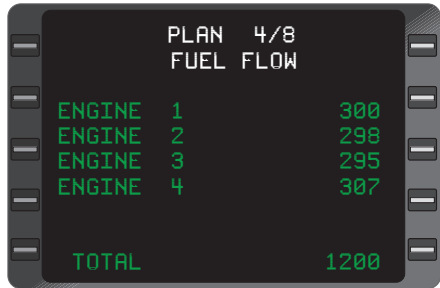
TOTAL:

The total fuel flow, in pounds or kilograms per hour, from all engines. (Figure 2-54)

```
          PLAN  4/8
          FUEL FLOW

ENGINE  1           300
ENGINE  2           298
ENGINE  3           295
ENGINE  4           307


TOTAL              1200
```

Figure 2-54

NOTE: This page will appear only if the system is configured for automatic fuel flow and the individual engine fuel flow is available.

PLAN 5/8 (Page 5 of 8) DATE/GMT

Pressing the **PLAN** Key again will display the **PLAN 5/8** Page.

DATE:

Same as the Initialization Page.

GMT:

Same as the Initialization Page.

*NOTE: If necessary, both **DATE** and **GMT** can be corrected on this page but the takeoff and time values will be affected.*

TAKEOFF:

The **GMT** at weight-off-wheels plus 10 seconds. (Figure 2-55)

LAND:

The **GMT** at weight-on-wheels. This field is not displayed until weight-on-wheels plus 10 seconds occurs. (Figure 2-55)

```
         PLAN  5/8

DATE          18 FEB 95
GMT               14:13

TAKEOFF           20:43
LAND              22:45

FLIGHT TIME       02+02
```

Figure 2-55

*NOTE: **TAKEOFF** and **LAND** times may be based on groundspeed and/or TAS valids depending upon system configuration.*

FLIGHT TIME:

The elapsed flight time is displayed in hours and minutes. (Figure 2-55)

PLAN 6/8 (Page 6 of 8) AIRCRAFT WEIGHT

Pressing the **PLAN** Key again will display the **PLAN 6/8** Page.

BASIC OP WT:

The combined weight in pounds or kilograms of the empty aircraft, crew members, and crew baggage. (Figure 2-56)

PAYLOAD:

Weight in pounds or kilograms of passengers, cargo, and baggage (excluding crew). (Figure 2-56)

```
       PLAN  6/8

     AIRCRAFT WEIGHT

BASIC OP WT        7400
PAYLOAD             400
FUEL ON BOARD      2937
VERIFY FUEL
FUEL USED           101
GROSS WT          10737
```

Figure 2-56

FUEL ON BOARD:

Weight in pounds or kilograms of fuel on board. (Figure 2-56)

VERIFY INPUTS:

Each of the flashing values must be verified or entered by pressing the **ENTER** Key when the cursor is over each field. This field is displayed only after system turn on.

VERIFY FUEL:

This is displayed in the same field as **VERIFY INPUTS** if a manual fuel flow has been entered and has not been verified for 15 minutes or more.

FUEL USED:

If configured for Automatic Fuel Flow, the weight in pounds or kilograms of fuel consumed. (Figure 2-56)

NOTE: This field appears as dashes at power up and increments as auto fuel flow data is available.

GROSS WT:

The total weight in pounds or kilograms of basic operating weight, payload and fuel on board displayed after all values have been entered. (Figure 2-56)

PLAN 7/8 (Page 7 of 8) FDE Prediction

All references to FDE prediction do not apply to 17960-0101 units. FDE prediction is only available in 17960-0102, 17960-0203 and 17960-0204 units.

Pressing the **PLAN** Key again will display the **PLAN 7/8** Page. This page is used if GPS will be the sole navigation source in Oceanic/Remote operation. The following information is entered to make the necessary FDE prediction to determine sufficient satellite availability, integrity, and accuracy. All entries made on this page will remain until changed or the system is powered down. See Figure 2-57.


```
        PLAN  7/8
          FDE
DEPART DT      20 DEC 95 >
DEPART GMT         --:--
ROUTE SPACING         -- >
EXPECTED GS          ---
START FDE WPT      ----- >
END FDE WPT        -----
EXCLUDE SATS     (QTY 0) >
   PREDICTION UNAVAIL
```

Figure 2-57

DEPART DT:

Date for which FDE prediction is to be calculated.

DEPART GMT:

Time for which FDE prediction is to be calculated.

ROUTE SPACING:

Centerline to centerline route spacing of segment for which FDE is being calculated. 1 to 99 nautical miles may be entered. 60NM is a normal entry.

EXPECTED GS:

Estimated ground speed for the route segment. A value of 100 to 999 may be entered.

START FDE WPT:

First waypoint on the Oceanic/Remote route segment. Placing the cursor over this field allows waypoint entry. Pressing the **BACK** Key will cycle through the waypoints on the active flight plan. Dashes are displayed prior to the last waypoint on the flight plan. Pressing **ENTER** while the dashes are displayed will clear the start and end waypoints, resulting in an undefined Oceanic/Remote segment.

END FDE WPT:

Last waypoint in the Oceanic/Remote route segment. The **BACK** and dashes operate the same here as in the **START FDE WPT** field.

EXCLUDE SATS (QTY x):

Displays the number of satel-
lites currently being excluded
from the FDE prediction. Up
to seven satellites may be
excluded at a given time.
When the cursor is placed
over this field and **ENTER** is
pressed, the **FDE EXCLUDE
SATS 1/1** Page will be dis-
played. See Figure 2-58

Figure 2-58

ENTRY REQUIRED:

This is displayed If the aircraft is on the ground and not all the data has been entered. The following is a list of the other possible mes-
sages displayed in this field:

• START CALC? ENTER:
This is displayed when the
aircraft is on the ground and
all data has been entered.
Pressing ENTER will start the
FDE calculation and display
PLAN 7/8 FDE COMPUTA-
TION. See Figure 2-59
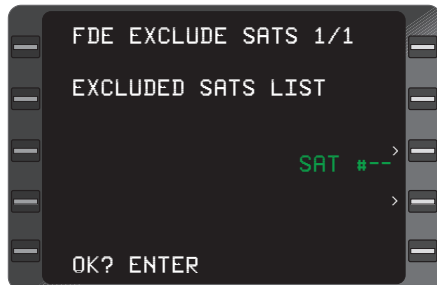
Figure 2-59

• **NEED ACTIVE FPL**: This will be displayed if there are less than two waypoints on the active flight plan.

• **BACK FOR NEXT WPT**: Displayed when the cursor is over the start or end waypoint field.

• **PRED IN PROGRESS**: This is displayed when an FDE prediction is in progress. All other fields are disabled at this point.

• **PREDICTION UNAVAIL**: This will be displayed if the GPS is not in the idle state or the aircraft is not on the ground.

FDE EXCLUDE SATS 1/1 (Page 1 of 1)

This page is accessed by placing the cursor over the **EXCLUDE SATS (QTY x)** field on **PLAN 7/8** Page and pressing **ENTER**.

EXCLUDE SATS LIST:

The designated satellite number being excluded from the FDE prediction is listed here.

```
┌──────────────────────────┐
│   FDE EXCLUDE SATS 1/1    │
│                          │
│    EXCLUDED SATS LIST     │
│  12 14 02 16 19 22 07     │
│                          │
│               SAT #02  ›  │
│            CLEAR ALL  ›   │
│                          │
│  OK? ENTER                │
└──────────────────────────┘
```
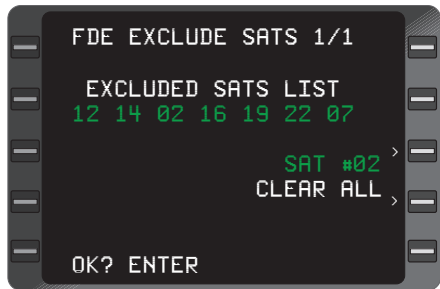
Figure 2-60

SAT #:

The desired satellite being excluded from FDE prediction is entered by pressing the Line Select Key by this field and entering the number of the satellite. Press **ENTER** to add the satellite to the list. Entering a number already listed and pressing **ENTER** will remove the number from the list. Pressing the Line Select Key next to **CLEAR ALL** and pressing **ENTER** will remove all satellites from the exclusion list.

PLAN 8/8 (Page 8 of 8) FDE COMPUTATION

COMPUTING - STANDBY:

This display will flash while FDE prediction is being calculated. See Figures 2-61

xx% COMPLETE:

The number displayed is the percentage of calculation completed.

```
┌──────────────────────────┐
│       PLAN  8/8           │
│     FDE COMPUTATION       │
│                          │
│   COMPUTING - STANDBY     │
│                          │
│     51% COMPLETE          │
│                          │
│    CANCEL COMPUTE     ›   │
└──────────────────────────┘
```

Figure 2-61

When the FDE prediction is complete, the system will display either FDE and NAV are available or unavailable. Normal calculation time is from ten to twenty minutes. See Figures 2-62 and 2-63.
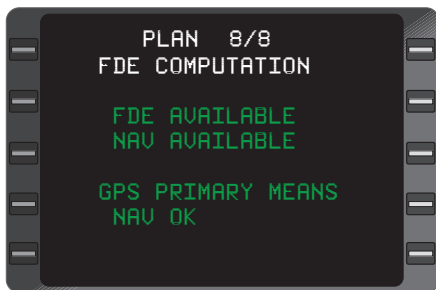
Figure 2-62
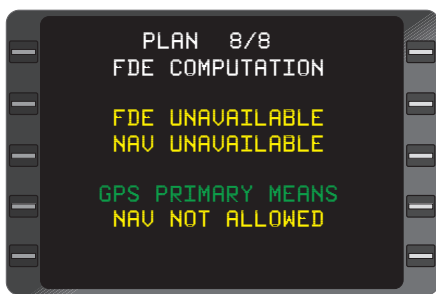
Figure 2-63

HEADING SECTION (HDG KEY)

Upon pressing the **HDG** Key the **HEADING VECTOR 1/1** Page will be displayed and the following can be observed.

HEADING PAGE

HEADING VECTOR 1/1 (Page 1 of 1)

HDG:

Commanded heading in whole degrees. This field may also prefill with current aircraft heading if heading is valid. Pilot may manually enter heading preceded by a turn direction **R** or **L**. A **T** indicates the system is operating in the true heading mode. After a heading entry is made and the **ENTER** Key

Figure 2-64

is pressed, the cursor will move to the Heading Mode field and **HDG SELECT?** will be displayed.

HEADING MODE:

Use **BACK** Key to select one of the following:

• **INTERCEPT:** indicates Heading Mode is **ON** and will intercept next leg of the flight plan if the remaining fields are verified or entered. (Figure 2-65)

• **CANCEL:** indicates Heading Mode is **OFF**.

• **HDG SELECT:** indicates Heading Mode is **ON,** but no intercept.

Figure 2-65

*NOTE: If any of the mode words are followed by a **?** the mode is not active. The **ENTER** key must be pressed to activate the mode.*

TO WAYPOINT:

Prefills with current **TO** Waypoint or is enterable (from one to six alphanumeric characters). (Figure 2-65)

*NOTE: With the cursor over the **TO** Waypoint field, using the **BACK** Key will step through to the end of the Active Flight Plan waypoints. The system will identify an IAF, ARC, PT, HP, FCF, FAF or MAP waypoint above the TO Waypoint field.*

DTK:

Desired track is the Great Circle course in whole degrees between the **FROM** and **TO** waypoints from Navigation Page 1. (Figure 2-58) If the system is displaying Direct **To** a waypoint, the **DTK** will be from present position to the current **To** waypoint.

*NOTE: If the default desired track is changed, a Pseudo Vortac (selected course) leg will be programmed on the **NAVIGATION 1/4** Page.*

INTERCEPT Messages:

If the Intercept Mode is programmed one of the following messages may appear. (Figure 2-65)

• **INTERCEPT BEYOND FIX** indicates the commanded heading will cause the aircraft to intercept the programmed course on the FROM side of the fix.

• **NO COURSE INTERCEPT** indicates the commanded heading will cause the aircraft to diverge from the programmed course (crosstrack deviation will increase).

• No Message indicates an intercept is not programmed, or the commanded heading will intercept the programmed course prior to the fix. (The **TO** side of the fix)

• **NO ARC INTERCEPT** indicates commanded heading will not intercept the arc programmed on the approach procedure.

OK? ENTER:

The procedure for accepting the entered heading, **TO** waypoint or **DTK** is to depress the **ENTER** Key. (Figure 2-65)

TUNING SECTION (TUNE KEY)

Upon pressing the **TUNE** Key the **TUNE 1/4** Page will be displayed and the following can be observed.

TUNING PAGES

TUNE 1/4 (Page 1 of 4) COMM

NOTE: If the system is configured for two or less communications radios, the tune section will display only three pages.

COMM 1 or **COMM 2:**

The information for each Comm radio. (Figure 2-66)

ACTIVE:

NOTE: If the frequency currently tuned and displayed on the respective control head, appears briefly but turns to dashes, the system interface does not provide a return frequency input.


```
         TUNE 1/4
COMM 1
    ACTIVE   (MAN) 121.50
    PRESET         135.20
         TRANSFER?
COMM 2
    ACTIVE   (MAN) 132.55
    PRESET         127.77
```
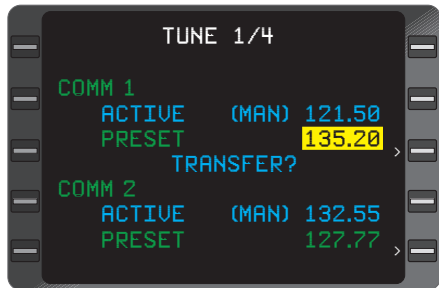
Figure 2-66

(MAN) in this field indicates the frequency was manually entered via the control head (Figure 2-66). If the **(MAN)** field is blank, the system was tuned via the CDU keyboard.

PRESET:

The pilot can enter and store a frequency in this field through the keyboard. (Figure 2-66)

TRANSFER?:

The displayed **PRESET** frequency can be transferred to **ACTIVE** when the **ENTER** key is depressed. The control head will reflect this change. (Figure 2-66)

TUNE 2/4 (Page 2 of 4) COMM

The same information from the first page is displayed here for additional **COMM** radios.

TUNE 3/4 (Page 3 of 4) NAV

Pressing the **TUNE** Key again will display this page and the following information may be observed.

NAV 1 or **NAV 2:**

The station identifier to which the respective **NAV** receiver is tuned. **(KEY)** will be displayed when the frequency or identifier of the station has been entered using the CDU keyboard.

FREQ:

The frequency currently tuned and displayed on the respective control head. **(MAN)** in this field indicates the frequency was manually entered via the control head. The field may also show **(KEY)** if the ident is unknown and the frequency was tuned via the CDU keyboard. **(KEY)** will appear in the **NAV 1** or **NAV 2** field if the I**DENT** is known. No annunciation in this field indicates the VPU is automatically tuning the NAV radio. (Figure 2-67)
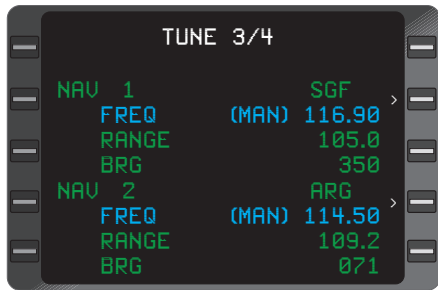
Figure 2-67

RANGE:

The range in nautical miles and tenths from aircraft present position to the DME. (Figure 2-67) The station identifier can also appear in the field between the range and range value field if the control head is placed in the DME HOLD mode. **NO ID** is displayed in this field if the identifier of the held station is unknown.

BRG:

The bearing in whole degrees from aircraft present position to the VOR. (Figure 2-67)

When the dedicated DM441B or the dedicated DME42 is configured, the **TUNE 3/4** page is different (Figure 2.67a). The Bearing information is suppressed and DME is annunciated instead of NAV.

Figure 2-67a

When the non-dedicated DM441B is configured, the **TUNE 3/4** page is different (Figure 2.67b). The Bearing information is suppressed and the radios cannot be manually tuned.
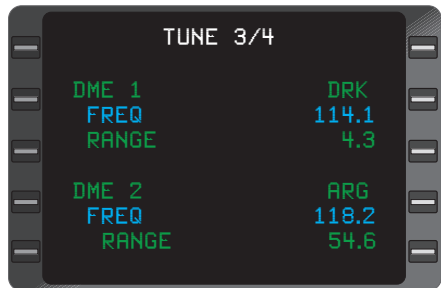
TUNE 4/4 (Page 4 of 4) XPDR/ADF

Pressing the **TUNE** Key again will display this page and the following information may be observed.

Figure 2-67b

XPDR:

NOTE: If the transponder reply code appears briefly after tuning but turns to dashes, the system interface does not provide a return frequency input. **(MAN)** *indicates the entry was made through the control head. (Figure 2-68)*
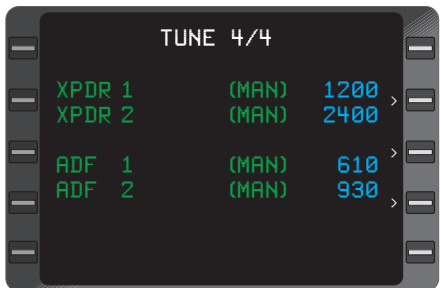
Figure 2-68

ADF:

NOTE: If the frequency that the **ADF** *is tuned to appears briefly but turns to dashes because the system interface does not provide a return frequency input. It may also be annunciated with (MAN). (Figure 2-68)*

NOTE: If either the **XPDR** *or* **ADF** *frequencies are tuned via the CDU keyboard the (MAN) field will be blank.*

HOLDING PATTERN SECTION (HOLD KEY)

HOLDING PATTERN PAGE

This page is accessed by depressing the **HOLD** Key when the cursor is positioned over a Waypoint Identifier.

HOLDING PATTERN 1/1 (Page 1 of 1)

AT:

The Holding Fix and country name or airport ident. (Figure 2-69)

• HOLDING PATTERN ENTRY AND STATUS MESSAGE:

If the entry course to the holding fix can be determined, the entry procedure will be annunciated after all the holding pattern parameters are entered.

```
  HOLDING PATTERN    1/1
AT DILLY
     DIRECT ENTRY
INBOUND CRS         305
MAX HOLDING TAS     261
TURN DIR          RIGHT
LEG TIME            1.5
LEG DIS           (4.4)
EXIT MODE        MANUAL
```
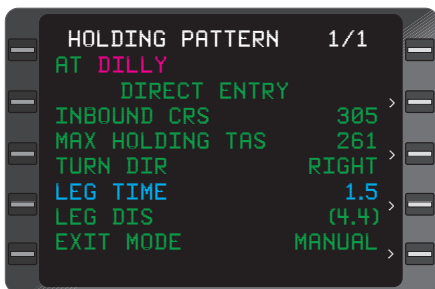
Figure 2-69

• DIRECT ENTRY: indicates the system will use a direct entry to the holding pattern. See Figure 2-70 for Direct Entry pattern.

• TEARDROP ENTRY: indicates the system will use a teardrop entry to the holding pattern. See Figure 2-71 for Teardrop Entry pattern.

• PARALLEL ENTRY: indicates the system will use a parallel entry to the holding pattern. See Figure 2-72 for Parallel Entry pattern.
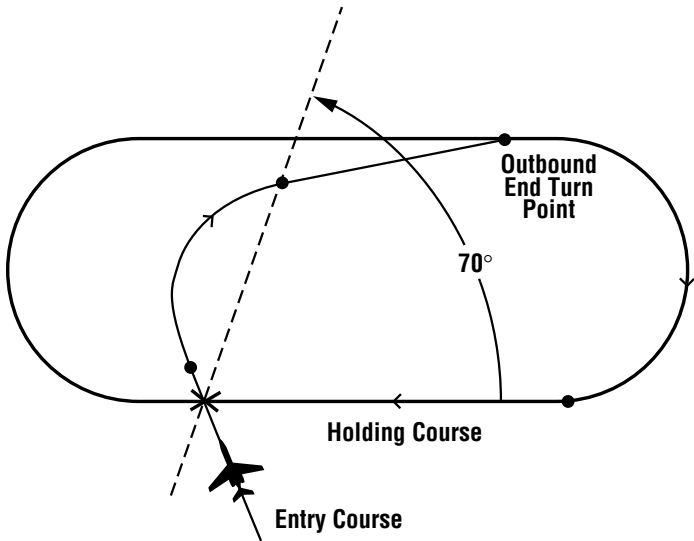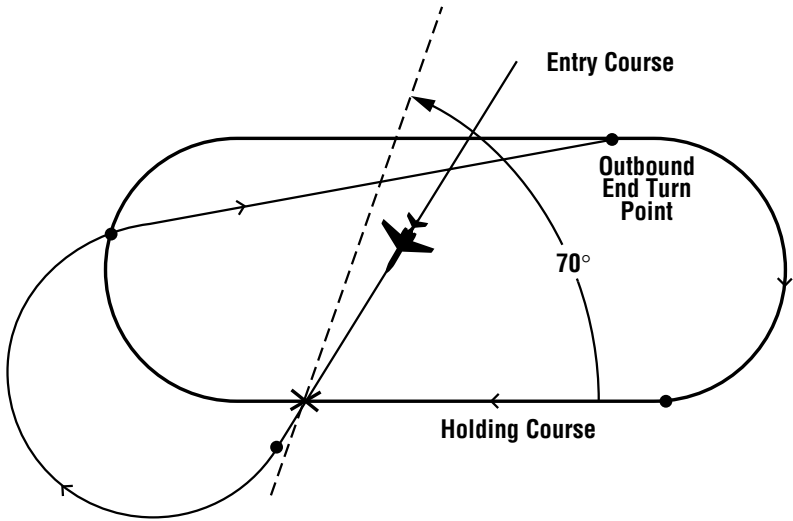
Direct Entry Pattern
Figure 2-70

Teardrop Entry Pattern
Figure 2-71

GNS-XLS Enhanced Flight Management System
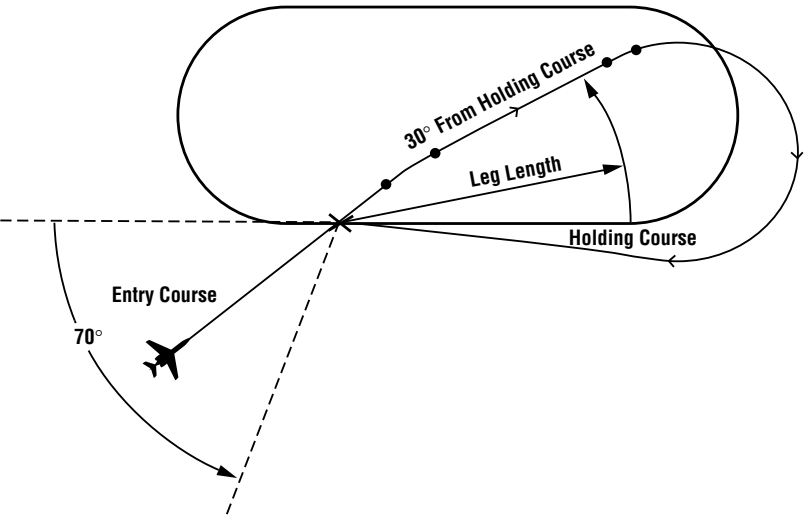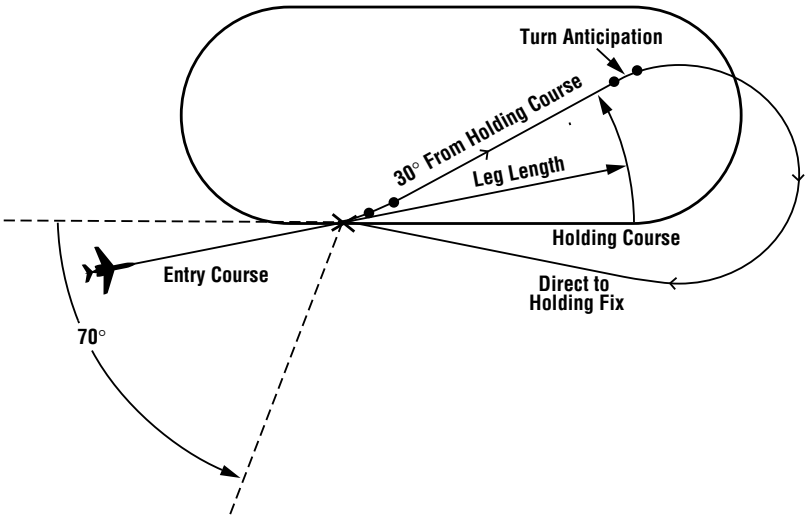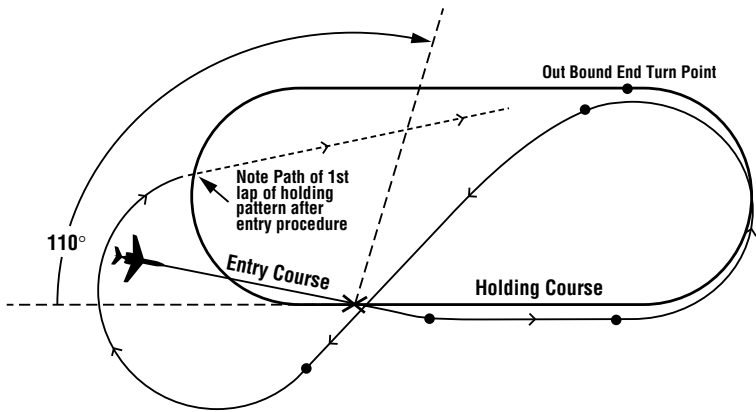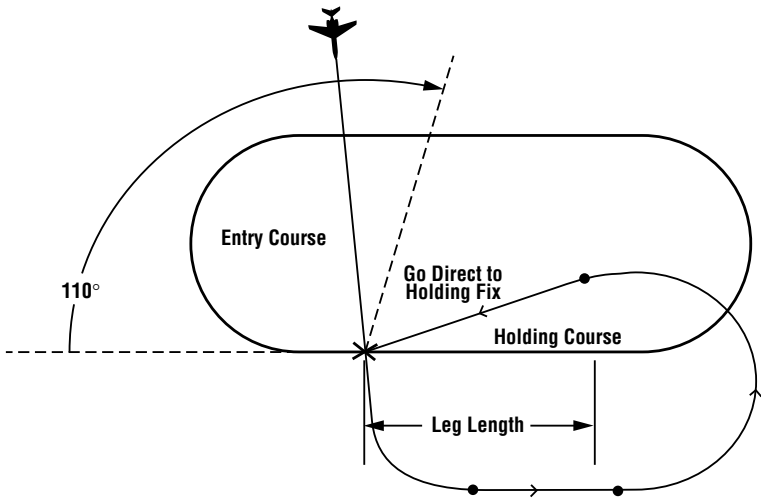
Parallel Entry Pattern
Figure 2-72

• **HOLDING:** indicates the system has entered the Holding Pattern. (Figure 2-73)

• **EXIT HOLD:** indicates the system will exit the holding pattern the next time over the holding fix.

INBOUND CRS (course):

The inbound holding course in whole degrees. This field can be True or Magnetic according to the display mode selected by the TRUE/MAG switch input. A **T** appears if in the True mode (Figure 2-73). The **T** field will be blank if the system is Magnetic mode.

```
   HOLDING PATTERN    1/1
AT DILLY
          HOLDING
INBOUND CRS          T305  ›
MAX HOLDING TAS       261
TURN DIR            RIGHT  ›
LEG TIME              1.5  ›
LEG DIS             (5.8)
EXIT MODE          MANUAL  ›
                  CANCEL?
```
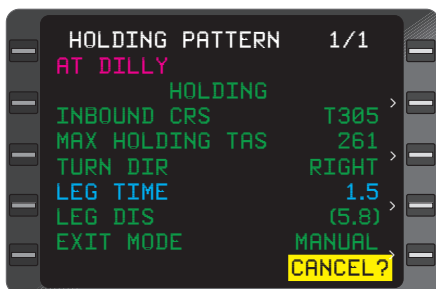
Figure 2-73

MAX HOLDING TAS:

This field is computed based on configuration module max holding indicated airspeed and worst case winds. It represents the maximum true airspeed in the holding pattern that will assure that the aircraft remains in protected airspace. (Figure 2-73)

TURN DIR (direction):

RIGHT indicates the standard default holding pattern turn direction. The non-standard **LEFT** turn can be accessed using the **BACK** Key when the cursor is over this field. (Figure 2-73)

LEG TIME:

Holding Pattern inbound leg time in minutes and tenths (1.0 to 9.9). (Figure 2-73)

*NOTE: The **LEG TIME** may be in parentheses indicating that the time has been calculated using **LEG DIS.***

LEG DIST (distance):

 Holding Pattern inbound leg distance in nautical miles (1.0 nm to 50.0 nm). (Figure 2-73)

*NOTE: The **LEG DIS** may be in parentheses indicating that the distance has been calculated using **LEG TIME.***

EXIT MODE:

The **MANUAL** default indicates the system will stay in the holding pattern indefinitely. Using the **BACK** Key with the cursor over this field **AUTO** can be selected if the **ENTER** key is pressed. The system will then execute a holding pattern entry and exit the next time crossing the fix waypoint. (Figure 2-73)

*NOTE: If a holding pattern is selected an **HP** is annunciated next to the waypoint on Flight Plan, Navigation and Direct To Pages.*

OK? ENTER:

Depressing **ENTER** Key when this prompt appears at the bottom of the Holding Pattern Page programs a Holding Pattern for a particular waypoint.

NOTE: The cursor will not appear in this field.

CANCEL:

Used to cancel a holding pattern. (Figure 2-73)

POSITION FIX PAGE

This page is accessed by depressing the **HOLD** Key anytime the cursor is not displayed over a waypoint.

POS:

The composite (system) position coordinates at the moment the **HOLD** Key was depressed in degrees, minutes, and hundredths of minutes. (Figure 2-74)

IDENT:

The alphanumeric designator of the reference waypoint used to check or update position. (Figure 2-74)

FIX :

The actual coordinates of the reference point in degrees, minutes, and hundredths of minutes. (Figure 2-74)
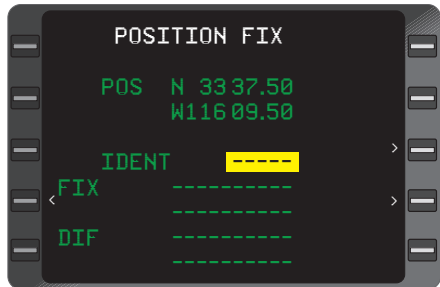
Figure 2-74

DIF:

The difference between the composite position and the **FIX** (or other sensor) position in degrees, minutes and hundredths of minutes. (Figure 2-74)

*NOTE: Position coordinates of individual sensors and the difference between those sensor positions and the composite (system) position may be displayed by moving the cursor over the **FIX** field and depressing the **BACK** Key. The composite position may be updated to the most accurate sensor by pressing the **BACK** Key until the desired sensor appears, then pressing the **ENTER** Key twice.*

DIRECT TO SECTION (⬧ KEY)

DIRECT TO PAGES

DIRECT 1/2 (Page 1 of 2)

This display is accessed through the ⬧ key and presents a listing of all Active Flight Plan waypoints on as many pages as is appropriate to display all of the waypoints. The cursor may be positioned over any desired identifier (ahead of or behind the aircraft) to proceed **DIRECT** (Figure 2-75). A new waypoint may be added to the flight plan to proceed direct.

TO:

When this page is accessed, the cursor is displayed over the current **TO** waypoint. (Figure 2-75)

The following may also be displayed with a waypoint: **HP** (Holding Pattern), **PT** (Procedure Turn), **MAP** (Missed Approach Point), **FAF** (Final Approach Fix), and **IAF** (Initial Approach Fix).
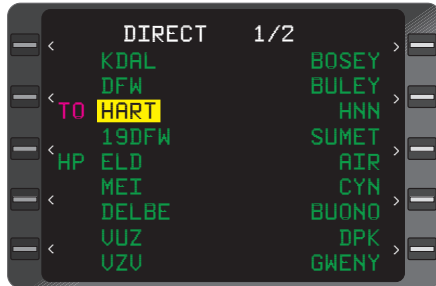
Figure 2-75

DIR CLOSEST ARP 2/2 (Page 2 of 2)

DIRECT TO CLOSEST AIR-PORT: The Closest Airport page is the last page in the **DIRECT TO** section. Up to nine airports are displayed, in order of their proximity to the aircraft, with the closest airport listed first. (Figure 2-76)

```
DIR CLOSET ARP 1/2
TO 312            344/ 10
   I18            045/ 14
   I43            301/ 29
   KUNI           344/ 29
   KCRW           141/ 31
   KHTS           230/ 34
   I28            254/ 35
   KPMH           281/ 39
   KPKB           040/ 45
```

Figure 2-76

NOTE: Airports listed from the database on this page have runways 3000 ft long or greater and are hard surfaced.

WAYPOINT SECTION

WAYPOINT PAGES

Waypoints fall into four categories:

• Database generated

• Pilot entered (personalized/ offset)

• Special

• Obsolete

Waypoint Pages can be accessed from any **FLIGHT PLAN, NAV, ↴ , HOLD, INITIALIZATION, HEADING,** or **TRIP PLAN/FUEL PLAN** Pages.

DATABASE WPT 1/1 (Page 1 of 1) Database Generated Waypoints

This page is accessed by typing in a waypoint identifier or by placing the cursor over a waypoint identifier and pressing ENTER.

Database Generated Waypoints are automatically updated when accessed and cannot be modified by the operator. The four basic types of waypoints residing in the data base are navaids, airports, intersections and special waypoints.

VHF Navaids

WAYPOINT:

Alphanumeric designator for the Navaid. (Figure 2-77)

NOTE: If the waypoint has a duplicate identifier in the database, for another location, the closest waypoint to the aircraft position will be shown and the country code will be displayed beneath the waypoint identifier. (Figure 2-78)

Press the **NXT** Key to sequence to the next waypoint page with a different country code. The **PRV** Key can be used to sequence backward through the waypoint pages. Additional country codes and corresponding **POS** coordinates will be sequentially displayed.

```
    DATABASE WPT    1/4

WAYPOINT        TRM
                USA
       POS  N 3337.70
            W11609.60
FREQ            116.20
VAR               E 13
ELEV              -110
NDB-ENTER
```

Figure 2-77

```
    DATABASE WPT    2/4

WAYPOINT        TRM
                PORTU
       POS  N 3845.60
            W02705.60
FREQ            116.20
VAR               W 14
ELEV               172
NDB-ENTER
```

Figure 2-78

POS:

The coordinates of the waypoint as stored in the database memory. (Figure 2-77)

FREQ:

The VHF frequency for the station. (Figure 2-77)

VAR:

The magnetic variation of the station. (Figure 2-77)

ELEV:

The elevation in feet of the station (DME equipped VHF Navaids only). A (-) indicates elevation is below sea level. (Figure 2-77)

NDB -ENTER:

The procedure for accepting the waypoint from the Navigation Data Base is to depress the **ENTER** Key. (Figure 2-78)
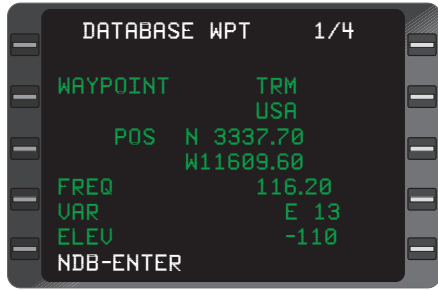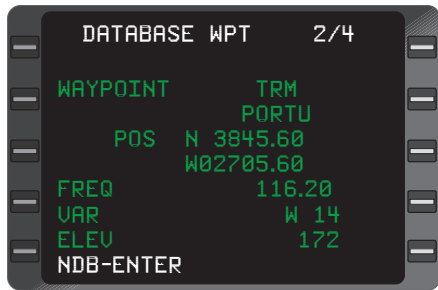
Non-Directional Beacons (NDBs)

NDBs stored in the internal database are listed in Jeppesen publications with a 2 or 3 letter identifier. To distinguish these NDBs from VHF NAVAIDS, you must add an "NB" suffix to the database identifier. Example: To access the Prince Rupert (PR) NDB, you must enter PRNB. (Figure 2-79)

```
     DATABASE WPT    1/14

 WAYPOINT     PRNB
              CAN
       POS  N 54 15.80
            W130 25.40


 NDB-ENTER
```
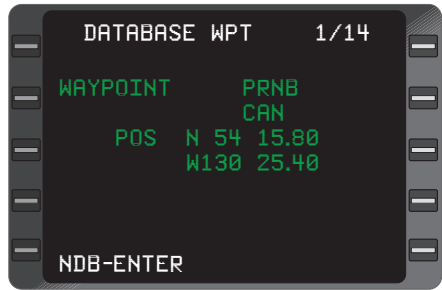
Figure 2-79

Airports

International Civil Aviation Organization (ICAO) identifiers are used to access data in the database.

ICAO identifiers differ in some cases from those familiar to many pilots.

The following are guidelines to access information from the database:

Except for a few hundred 3 or 4 letter/number airport identifiers in Alaska, Canada and the Continental USA, all airport identifiers stored in the database have 4 letters.

In most cases, these identifiers begin with a letter that corresponds to the geographic area in which the airport is located. The ICAO code letter prefix for Continental USA airports is **"K"**. Hawaii and Alaska identifiers begin with **"P"**.

To access a 4 character identifier, use the IDENTIFIER found in the Jeppesen charts. For example, enter **KSNA** for Santa Ana. (Figure 2-80)

```
     DATABASE WPT    1/1

 WAYPOINT     KSNA
              ARP
       POS  N 33 40.50
            W117 52.10
 OM19R           RW19R  >
 RW01L
 RW01R
 RW19L
```
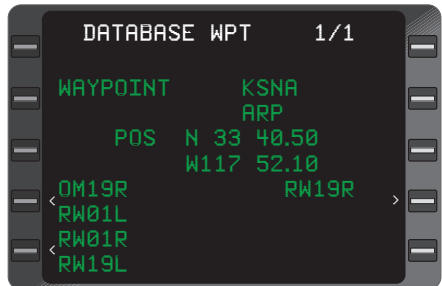
Figure 2-80

• If the airport shows a 3 letter IDENTIFIER, add the correct ICAO prefix letter. Example: **NEW** (New Orleans Lake Front) add a **"K"** prefix and enter **KNEW** (Figure 2-81).

• If the airport shows a 3 character (letters and numbers) IDENTIFIER, enter the identifier as printed. Example: 31J (Lake City, Florida) enter 31J. (Figure 2-82)

Airport Reference Points, Outer Markers, Runway Thresholds

Airport Reference Point **(ARP)** coordinates are always displayed in response to the airport identifier.

Outer markers and runway thresholds for which data is stored in the database are also displayed on the airport waypoint page (also known as airport continuation records page) and can be accessed by pressing the **PRV** or **NXT** Key or Line Select Keys. (Figure 2-83)

The selected outer marker or runway threshold will then be displayed in place of the airport identifier in the waypoint field. The airport identifier Shifts to and replaces the **ARP** field below. (Figure 2-83)

```
   DATABASE WPT    5/8

WAYPOINT      KNEW
                ARP
      POS  N 30 02.60
           W090 01.70
 RW09            RW36L
 RW18L           RW36R
 RW18R
 RW27
```

Figure 2-81

```
   DATABASE WPT    6/8

WAYPOINT       31J
                ARP
      POS  N 30 10.90
           W082 34.60
 RW10
 RW26
```

Figure 2-82

```
   DATABASE WPT    7/8

WAYPOINT      OM19R
               KSNA
      POS  N 33 46.70
           W117 48.30
 OM19R          RW19R
 RW01L
 RW01R
 RW19L
```
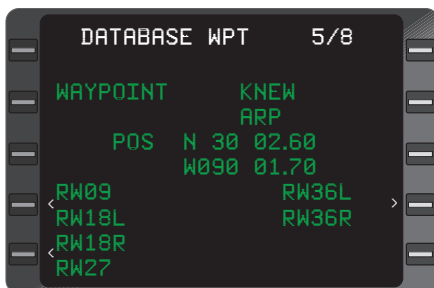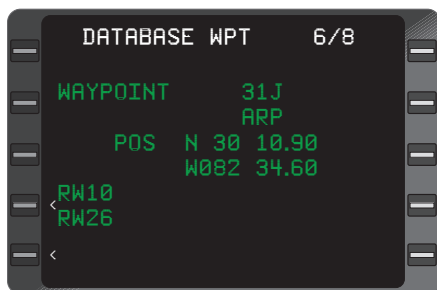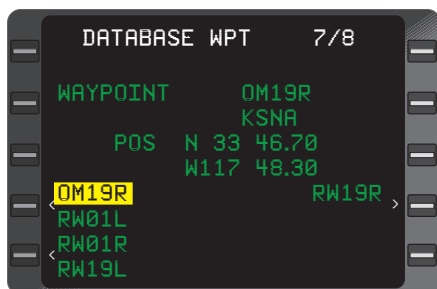
Figure 2-83

Intersections/Enroute Waypoints

Most intersection waypoint identifiers consist of 5 letters. However, 3, 4, and 5 letter and number combinations exist. To access these way-points, simply enter the identifier from the Jeppesen chart. Example: **WHALE** intersection. (Figure 2-84)

SPECIAL DATABASE WAYPOINTS

PILOT ENTERED WPT (Personalized) Waypoint

The operator is responsible for generating the waypoint data and maintaining its accuracy.

```
     DATABASE WPT    1/2

 WAYPOINT      WHALE
                USA
         POS  N 42 11.87
               W066 59.96


 NDB-ENTER
```
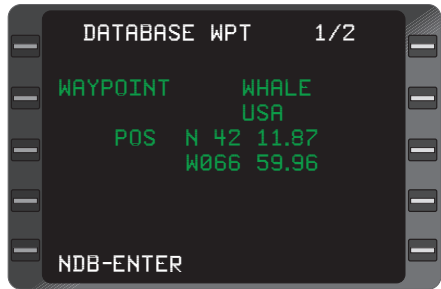
Figure 2-84

WAYPOINT:

The alphanumeric designator selected by the pilot. Identifiers can consist of up to six characters, and can be composed of any of the characters on the keyboard. (Figure 2-85) However, the asterisk (*) and pound sign (#) have special functions.

POS:

Blank fields for entering the latitude and longitude of the waypoint. When initially accessed (waypoint not yet in memory) the coordinate fields are both dashed and covered by a double cursor. (Figure 2-85)

```
    PILOT ENTERED  WPT

 WAYPOINT     GLOBAL
               USA
        POS  ---------
             ---------


 944 WPTS AVAIL
```

Figure 2-85

WPTS AVAILABLE:

The number of waypoints available in memory after this waypoint is defined. Maximum way-point storage in non-volatile memory is 999. (Figure 2-85)

WAYPOINT:

(Figure 2-86). Same as previous.

POS:

If the waypoint has been previously defined, the coordinates of the waypoint will be displayed as stored in memory. These coordinates may be changed at any time. (Figure 2-86)

```
       PILOT ENTERED WPT

  WAYPOINT       GLOBAL
                   USA
         POS   N 33 39.70
               W117 51.00


  944 WPTS AVAIL
```

Figure 2-86

OK? ENTER:

The procedure for accepting the waypoint if the coordinates are correct is to depress the **ENTER** Key. (Figure 2-86)

OFFSET WAYPOINT

An offset waypoint is a set of coordinates determined by a selected radial and distance from a previously defined or database (parent) waypoint. An * following the parent waypoint denotes an offset waypoint. (Figure 2-87)
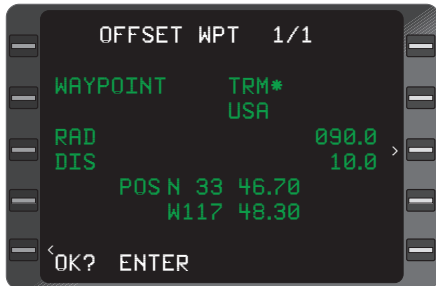
More than one offset waypoint is allowed from one parent, using [*], [*1], [*A1], etc. as identifying notation.

```
      OFFSET WPT  1/1

  WAYPOINT     TRM*
                 USA
  RAD                  090.0
  DIS                   10.0  >
        POS N 33 46.70
            W117 48.30
 < OK?  ENTER
```

Figure 2-87

NOTE: The offset waypoint uses station declination, if available, or it uses the calculated magnetic variation of the parent waypoint. All waypoints defined by a VHF Navaid in the National/International Airspace System are based on the VHF Navaid station declination. Since the magnetic variation and station declination may not be the same at a given Navaid, the FMS calculated position and the defined position may differ.

WAYPOINT:

The parent waypoint identifier followed by an ***.** When an offset waypoint identifier is entered and the waypoint has not been previously defined, the **RAD, DIS,** and **POS** fields are all dashed.

When the waypoint has been previously defined the coordinates will be displayed and the radial and distance values will be computed based on the location of the parent waypoint. (Figure 2-87)

If the parent waypoint is a waypoint from an airport continuation record (runway or outer marker associated with a specific airport), the airport identifier will be displayed immediately below the offset way-point identifier.

If a parent waypoint has a duplicate identifier in the database, the country code will be displayed immediately below the offset waypoint identifier. (Figure 2-87)

RAD:

The radial from the parent waypoint in degrees and tenths of degrees, along which the offset is established. This entry will be annunciated with a **T** if a true heading input is received or if the parent waypoint is north of N 70° or south of S 60° latitude. (Figure 2-87)

*NOTE: The radial can be entered in whole numbers without a trailing 0. i.e. enter 070 or 70 and 070.0 will be displayed. To enter a tenth of a radial all 4 digits must be entered. i.e. 0701 will be displayed as 070.1. The **DIS** entry requires a trailing 0 be entered for any **DIS** value greater than .9. i.e. enter 100 to display 10.0.*

DIS:

The distance from the parent waypoint to the offset waypoint (1999.9 maximum enterable). (Figure 2-87)

POS:

The computed offset waypoint coordinates based on the pilot entered radial and distance from the parent waypoint. (Figure 2-87)

OK? ENTER:

The procedure for accepting the waypoint if the coordinates are correct is to depress the **ENTER** Key. (Figure 2-87)

SPECIAL WAYPOINTS

#0,#1 and **#OFF** are special waypoints defined automatically by the system based on the airplane position.

#0 After pressing the ⊕→ key and **ENTER** key the position after the turn where the airplane intercepts the course to the direct to waypoint. The **#0** waypoint is defined as the point from which a DIRECT TO waypoint leg has begun. Should the DIRECT TO procedure require a

turn, **#0** will be defined as the point at which the aircraft completes the turn and intercepts the direct course to the fix. **#0** will momentarily be displayed on an EFIS map. **#0** can only be defined by the system.

#1 The position at the point where the **POSITION FIX** Page was last accessed via the **HOLD** Key. #1 can only be defined by the system.

Power Off Waypoint

The Power Off Waypoint is a set of coordinates retrieved as the last known position when power is lost enroute. This page should be accessed by inserting **#OFF** in the **IDENT** field on the **POSITION FIX** Page after power has been restored and Initialization Enroute has been performed.

WAYPOINT #OFF:

The Power Off Waypoint designator. (Figure 2-88)

POS:

The last present position coordinates at loss of power. Coordinates are stored in non-volatile memory. (Figure 2-88)

```
        SPECIAL WPT

WAYPOINT        *OFF

    POS   N 42 08.00
          W074 49.90
GMT OFF         00:13
MINUTES OFF     01.1
LAST TK           281
LAST GS           251
```
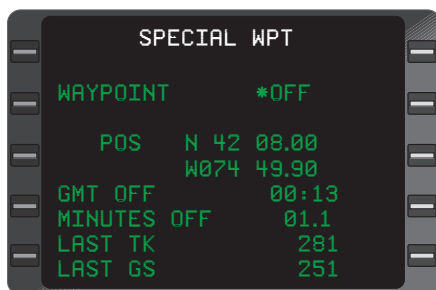
Figure 2-88

GMT OFF:

The actual time (Greenwich Mean Time) of power loss. (Figure 2-88)

MINUTES OFF:

The total time elapsed during power off. (Figure 2-88)

LAST TK:

Aircraft track at time of power off. (Figure 2-88)

LAST GS:

Last groundspeed in knots at time of power off. (Figure 2-88)

OCEANIC REPORTING WAYPOINTS

These waypoints are in the database and are used for oceanic position reporting. These waypoints can be added to the FPL by typing special numbers. See Section 3, ADDING A WAYPOINT.

OBSOLETE WAYPOINT

Obsolete Waypoints are typically created when a multiply defined database waypoint used on a stored flight plan is no longer found in the database. This may happen when a new data-base is loaded. An obsolete waypoint can be accessed only by verifying it as an existing waypoint on a flight plan. It will be lost once it is erased from a stored flight plan.

MESSAGES (MSG KEY)

System and Sensor messages are displayed on separate pages in the Message Section. They are accessed by depressing the **MSG** Key. The Message Section will consist of as many pages as are required to display current messages. The **MSG** Key is used to sequence through the System and Sensor Message Pages and to return to the page that was displayed before accessing the Message Section.

```
  SYSTEM MESSAGES    1/1

*ENTRY REQUIRED
NAV RDY
*-HOLD/ENTER
NO NAV
NDB-WW EXP 27DEC
```

Figure 2-89

NXT, BACK, and **PRV** keys can be used to page forward and backward through the message pages.

System Messages describe the system's operation with all related aircraft systems

```
  SENSOR MESSAGES    1/1

VLF    - NO NAV
IRS    - LINK FAIL
GPS    - NAV RDY
VPU    - DR
```

Figure 2-90

(Figure 2-89). Sensor Messages describe the operational status of each navigation sensor (Figure 2-90).

In most instances when new messages are added, the Message light will flash and a flashing yellow asterisk will appear adjacent to the new message.
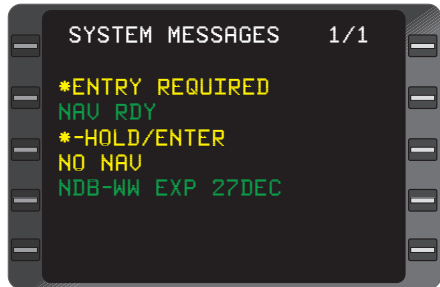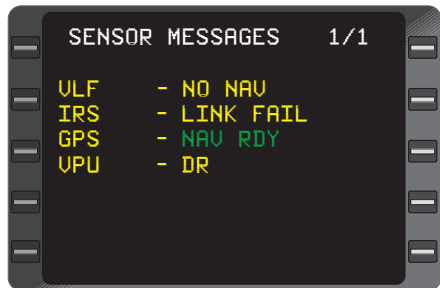
SYSTEM MESSAGES

ACTION REQUIRED:

The following are the action required messages that may appear on the **SYSTEM MESSAGES** Page. All will cause the message annunciator to flash.

System Message	Explanation
ENTRY REQUIRED	Information required on the Initialization Page must be verified/entered. (Date, GMT and Position).
VERIFY POSITION	Aircraft composite (blended) position is in question and must be manually verified.
VAR WARNING	Magnetic variation cannot be automatically computed, and **MAN VAR REQD.** A manual variation entry must be made on NAV Page 3 (i. e. aircraft position is north of 70° N latitude or south of 60° S latitude).

ADVISORY:

The following are the advisory messages that may appear on the **SYSTEM MESSAGES** Page. All will cause the message annunciator to flash unless otherwise noted with an asterisk *.

System Message	Explanation
AFIS LINK FAIL	For AFIS equipped operation, communication to the AFIS DMU has failed.
AFIS XFER FAIL	For AFIS equipped operation, a flight plan transfer from the AFIS DMU to the FMS has failed.
ALTITUDE FAIL	The altitude input to the system has failed.
*APRCH ARMED ENTER TO CANCEL?	Approach is ready to be executed. Pressing **ENTER** will cancel the sequence. Displayed within 30NM radius of the airport. CDI sensitivity changes to 1NM full scale deflection. VNAV Deviation changes to 500 ft. full scale deflection. The message annunciator will not illuminate.

*APRCH NEXT
ENTER TO CANCEL?   Aircraft is within 3NM of the FAF. CDI sensitivity changes from 1NM to .3NM full scale deflection. The message annunciator will not illuminate.

*APRCH ACTIVE
ENTER TO CANCEL?   Approach sequence is being executed. Pressing **ENTER** will cancel the approach. The message annunciator will not illuminate.

APRCH CANCELED   System is in an Approach Mode and the approach is changed or deleted from the Active Flight Plan.

APRCH WARN   The aircraft is within 2 NM from the FAF and GPS is in Dead Reckoning (DR) or there is no RAIM available. HSI is flagged.

BARO ALT FAIL   The barometric altitude input has failed.

*CAL CLOCK FAIL   The internal calendar/clock function has failed.

CNFG DATA CHANGED   The configuration module data from the present power up and previous power up sequence is different.

CNFG DATA LOST   CDU non-volatile memory has lost its configuration information and the configuration module has failed.

CNFG MODULE FAIL   Configuration module has failed. CDU non-volatile memory configuration information will be used.

COMPASS FAIL   The aircraft's compass heading input to the system is invalid.

DATA BASE INVALID
UPDATE ABORTED   The data base is invalid because the last attempt to update the data base was aborted.

DR HDG/TAS
DR TK/TAS
DR TK/GS
DR HDG/GS   The system is in the Dead Reckoning (DR) Mode and is using one of these four combinations of inputs to compute position.

EXT WPT REJECT   CDU has rejected an external waypoint input from a radar or EFIS. (Maximum 99 external waypoints received or 999 waypoints stored).

ADVISORY: (continued)

System Message	Explanation
FMS LINK FAIL	In dual system operation, communications with the cross-side FMS has been lost.
HIGH HOLDING SPD	During Holding or when system is about to enter a Holding pattern, TAS is high enough to cause the aircraft to stray outside the boundaries of protected airspace.
HIGH PROC TURN SPD	The ground speed on entry of a procedure turn is too high. The message appears approximately three minutes prior to entry of the procedure turn or at any time during the procedure turn.
INTERCEPT PAST FIX	A heading intercept mode capture will be on the from side of the fix.
IRS ONLY>30 MIN	System has been operating enroute in IRS Only Mode for more than 30 minutes. The message annunciator will not illuminate if the aircraft is Weight On Gear.
IRS ONLY>10 MIN	System has been operating in the terminal area in IRS Only Mode for more than 10 minutes. The message annunciator will not illuminate if the aircraft is Weight On Gear.
MEM FAIL	Non-volatile memory has failed at least partially.
*NAV RDY	The system is ready to be placed in the Primary Navigation Mode. Message annunciator will not illuminate.
NDB FAIL	Database has failed.
NDB OUTDATED	Expiration date of the database has been reached. Database should be updated.
NDB-WW EXP 27OCT	Worldwide (WW) or North American/European (NA) database and expiration date.
NO AUTO LEG CHG	An automatic leg change will not occur upon reaching the TO waypoint. Message annunciator will not illuminate most of the time.

ADVISORY: (continued)

System Message   Explanation

NO ARC INTERCEPT   A heading intercept to arc mode will not capture the arc.

NO COURSE INTERCEPT   A heading intercept mode will not capture the desired track.

NO NAV   The system is not navigating. Message annunciator will not illuminate.

POS WARN>1.7 NM   Based on the signal strength or geometry, the VPU sensor quality may be such that the composite position may have more than 1.7 nm error and may not be suitable for navigation in the terminal areas.

POS WARN>2.8 NM   Based on the signal strength or geometry, the VPU or VLF sensor quality may be such that the composite position may have more than 2.8 nm error and may not be suitable for enroute navigation on J/V routes.

POS WARN>3.8 NM   Based on the signal strength or geometry, the VPU or VLF sensor quality may be such that the composite position may have more than 3.8 nm error and may not be suitable for enroute navigation on J/V or Random routes.

POWEROFF POS   The system has lost power in flight for more than 7 seconds and the **#OFF** waypoint is available. Reviewing the **#OFF** waypoint page removes this message.

SENSOR MISCOMPARE The difference between the CDU composite (blended) position and a sensor position exceeds a predetermined amount.

*STRG INVALID   The system has stopped computing a roll command steering output due to invalid heading, auto-TAS, navigation leg, groundspeed or crosstrack distance. Message annunciator will not illuminate.

TAS FAIL   The True Airspeed input to the system from the Air Data Computer is invalid.

ADVISORY: (continued)

USING MAN HDG	An H-field antenna is installed with the RPU and a manual heading input is being used.
*WPT ALERT	The aircraft is within 30 seconds ETE of the next leg lateral change. Message annunciator will not illuminate.
WPT MEM FULL	All 999 waypoint locations have been used in flight plans or as FROM or TO waypoints.
VNAV WPT ALERT	Aircraft is within 1 minute ETE of **#TOD** or path intercept point. Message annunciator will not illuminate. However the discrete WPT annunciator will flash for 10 seconds then go steady
VSPD FAIL	The system vertical speed input has failed.

SENSOR MESSAGES

The following are sensor messages that may appear on the **SENSOR MESSAGES** Page. All messages will cause the **MSG** annunciator to flash unless other wise noted with an asterisk*.

Sensor Message	Explanation
ACCURACY WARN	The integrity monitoring system that monitors the satellite constellation (RAIM) has detected a GPS horizontal position error that is outside the alarm threshold for the phase of flight in progress. (.3NM Approach; 1NM Terminal; 2NM Enroute)
ALIGN	The IRS is in the alignment mode and is not yet **NAV RDY**.
ATTITUDE	The IRS is in the Attitude mode.
BATTERY WARN	The sensor is operating on its own internal battery.
CHECK QUAL	The VPU quality factor has exceeded the pilot entered advisory quality factor.

SENSOR MESSAGES: (continued)

Sensor Message	Explanation
*DESELECTED	The sensor has been manually deselected and will no longer contribute to the computation of composite (blended) position. Message annunciator will not illuminate.
DR	Either the GPS or VPU sensor is in the Dead Reckoning (DR) mode of navigation. The message annunciator will not illuminate for VPU.
ENTR SET HDG	The IRS is in the attitude mode and a heading value must be entered.
LINK FAIL	Data exchange between the sensor and CDU has failed.
*NAV RDY	The sensor is capable of navigation, but has not been placed in the navigation mode. Message annunciator will not illuminate. Only dispayed when GPS sensor is not available.
*NO NAV	The sensor has not navigated since system power up. Message annunciator will not illuminate.
NO RAIM	RAIM is not available at this time.
NO RAIM @ DEST	RAIM is available at the present time, but will not be available at the destination arrival time.

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SECTION 3

SYSTEM OPERATION

PRE-DEPARTURE

POWER ON/OFF AND PARALLAX ADJUSTMENT

1. **ON** Key - DEPRESS (momentarily). The **SELF TEST** Page (Figure 3-1) will be displayed for approximately 30 seconds. During the time the **SELF TEST** message is displayed, the system is performing internal self tests. If the system was turned OFF last by the removal of aircraft power, the system will turn ON automatically when aircraft power is applied.

    ```
    SELF TEST

    GLOBAL

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    ALL RIGHTS RESERVED
    ```

    Figure 3-1

2. **BRT** Key - Adjust as required. The display will initially come on at 75% of full bright. DEPRESS and hold the **BRT** Key to dim the display. Release the **BRT** Key. DEPRESS and hold again to brighten the display. To attain 100% brightness depress and hold **BRT** Key again until the display no longer gets brighter.

*NOTE: The display may be changed instantaneously to 75% of full bright from any brightness level by momentarily depressing the **ON** Key.*

3. Parallax Adjustment - If the Line Select Keys do not align with the line select prompts on the screen, DEPRESS the **BRT** Key (If the screen begins to dim, release the **BRT** Key then depress again and hold while momentarily pressing the **D→** Key, then the **P** Key). Using the **U** (Up) or **D** (Down) Key, adjust the display to the desired alignment. DEPRESS any key when alignment is complete.

4. To turn the system off, depress the **ON** Key and hold for three seconds.

INITIALIZATION PAGE

It is important that the initialization position and the first waypoint of the Active Flight Plan are the same so that the TO/FROM Leg Distance displays the correct information. The DIRECT TO function to the first waypoint on the flight plan may also be used to insure distance accuracy.


```
          INITIALIZATION
  DATE              01 JUN 99  >
  GMT                  18:42
       IDENT    KDAL            >
       POS    ----------
              ----------
  17960-0204            SM00  >
```
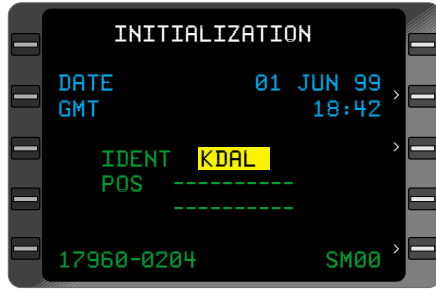
Figure 3-2

The Initialization Page gives the pilot access to the required initialization data (Date, GMT and Position). Following confirmation or entry of this data, the page disappears and cannot be retrieved unless the system power is removed and then restored. GMT and Date are available in the **PLAN** section and Position is available in the **NAV** section.

DATE and GMT

The **DATE** and **GMT** are continuously updated while the system is off. If non volatile memory is erased the date and time field will be dashes. When the system is turned on, the **DATE** and **GMT** will appear on the Initialization Page. If the **DATE** is incorrect, move the cursor to the **DATE** field to update manually.

1. **DATE** - INSERT, if required (day/month/year - digits only). For example: March 1, 1995 would be entered as 01 03 95. Enter a leading 0 for months with a numerical value of less than 10.

2. **ENTER** Key - DEPRESS to verify display.

3. **GMT** - INSERT, if required (hours and minutes). If the GMT is incorrect, update manually.

4. **ENTER** Key - DEPRESS to verify display.

5. **MSG** Key - DEPRESS to verify Database Expiration Date and review other System Messages. Continue depressing **MSG** Key to review **SENSOR MESSAGES** and to return to **INITIALIZATION** Page.

INITIALIZATION POSITION

The Initialization Position for non-IRS equipped systems should be the departure runway threshold. For IRS equipped systems, the ramp or alignment LAT/LONG position should be inserted as Initialization Position.

NOTE: Once the INITIALIZATION Page appears, and after a brief delay, the IDENT field normally prefills with the ICAO ident of the airport closest to the aircraft position at shut-down, provided the aircraft's real position and system position were the same at system shutdown.

The Departure Position may be entered using either:

> Option 1: Using the IDENT field for non-IRS equipped systems

> Option 2: Using the POS field

Option 1: Using the IDENT field for non-IRS equipped systems

(Entering Alpha and Numeric Identifiers on the Initialization Page)

 1. Line Select Key - DEPRESS to position cursor over the IDENT field (if required).

    Enter letters of the departure airport's ICAO identifier. Enter letters and numbers of the departure airport if it is a non-ICAO identifier.

2. **ENTER** Key - DEPRESS.

3. Airport Reference Point (ARP) coordinates will be displayed with continuation records listed below.

    To access the airport continuation records, position the cursor over a departure runway identifier. This will automatically result in the display of the departure runway threshold in the waypoint
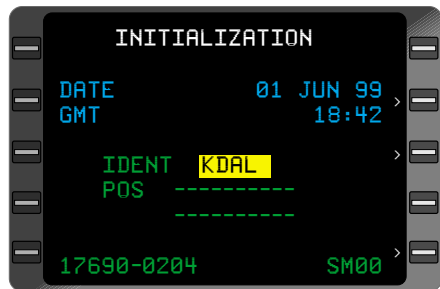
Figure 3-3

field, the departure airport identifier will replace the **ARP** field, and **POS** coordinates will reflect selected runway threshold. (Figure 3-4)

```
┌─────────────────────────┐
│   DATABASE WPT    4/8    │
│                         │
│  WAYPOINT        RW19R  │
│                   KSNA  │
│     POS     N 33 40.89  │
│             W117 51.90  │
│‹ OM19R          RW19R   ›│
│  RW01L                  │
│  RW01R                  │
│‹ RW19L                  │
└─────────────────────────┘
```

Figure 3-4

4. **ENTER** Key - DEPRESS.

5. **POS** Coordinates - VERIFY coordinates highlighted by the cursor on the Initialization Page. (Figure 3-5)
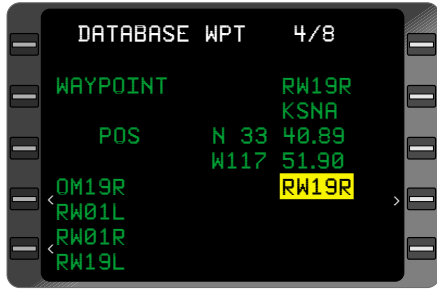
6. **ENTER** Key - DEPRESS.

If AFIS is not installed, the display will automatically advance to the **FLIGHT PLAN LIST** Page. The cursor will be positioned over the first Flight Plan Number that originates with the same airport or runway identifier as entered on the **INITIALIZATION** Page (Figure 3-6). Stored Flight Plans are referenced according to Departure and Destination pairs and are automatically sequenced in alphabetical order on the **FLIGHT PLAN LIST** Page. The cursor may be placed over the desired **FPL** number. To review the **FPL** press **ENTER.**

```
┌─────────────────────────┐
│      INITIALIZATION      │
│                         │
│  DATE        01 JUN 99  │
│  GMT            18:42   ›│
│                         │
│    IDENT   RW19R        ›│
│    POS   N 33 40.89     │
│          W117 51.90     │
│                         │
│  17960-0204       SM00  ›│
└─────────────────────────┘
```

Figure 3-5

```
┌─────────────────────────┐
│   FLIGHT PLAN LIST 1/1   │
│                         │
│  KABQ    KMSY        1   │
│  KDAL    KHPN        6  ›│
│  KDAL    KSFO        8   │
│  KHPN    KORD        2  ›│
│  KHPN    KORD        9   │
│  KLAX    KSTL        4  ›│
│  KPRC    KSNA        3   │
│  KSNA    KHPN        7   │
└─────────────────────────┘
```
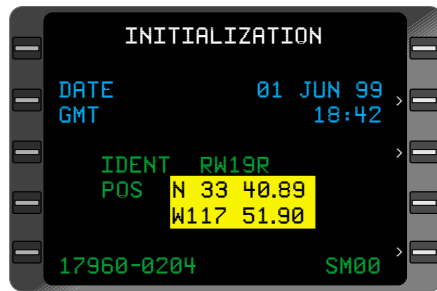
Figure 3-6

If AFIS/ACARS is installed, the display will advance to the **AFIS FPL** Page or the **ACARS Initialization** Page after the system is initialized.

Option 2: Using the POS field

For IRS equipped systems, the ramp or alignment LAT/LONG position should be inserted as the Initialization Position using **POS** Coordinates.

1. Line Select Key - DEPRESS (cursor over **POS** field).

2. **POS** Coordinates - VERIFY. Coordinates displayed are the computed position when the system was shutdown. If correct, these coordinates may be used as the Departure Position.

If Incorrect:

  a. Latitude - INSERT **N** or **S** first, then 6 numbers (degrees, minutes, and hundredths).

  b. **ENTER** Key - DEPRESS. (See Note)

  c. Longitude - INSERT **E** or **W** first, then 7 numbers (degrees, minutes, and hundredths).

*NOTE: If coordinate field flashes after entry, verify coordinates and depress **ENTER** again. Coordinate field will flash if the entered value varies more than 10 arc minutes from the displayed value.*

*If only one coordinate is in error, it may be updated individually by depressing **N, S, E,** or **W** Key to access the desired field.*

3. **ENTER** Key - DEPRESS.

If AFIS is not installed in the system, The **FLIGHT PLAN LIST** Page will now be displayed. A Flight Plan may be selected by bringing the cursor on to the **FLIGHT PLAN LIST** Page over the desired flight plan number and pressing **ENTER**.

*NOTE: If necessary, use the **PRV** or **NXT** Key to cycle through all available **FLIGHT PLAN LIST** Pages.*

If the desired flight plan does not appear, a new flight plan may be created. (See Building Flight Plans)

If AFIS is installed in the system, the display will automatically advance to the AFIS Flight Plan Page. Here a flight plan may be selected from the disc that has been inserted in the AFIS DTU prior to turning on the system. (Refer to Section 7)

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BUILDING FLIGHT PLANS (FPL)

CREATING A FLIGHT PLAN

1. **FPL** Key - DEPRESS to display (Stored) **FLIGHT PLAN LIST** Page (if required).

2. Line Select Key - DEPRESS to position cursor on blank line and display the **NEXT FPL** number. (Figure 3-7)

   If several Flight Plans are displayed, position cursor anywhere on the page then depress the **BACK** Key to show **NEXT FPL** number available.

```
FLIGHT PLAN LIST 1/1

KABQ      KMSY          1
KDAL      KHPN          3
KDAL      KSFO          2
KHPN      KORD          4
NEXT FPL                5
```

Figure 3-7

*NOTE: If all 56 Flight Plans are used, **NO FPL AVAIL** will appear in the field. Any of the stored flight plans may be erased to allow additional entries. The procedure is described under Modifying A Flight Plan.*

3. *__ENTER__ Key - DEPRESS to display __FLIGHT PLAN__ Page. (Figure 3-8) NOTE: The __XFILL__ prompt will only be displayed if the airplane is configured for dual systems.*

```
FLIGHT PLAN  5  1/1
    ******

<
<
DEPART          XFILL
ARRIVE          SELECT
APPROACH        ERASE
```

Figure 3-8

4. Type the appropriate departure airport or waypoint identifier in the cursor field.

*NOTE: Identifier may contain from 1 to 6 characters in any combination of letters and numbers. If an entry error is made, press the **BACK** Key to erase a character, then enter the correction.*

5. **ENTER** Key - DEPRESS.

6. Waypoint Coordinates and Data - VERIFY. If a specific runway is desired, depress the appropriate Line Select Key to place the cursor over the desired runway.

7. **ENTER** Key - DEPRESS to add waypoint to the FPL.

8. Repeat Steps 4 through 7 for the remaining waypoints. The destination airport identifier should be the last waypoint on the flight plan.

NOTE: Waypoints are generally obtained from the Navigation Data Base (NDB). Pilot entered offsets and waypoints may also be entered. See CREATING/CHANGING PILOT ENTERED WAYPOINTS for a more in depth discussion.

NOTE: SID's, STARS, Enroute Airways, and non-precision approach procedures may also be entered on either the stored or active flight plan. See SIDs, STARs, APPROACHES AND ENROUTE AIRWAYS for more details.

A maximum of 50 waypoint identifiers can be entered on Stored Flight Plans and 100 on the Active Flight Plan.

*Attempting to enter more than the maximum allowed will cause **FPL FULL** to be displayed with the identifier flashing in the cursor.*

*If adding a SID, STAR or Approach to A Flight Plan will exceed the Flight Plan capacity. A **NO ROOM ON FPL** message will appear on the procedure page being displayed.*

*Attempting to enter more than 999 pilot entered waypoints in memory causes **MEM FULL** to be displayed on the **FLIGHT PLAN** Page. The **MSG** light will flash and **WPT MEM FULL** will be displayed on **SYSTEM MESSAGES** Page.*

To Delete a Waypoint

9. Line Select Key - DEPRESS to position the cursor over the waypoint to be deleted.

10. **BACK** Key - DEPRESS. A **DELETE?** prompt will appear adjacent to the waypoint to be deleted.

11. **ENTER** Key - DEPRESS. The waypoint will be deleted.

MODIFYING A FLIGHT PLAN

To Access The Desired Flight Plan:

This procedure may be used to modify the Active Flight Plan or any Stored Flight Plan. Access the Active Plan or Stored Flight Plan by

depressing the **FPL** Key. Access a Stored Flight Plan from the alphabetized **FLIGHT PLAN LIST** Page. Use the **PRV** or **NXT** Keys to cycle through the available pages.

NOTE: A change made to the Active Flight Plan does not affect the Stored Flight Plan. Any change made to a Stored Flight Plan remains in memory.

Deleting A Waypoint:

1. Line Select Key - DEPRESS to position the cursor over the waypoint identifier.

2. **BACK** Key - DEPRESS. **DELETE?** appears in the waypoint field to inform the pilot of the pending change. (Figure 3-9)

3. **ENTER** Key - DEPRESS. The waypoint is deleted and the cursor is displayed over the next waypoint. (Figure 3-10)

NOTE: Deleting a waypoint from either a SID, STAR, or Approach Procedure will invalidate that procedure as indicated by the waypoints of the procedure no longer being indented.

Figure 3-9

Figure 3-10

To remove a waypoint from non-volatile memory it must be deleted from all Stored Flight Plans. This does not include database waypoints.

ADDING A WAYPOINT

A waypoint may be added anywhere in a Flight Plan sequence, except prior to the current **TO** waypoint if the **ACTIVE FPL** Page is displayed.

1. Line Select Key - DE-PRESS to position the cursor over the waypoint

identifier that will follow the
new entry. (Figure 3-11)

2. Type Waypoint Identifier -
   INSERT. (Figure 3-12)

3. **ENTER** Key - DEPRESS.

4. Waypoint Coordinates -
   VERIFY or INSERT.

5. **ENTER** Key - DEPRESS.
   The new waypoint is
   added to the Flight Plan
   sequence and the cursor
   is over the waypoint fol-
   lowing the new entry.
   (Figure 3-13)

*NOTE: Adding a waypoint to
a SID, STAR, or Approach
Procedure will invalidate that
procedure as indicated by the
waypoints no longer being
indented.*

Figure 3-11

Figure 3-12

Adding Oceanic
Waypoints

Oceanic waypoints are
entered in the same manner
as other waypoints with one

Figure 3-13

exception. Instead of entering a waypoint identifier, a five-character
coordinate identifier, such as 3050N, is entered. The following rules
are to be applied:

1. Positions in the Northern Hemisphere use letters "N" and "E".
   Positions in the Southern Hemisphere use the letters "S" and
   "W". Both will use numerics for latitude and longitude values as
   follows:

   a. Latitude - Latitude will always precede longitude.

    b.   Longitude - Use only the last two digits of the first, three-digit longitude value.

    c.   Letter Placement - The letter designator will be the last character in the five-character string if the longitude is less than 100 degrees and will be the third character in the five-character string if the longitude is 100 degrees or greater.

    d.   The letter "N" is used for north latitude and west longitude. The letter "E" is used for north latitude and east longitude. The letter "S" is used for south latitude and east longitude. The letter "W" is used for south latitude and west longitude.

2. Examples:

North latitude/**West** longitude	**North** latitude/**East** longitude
N50 00/W040 00 = 5040N	N50 00/E040 00 = 5040E
N07 00/W008 00 = 0708N	N07 00/E008 00 = 0708E
N75 00/W170 00 = 75N70	N75 00/E170 00 = 75E70
N07 00/W120 00 = 07N20	N07 00/E120 00 = 07E20

South latitude/**East** longitude	**South** latitude/**West** longitude
S50 00/E040 00 = 5040S	S50 00/W040 00 = 5040W
S07 00/E008 00 = 0708S	S07 00/W008 00 = 0708W
S75 00/E170 00 = 75S70	S75 00/W170 00 = 75W70
S07 00/E110 00 = 07S10	S07 00/W120 00 = 07W20

ERASING A STORED FLIGHT PLAN

1. **FPL** Key - DEPRESS to display desired **FLIGHT PLAN LIST** Page.

2. Line Select Key- DEPRESS to position the cursor over the number of the **FPL** to be erased.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **ERASE?**

5. **ENTER** Key - DEPRESS. All waypoints of the stored FPL will be erased.

NOTE: If the Active Flight Plan is erased, all waypoints except the ***FR*** *and* ***TO*** *are deleted. A fence (- - - - - -) is displayed indicating no auto leg change beyond the* ***TO*** *waypoint.*

USING DUPLICATE WAYPOINT IDENTIFIERS

1. Duplicate Waypoint Identifiers: (Figure 3-14) There are several waypoints around the world with same identifier. If the identifier selected has more than one waypoint associated with it, additional pages will be indicated on line 1. i.e.1/2, 1/4, etc. The waypoint nearest the aircraft position will be displayed first.

```
   DATABASE WPT    2/4

WAYPOINT            TRM
                   USA
    POS       N 33 37.70
              W116 09.60
FREQ              116.20
VAR                 E 13
ELEV                -110
NDB-ENTER
```

Figure 3-14

To select an alternate way-point location:

2. **PRV** or **NXT** Key - DEPRESS until desired country name is displayed. (Figure 3-15)

3. **ENTER** Key- DEPRESS to add the waypoint to the flight plan.

```
   DATABASE WPT    2/8

WAYPOINT            TRM
                  PORTU
    POS       N 38 45.60
              W027 05.60
FREQ              116.20
VAR                 W 14
ELEV                 172
NDB-ENTER
```

Figure 3-15

REVIEWING WAYPOINT DATA/COORDINATES (FLIGHT PLAN PAGES ONLY)

If the stored flight plan is currently displayed, proceed to Step 4.

To access the desired flight plan:

1. **FPL** Key - DEPRESS to locate the desired Flight Plan on the **FLIGHT PLAN LIST** Pages.

2. Line Select Key - DEPRESS to position the cursor over desired Flight Plan Number.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over identifier to be reviewed.

5. **ENTER** Key - DEPRESS.

6.   Waypoint Coordinates or data- VERIFY.

7.   **ENTER** Key - DEPRESS. The Flight Plan is displayed with the cursor over the next waypoint.

8.   Repeat Steps 5 through 7 for remaining waypoints.

NOTE: This procedure may also be used for reviewing waypoint information on the Active Flight Plan Page.

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FLIGHT PLAN (FPL) SELECTION

This procedure is used to transfer a stored FPL to active FPL status.

It is recommended that the initialization position and the first waypoint of the Active Flight Plan are the same so that the TO/FROM Leg Distance displays the correct information. The DIRECT TO function to the first waypoint on the flight plan may also be used to insure distance accuracy.

If a stored flight plan is currently displayed, proceed to Step 5.

1. **FPL** Key - DEPRESS (if required) until the desired **FLIGHT PLAN LIST** Page appears.

NOTE: If the desired Flight Plan is not listed refer to the procedure for Creating a Flight Plan.

2. Line Select Key - DEPRESS to position the cursor over the desired Flight Plan Number.

*NOTE: If desired Flight Plan number is known, position the cursor on the page, enter the number and depress **ENTER** Key. The desired Flight Plan will be displayed.*

3. **ENTER** Key - DEPRESS.

4. **FLIGHT PLAN** Page - VERIFY Flight Plan. Review routing by depressing **PRV** or **NXT** Key to page through multiple Flight Plan pages.

*NOTE: DEPRESS **FPL** or **NXT** Key to sequence to an alternate Flight Plan with the same departure destination pair and higher Flight Plan number.*

*DEPRESS **PRV** or **BACK** Key to sequence to a lower Flight Plan number with the same departure-destination pair.*

5. Line Select Key- DE-PRESS to position cursor over **SELECT?** (Figure 3-16):

   a. to transfer the Stored Flight Plan to Active Flight Plan status continue with Step 6.

   b. to **INVERT** and transfer the Stored Flight Plan with waypoint sequence

Figure 3-16

reversed to Active Flight Plan status, press the **BACK** Key to display **INVERT?.** (Figure 3-17)

6. **ENTER** Key - DEPRESS.

7. **ACTIVE FPL** - CONFIRM. Observe that the Stored Flight Plan transferred to the **ACTIVE FPL** Page as SELECTED or INVERTED. (Figure 3-18)

```
FLIGHT PLAN  5  3/3

     BDF
     GSH
     KDTW
     ******

 DEPART
 ARRIVE              INVERT?
 APPROACH            ERASE
```
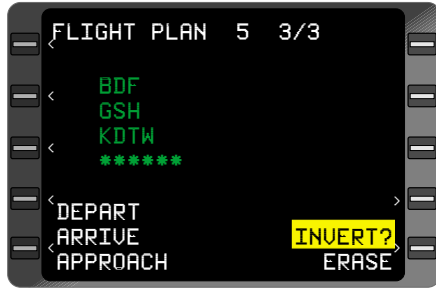
Figure 3-17

INITIAL LEG SELECTION

An initial From/To Leg or Direct To Leg must be established in order for the system to provide guidance along the Flight Plan. From the **ACTIVE FPL** Page , the following procedure is used.

```
   ACTIVE FPL   1/3
 KSNA    - KDTW
 MUSEL
 HEMET
 TRM
 EED*
 TBC
 DEPART
 ARRIVE              ETE
 APPROACH            ERASE
```

Figure 3-18

1. **NAV** Key - DEPRESS.

2. **FR** Waypoint - VERIFY. The first waypoint on the Active Flight Plan will appear in the **FR** field. To change the **FR** waypoint, insert the desired identifier.

3. **ENTER** Key - DEPRESS. The next waypoint in the Active Flight Plan sequence will appear in the **TO** field.

4. TO Waypoint - VERIFY. To change the **TO** waypoint, insert the desired identifier.

5. **ENTER** Key - DEPRESS.

6. **DIS, DTK** - CHECK for reasonableness. (Figure 3-19)

```
   NAVIGATION    1/4
 FR KSNA         -----
 TO MUSEL        -----

 DIS             13.1
 ETE             -----
 DTK             186
 GS              -----
 WIND            ---/---
        -AUTO-
```
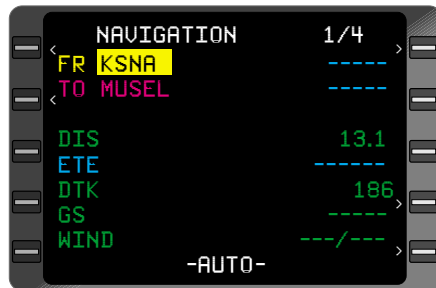
Figure 3-19

If this leg selection is part of an active flight plan involving Oceanic/Remote operation using GPS as the sole navigation source, an FDE prediction to determine sufficient GPS availability must be performed prior to departure. Refer to the Special Procedures section for instructions on performing the FDE prediction procedure.

BEFORE TAXI (IRS EQUIPPED)

The Inertial Reference System (IRS) should be aligned and placed in the Navigation Mode using the IRS manufacturer's operating instructions.

1. **MSG** Key - DEPRESS for IRS Sensor Messages.

    SENSOR MESSAGES Page will show **IRS-ALIGN** during alignment sequence. When the IRS is in normal Navigation Mode no IRS messages will be displayed.

2. IRS Status - VERIFY NAV. Observe that no IRS messages appear on the **SENSOR MESSAGES** Page.

RUNWAY LINE-UP (IRS EQUIPPED)

Provided an accurate alignment position was entered and the IRS was placed in the Navigation Mode prior to taxi, no further action is required.

IRS, GPS AND/OR VPU EQUIPPED

On the ground the system will navigate deriving composite position and groundspeed from the GPS or IRS, provided the IRS was aligned and placed into the Navigation Mode prior to taxi. All other sensors (VPU) will enter the Primary Navigation Mode automatically at 50 kts (IRS) groundspeed or weight-off-wheels, provided they have sufficient stations to begin navigation. Momentarily depressing **HOLD** Key, then **ENTER,** and **ENTER** again will also put the sensors in the primary NAV mode if sufficient stations are available.

VPU EQUIPPED ONLY

This procedure is used to manually place the system into the Primary Navigation Mode at the designated departure position i.e. the end of the departure runway. The VPU is a position finding sensor that can navigate once airborne or within line of sight of suitable navaids.

1. **MSG** Key - DEPRESS.

2. **MSG** Key - DEPRESS to verify status of all sensors. Observe **NAV RDY/NO NAV** messages for appropriate sensor and refer to the Flight Manual Supplement for limitations.

3. **HOLD** Key - DEPRESS to verify departure coordinates.

4. **ENTER** Key - DEPRESS twice to enter Primary Navigation Mode.

*NOTE: If the **[HOLD/ENTER/ENTER**] procedure had not been initiated prior to takeoff, the system and the various sensors will enter the Primary Navigation Mode automatically at weight-off-wheels, or at a true airspeed of between 50 and 150knots, depending on configuration.*

SIDs, STARs, APPROACHES AND ENROUTE AIRWAYS

The GNS-XLS SID (Standard Instrument Departure), STAR (Standard Terminal Arrival), Approach and Airway retrieval feature is designed to relieve flight crew workload. SIDs and STARs require such procedures as flying headings and altitudes, as well as intercepting VOR radials and DME arcs, etc. Approaches can be flown autopilot/fight director coupled until the Missed Approach Point. Missed Approach Procedures must then be flown manually. The GNS-XLS is ONLY designed to provide meaningful input to the HSI when on a track between two waypoints or when Pseudo Vortac (selected course) procedures are used. **THE SYSTEM IS NOT DESIGNED TO FLY FULL SID, STAR OR MISSED APPROACH PROCEDURES.**

NOTE: The flight crew must review the published procedure and compare it to the procedure contained in the database. The published charts are the governing authority and the chart procedures must be followed. Any differences between the chart and the database must be resolved by the flight crew prior to commencing the procedure.

When flying those portions of a SID or STAR that are not tracks between fixes, the aircraft should be flown manually or in HEADING mode. In some cases, Pseudo Vortac procedures can be used to establish an intercept to a published track. When using the Pseudo Vortac mode, or upon intercepting a published track between two waypoints (fixes), the aircraft may be flown in reference to the cross track deviation provided by the GNS-XLS or by coupling the GNS-XLS roll command to the auto pilot.

The first leg of the SID that the FMS can fly is not the first leg of the procedure. To properly fly SIDs, the flight crew must manually fly the procedure to a point where the FMS can fly the procedure properly. The first leg of the SID that the FMS can fly is usually the first waypoint after the airport identifier or departure runway. After loading the SID on to the Active FPL, access NAV Pg 1. Enter the first waypoint after the runway or airport identifier in the FR field. Press ENTER. The TO field will display the next waypoint in sequence from the FPL. Press ENTER again to complete the initialization of the first leg of the flight plan. The flight crew must manually fly the airplane until reaching the first leg of the SID that can be flown by the FMS.

The following procedures contain leg types that the FMS cannot automatically fly, and require manual intervention by the pilot. The following operational procedures are recommended.

NOTE: Some SIDs and STARs require intercept procedures upon reaching a specified altitude. In these cases, execute the Pseudo Vortac, Direct To or Heading Intercept procedure upon reaching the specified altitude.

The CDU display, Figure 3-21, shows the waypoints that would be added to the flight plan through reference to the **ELMAA5** SID, **HQM** transition from **RW16L**.

Figure 3-21

Heading to Intercept Procedures

The shaded area on the SID chart, Figure 3-20, is an example of the portion of the procedure that must be flown manually or in the F/D heading mode. No reference to the GNS-XLS should be made at this time.

For procedures like the example in Figure 3-20, the following operational procedures are recommended.

1. Prior to departure, tune the Seattle VOR, select the VOR as the NAV source and set the HSI course pointer to 158°.

2. After departure, intercept the SEA 158° radial. After crossing the SEA 5 DME fix at or above 3000', turn right to 250°.

3. Select the FMS Heading and enter 250, then Intercept mode on the FMS. Select **ELMAA** as the TO waypoint and enter 227 in the **DTK** field and press **ENTER**.

4. Select the FMS as the NAV source.

5. The FMS will fly the remainder of the SID to **HQM**.

NOTE: This is known as the FMS HEADING/INTERCEPT procedure.
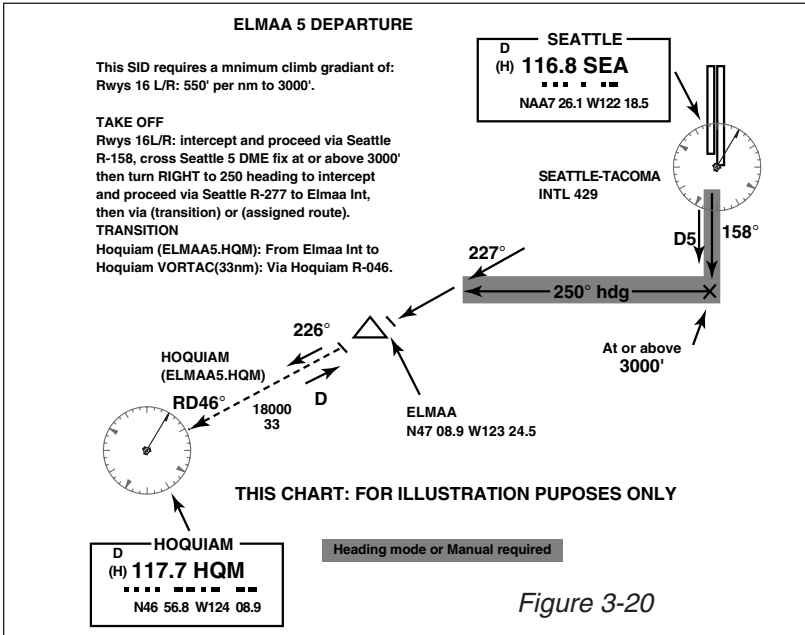
Figure 3-20

Overfly then Intercept Procedures

For procedures that require over-flying a waypoint (Figure 3-21a), then a turn to intercept a course to the next waypoint, follow these operational requirements for the example following:

1. Prior to departure, when the first waypoint is designated fly-over, select **MAN** leg change mode on NAV Page 1 and press **ENTER**.

2. Select the FMS as the NAV source.

3. Accurately fly the runway course or heading.

4. Immediately after passing **ZH582**, do a Direct To **ZH554**, enter 255 in the **DTK** field on NAV Page 1 and press **ENTER**.

NOTE: This is known as the FMS Pseudo Vortac procedure.

(LSZH   LASUN 3Y)

Procedure Requirement

Fly straight ahead, over fly ZH582, left turn intercept 255° course inbound to ZH554.

ZH582
N47 27.7
E008 29.7

ZH554
N47 24.8
E008 18.5

ZH569
N47 24.0
E008 13.9
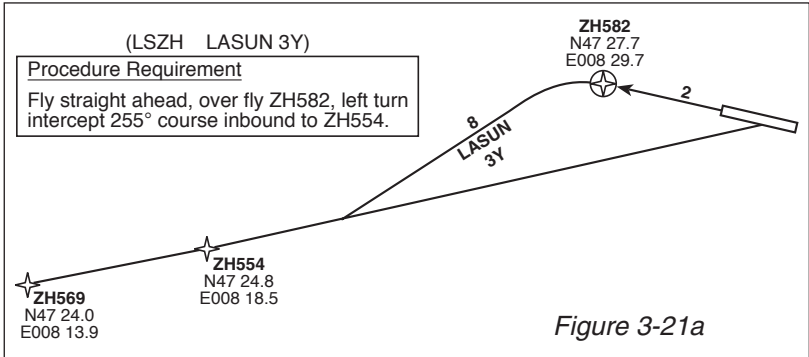
Figure 3-21a

Overfly then DIRECT TO Procedures

For procedures that require over-flying a waypoint (Figure 3-21b), then a Direct To the next waypoint, follow these operational require-ments for the example following:

1. Prior to departure, select **MAN** leg change mode on NAV Page 1 and press **ENTER**.

2. Select the FMS as the NAV source.

3. Accurately fly the runway course or heading.

4. Immediately after passing **WW166**, press the ⤳ key, cursor over **BRKNB** and press **ENTER**.

NOTE: This is known as the FMS Direct TO procedure.

(LOWW   MIKOV 2B)

Procedure Requirement

Fly straight ahead, over fly WW166, left turn direct to BRK.

WW272
N48 11.6
E016 47.3

BRUCK
408 BRK
-••• -•-• ---
N48 03.8 E016 43.0

MIKOV
2B

WW166
N48 01.3
E016 37.2

Figure 3-21b
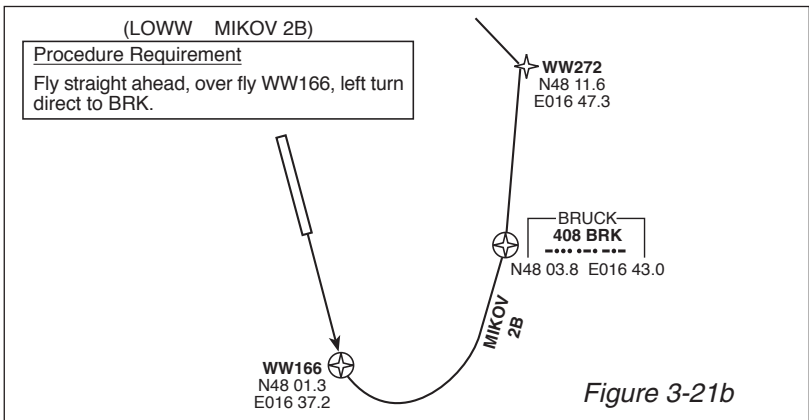
The following procedures allow the pilot to automatically add way-points stored in the database, as part of a SID, STAR, APPROACH, or Enroute Airway, to either a Stored or Active Flight Plan. These procedures provide an abbreviated method of waypoint entry, eliminating the need to enter individual waypoint identifiers for SIDs, STARs, APPROACHes and Airways.

NOTE: When a SID, STAR, APPROACH or Enroute Airway is added to an existing flight plan, duplicate waypoints may occur. To avoid an inconsistent flight plan and resulting map display, it may be necessary to delete any duplicate waypoints. Also, the routings and coordinates must be verified by the operator. These procedures must not be used in lieu of charts.

Due to the way the GNS-XLS database is structured, waypoints must have unique identifiers. However, some duplicate identifiers exist for more than one waypoint location. These waypoints are primarily located on APPROACHES, SIDS and STARS. In these cases the waypoint identifiers are renamed in the database as a 6 character identifier. Two naming conventions are used, one for four character identifiers and one for five character identifiers.

Four character waypoints have the first four characters but add the last two characters of the ICAO airport identifier as shown in the following example:

MA11 at KPRC becomes MA11**RC** in the database.

Five character waypoints have the first five characters but add the last character of the ICAO airport identifier as shown in the following example:

MA27L at KOAK becomes MA27L**K** in the database.

ENTERING A SID ON THE ACTIVE FPL

NOTE: These procedures may also be used with a stored flight plan.

1. **FPL** Key - DEPRESS to display Active **FPL** Page.

2. Line Select Key - DE-PRESS to position cursor over the **DEPART?** field (Figure 3-22).


```
    ACTIVE FPL     1/1
 FR KSEA      - KLAX
 TO KLAX
       *****


 DEPART ?
 ARRIVE              ETE
 APPROACH          ERASE
```

Figure 3-22

3. **ENTER** Key - DEPRESS to display **DEPARTURE** Page.

4. **DEPARTURE** Airport Identifier - VERIFY or INSERT valid ident.

NOTE: If the first waypoint on the Flight Plan is an airport, the Departure ident prefills and the cursor is positioned over the first SID identifier on the list.

*If the first waypoint on the Flight Plan is a runway, the **RUNWAY** field also prefills and the cursor is over the first **SID** identifier on the list.*

*If there are no SIDs associated with the Departure Airport, the message **"NO SIDS AVAILABLE"** appears and the ident field flashes. Depress the **FPL** Key to return to the Active Flight Plan.*

5. Line Select Key - DEPRESS to position the cursor over the desired SID, if required. (Figure 3-23)

6. **ENTER** Key - DEPRESS to select **SID.**
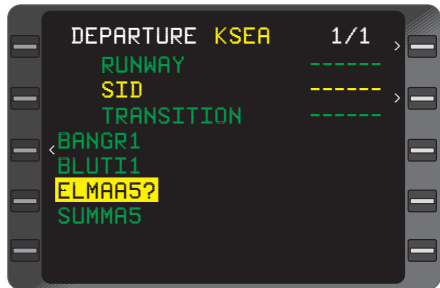
*NOTE: Cursor moves to the first **TRANSITION** identifier on the list. The **TRANSITION** field is highlighted in yellow.*


```
  DEPARTURE KSEA   1/1
     RUNWAY        ------
     SID           ------
     TRANSITION    ------
 BANGR1
 BLUTI1
 ELMAA5?
 SUMMA5
```

Figure 3-23

7. Line Select Key - DEPRESS to position cursor over the desired **TRANSITION,** if required. (Figure 3-24)

8. **ENTER** Key - DEPRESS to select **TRANSITION.**

*NOTE: If the **SID** and **TRANSITION** are runway dependent, and a runway has not*


```
  DEPARTURE KSEA   1/1
     RUNWAY        ------
     SID           ELMAA5
     TRANSITION    ------
 CVO
 HQM ?
 UBG
```

Figure 3-24

*prefilled, the cursor moves to the first runway on the **RUNWAY** identifier list and **RUNWAY** field is highlighted in yellow. See Figure 3-25. If runway is not required, proceed to Step 11.*

9. Line Select Key - DEPRESS to position cursor over the desired runway.

```
DEPARTURE KSEA    1/1
  RUNWAY          -----
  SID            ELMAA3
  TRANSITION        HQM
```

Figure 3-25

10. **ENTER** Key - DEPRESS to select **RUNWAY.**

11. Departure **SID** Waypoints - REVIEW (Figure 3-26), then DEPRESS the **ENTER** Key to select the SID and insert it into Active Flight Plan. The display will automatically return to the **ACTIVE FLIGHT PLAN** Page.

```
DEPARTURE KSEA    1/1
  RUNWAY         RW16L
  SID            ELMAA3
  TRANSITION        HQM
  WAYPOINTS OF SID:
    ELMAA
    HQM

SELECT?              ERASE
```
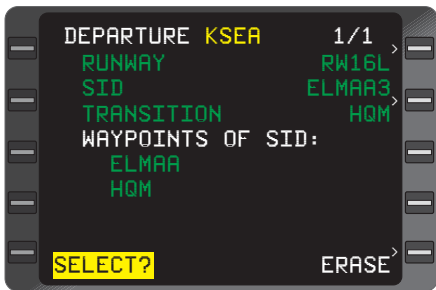
Figure 3-26

NOTE: If SID is added to a stored flight plan this display will return to the stored flight plan page after SID is selected.

*NOTE: **SID** waypoints appear indented from other waypoints in a Flight Plan that are not part of a procedure. (SID, STAR, APPROACH)*

REVIEWING A SID FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **DEPART** field on the **Flight Plan** Page.

2. **ENTER** Key - DEPRESS to review **SID** (Figure 3-27).

```
DEPARTURE KSEA    1/1
  RUNWAY         RW16L
  SID            ELMAA5
  TRANSITION        HQM
  WAYPOINTS OF SID:
    ELMAA
    HQM

                    ERASE
```

Figure 3-27

3. **BACK** Key - DEPRESS to return to Flight Plan Page.

*NOTE: **SELECT** will not appear as an option since a **SID** already exists in the Flight Plan.*

EDITING A SID FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **DEPART** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS.

3. Line Select Key adjacent to **SID** field - DEPRESS to position cursor over the first **SID** identifier on the list.

*NOTE: A list will only appear if the **TRANSITION/ RUN-WAY** are compatible with other **SID**s. (Figure 3-28)*

4. Line Select Key adjacent to the **TRANSITION** field - DEPRESS to position cursor over the current **TRANSITION** waypoint on the list. (Figure 3-29)

5. Line Select Key - DEPRESS to position the cursor over the desired **TRANSITION.** (Figure 3-30)

Figure 3-28

Figure 3-29

Figure 3-30

6. **ENTER** Key - DEPRESS to select desired **TRAN-SITION.** The system will automatically load the compatible SID associated with the selected **TRANSITION.** (Figure 3-31)

7. **ENTER** Key - DEPRESS to select a new **SID** and insert the new **SID** into the flight plan.

```
DEPARTURE KSEA      1/1 ›
  RUNWAY          RW16L
  SID            SUMMA5 ›
  TRANSITION        LKV
  WAYPOINTS OF SID:
    SUMMA
    LKV

SELECT?              ERASE ›
```

Figure 3-31

*NOTE: The **RUNWAY** can also be edited without changing the original **SID** if the SID/TRANSITION are compatible. This is done by pressing the Line Select Key adjacent to the **RUNWAY** field. Press the Line Select Key to position the cursor over the desired **RUNWAY**. Press **ENTER** to load the desired **RUNWAY** on the **SID.***

8. **ENTER** Key - DEPRESS to select the edited **SID** as displayed and insert it into the flight plan.

NOTE: Look carefully at the flight plan to see if any waypoints are out of sequence. Delete waypoints as necessary.

ERASING A SID FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **DEPART** field on the Flight Plan Page.

2. **ENTER** Key - DEPRESS.

3. Line Select Key - DEPRESS to position cursor over **ERASE?** (Figure 3-32).

```
DEPARTURE KSEA      1/1 ›
  RUNWAY          RW16L
  SID            ELMAA3 ›
  TRANSITION        HQM
  WAYPOINTS OF SID:
    ELMAA
    HQM
‹
‹                  ERASE? ›
```

Figure 3-32

4. **ENTER** Key - DEPRESS to erase **SID** and return to Flight Plan page.

ADDING OR DELETING WAYPOINTS WITHIN A SID

*NOTE: When a **SID** is modified by adding or deleting waypoints, the sequence of waypoints is no longer identified as a **SID.***

To Add a Waypoint

1. Line Select Key - DEPRESS to position cursor over the **SID** waypoint identifier that will follow the new entry on the Flight Plan page. See Figure 3-33.

2. Waypoint Ident - INSERT.

3. **ENTER** Key - DEPRESS twice.

*NOTE: The previously in-dented **SID** waypoints move over one space to the left on the screen and are treated as normal waypoints in the Flight Plan. (Figure 3-34)*

To Delete a Waypoint

4. Line Select Key - DEPRESS to position the cursor over the way-point to be deleted on the Flight Plan page.

Figure 3-33

Figure 3-34

5. **BACK** Key - DEPRESS. A **DELETE?** prompt will appear adjacent to the waypoint to be deleted.

6. **ENTER** Key - DEPRESS. The waypoint will be deleted and the waypoints of the SID will be treated as non-procedure waypoints in the flight plan.

ENTERING AN AIRWAY FROM ANY STORED FPL OR THE ACTIVE FPL PAGE

Enroute Airways include high altitude jet routes, low altitude and colored airways.

1. Line Select Key - DEPRESS to position cursor directly below the starting waypoint of the desired airway on the Flight Plan page. (Figure 3-35)

2. Airway ident - INSERT. Use:

   Option 1 if the destination waypoint is unknown.

   Option 2 to enter the known destination waypoint.

Option 1

   a. **#** Key - DEPRESS, then enter the airway identifier. (Figure 3-36)

   b. **ENTER** Key - DEPRESS. (Figure 3-37)

NOTE: If the waypoint above the cursor is not a waypoint on the selected airway, the airway identifier will blink. The appropriate airway or waypoint identifier must be entered.

The Flight Plan should always be checked for duplicate waypoints and the appropriate waypoints deleted.

```
    ACTIVE FPL   1/1
‹   KSEA    - KLAX
‹   ELMAA
    HQM
‹   KLAX
    ******
‹DEPART
 ARRIVE            ETA
‹APPROACH        ERASE
```

Figure 3-35

```
    ACTIVE FPL   1/1
‹   KSEA    - KLAX
‹   ELMAA
    HQM
‹   #J501
    ******
‹DEPART
 ARRIVE            ETA
‹APPROACH        ERASE
```

Figure 3-36

```
    AIRWAY J501   1/2
‹   RZS      TO HQM ?
    ZONAL       HQM31
‹   BSR         TOU
    PESCA       FINGS
    PYE         ZESNB
‹   NIECE       CAFTA
    COPPO       YZP
    OED         MOCA1
‹SELECT ENDING WPT
```
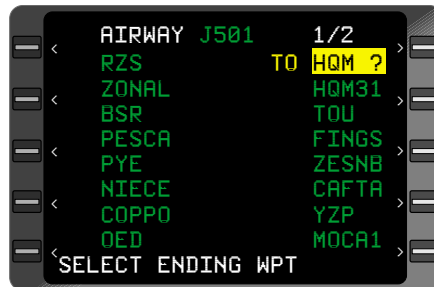
Figure 3-37

c. Line Select Key - DEPRESS to position cursor over the desired destination waypoint. (Figure 3-38). If applicable, use **PRV** and **NXT** Keys to access all airway waypoints pages.

```
    AIRWAY J501    1/2
 < TO RZS ?      FR HQM
       ZONAL        HQM31 >
       BSR          TOU
 <     PESCA        FINGS >
       PYE          ZESNB
 <     NIECE        CAFTA >
       COPPO        YZP
 <     OED          MOCA1
   SELECT ENDING WPT
```
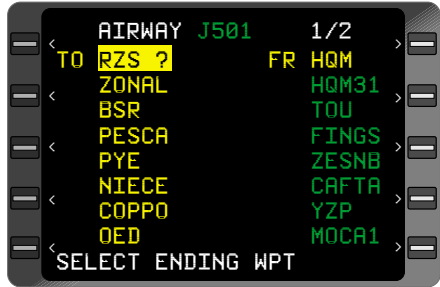
Figure 3-38

NOTE: As the cursor is moved up or down, "TO" will appear next to the cursor and a question mark will follow the ident. The waypoints between the TO/FROM waypoints will be displayed in yellow.

d. After selecting the ending waypoint **(TO)** on the Airway, depress the **ENTER** Key to merge the Airway waypoints into the flight plan and return to the **FPL** Page.

NOTE: If inserting the airway segment into the Flight Plan results in more than 50 waypoints in the stored Flight Plan or 100 waypoints on the Active Flight Plan, the message "FPL FULL" will appear.

NOTE: Look carefully at the flight plan to see if any waypoints are out of sequence. Delete waypoints as necessary.

```
    ACTIVE FPL  1/1
 <   KSEA   - KLAX
     ELMAA
 <   HQM
     #J501+RZS
 <   ******
 < DEPART
   ARRIVE        ETA >
 < APPROACH      ERASE
```

Figure 3-39

Option 2

a. **#** Key - DEPRESS then enter the airway identifier.

b. **±** Key - DEPRESS and type destination waypoint. (Figure 3-39)

c. **ENTER** Key - DE-PRESS. (Figure 3-40)

```
    AIRWAY J501    3/3
 < FR HQM       TO RZS ? >
      OED
 <    COPPO
      NIECE
 <    PYE
      PESCA
 <    BSR
      ZONAL
   SELECT ENDING WPT
```
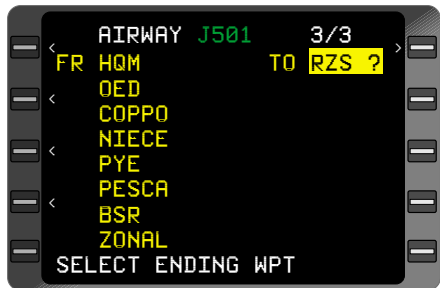
Figure 3-40

NOTE: If the waypoint above the cursor is not a waypoint on the selected airway, the airway identifier will blink and the appropriate airway or waypoint identifier must be entered. If the destination waypoint is not on the airway, the system reverts to Option 1.

    d. To change ending waypoint, use the Line Select Key to position cursor over a different destination waypoint. If applicable, use **PRV** and **NXT** Keys to access all airway waypoint pages.

*NOTE: As the cursor is moved up or down, "**TO**" will appear next to the cursor and a question mark will follow the ident. Waypoints between the **TO/FR** waypoints will be displayed in yellow.*

3. **ENTER** Key - DEPRESS to merge the airway waypoints into the Flight Plan and return to the Flight Plan Page. (Figure 3-41)

*NOTE: If inserting the airway segment into the Flight Plan results in more than 50 waypoints in the stored Flight Plan or 100 waypoints on the Active Flight Plan, the message "**FPL FULL**" will appear.*

```
        ACTIVE FPL   2/3
<      RYE
       PESCA
<      BSR
       ZONAL
<      RZS
       KLAX
<     DEPART
<     ARRIVE                ETA >
      APPROACH            ERASE
```

Figure 3-41

4. If applicable, enter additional airway identifiers to chain several airways together.

EDITING AN AIRWAY

Once an airway is merged into the flight plan, waypoints can be added to or deleted from the flight plan on the Flight Plan Page using normal edit procedures.

To add or delete waypoints from a selected segment of the airway, perform the following:

1. Line Select Key - DEPRESS to position cursor over an airway waypoint on the Flight Plan page.

2. **#** Key - DEPRESS then enter the appropriate airway identifier.

3. **ENTER** Key - DEPRESS. (Figure 3-42)

4. Line Select Key - DEPRESS to move the cursor to shorten or lengthen the previously selected segment of the airway. If applicable, use **PRV** and **NXT** Keys to access all airway way-point pages.

Figure 3-42

5. **ENTER** Key - DEPRESS to merge the edited airway segment into the Flight Plan and return to the Flight Plan Page.

ENTERING A STAR OR PROFILE DESCENT ON ANY STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **ARRIVE?** field on the Flight Plan page (Figure 3-43).

2. **ENTER** Key - DEPRESS to display **ARRIVAL** Page (Figure 3-44).

3. **ARRIVAL** Airport Identifier - VERIFY or INSERT valid identifier.

Figure 3-43

NOTE: If the last waypoint on the Flight Plan is an air-port and an Approach is pro-grammed, the Arrival airport identifier prefills and the cur-sor is over the first TRANSI-TION waypoint on the list.

If the last waypoint on the Flight Plan is a runway, the RUNWAY field also prefills and the cursor is over the first TRANSITION waypoint on the list.

Figure 3-44

If there are no STARs associated with the Arrival Airport, the message "NO STARS AVAILABLE" appears and the arrival airport ident field flashes. Depress FPL Key to return to ACTIVE FLIGHT PLAN.
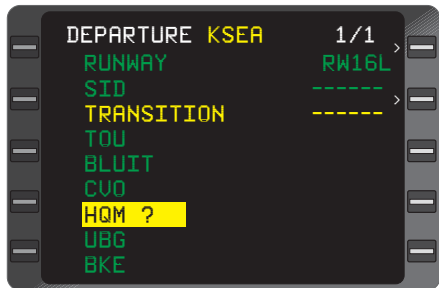
4. **NXT** Key - DEPRESS to view waypoints on subsequent pages if desired.

5. Line Select Key - DEPRESS to position cursor over the desired **TRANSITION.** (Figure 3-45)

6. **ENTER** Key - DEPRESS to select **TRANSITION.**

NOTE: The STAR field turns yellow and the cursor is over the first identifier on the STAR list.


```
ARRIVAL KLAX      2/2
RUNWAY           -----
TRANSITION       -----
STAR             -----
MALIT            ELKEY
ROSIN            RZS
AVE ?            VTU
DERBB
DINTY
MUDDE
```

Figure 3-45

7. Line Select Key - DEPRESS to position cursor over the desired **STAR.** See Figure 3-46.
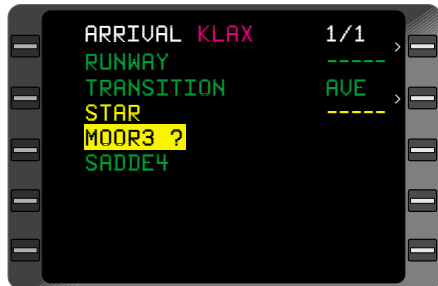
8. **ENTER** Key - DEPRESS to select **STAR.**

NOTE: If the STAR and TRANSITION are runway dependent, and a runway has not prefilled, the cursor moves to the first RUNWAY


```
ARRIVAL KLAX      1/1
RUNWAY           -----
TRANSITION        AVE
STAR             -----
MOOR3 ?
SADDE4
```

Figure 3-46

identifier on the runway list and the runway field is displayed in yellow. If a runway is not required, proceed to Step 11.

9. Line Select Key - DEPRESS to position cursor over the desired **RUNWAY** on the runway list.

10. **ENTER** Key - DEPRESS to select **RUNWAY.**

11. Arrival **STAR** Waypoints - REVIEW (Figure 3-47), then DEPRESS **ENTER** Key to insert **STAR** into Active Flight Plan and return to the **ACTIVE FLIGHT PLAN** Page.

NOTE: Look carefully at the flight plan to see if any waypoints are out of sequence. Delete waypoints as necessary.

```
ARRIVAL KLAX        1/1
RUNWAY           -----
TRANSITION         AVE
STAR             MOOR3
WAYPOINTS OF STAR:
    AVE      FIM
    DERBB    PAULA
    REYES    ILEAN
    PIRUE    WAKER
SELECT?            ERASE
```

Figure 3-47

STAR waypoints appear indented from the other waypoints on a Flight Plan that are not part of a procedure. (SID, STAR, or APPROACH)

REVIEWING A STAR FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **ARRIVE** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS to review **STAR.** (Figure 3-48)

3. **BACK** Key - DEPRESS to return to **FLIGHT PLAN** Page.

```
ARRIVAL KLAX        1/1
RUNWAY           -----
TRANSITION         AVE
STAR             MOOR3
WAYPOINTS OF STAR:
    AVE      FIM
    DERBB    PAULA
    REYES    ILEAN
    PIRUE    WAKER
                   ERASE
```

Figure 3-48

NOTE: SELECT will not appear as an option since a STAR already exists in the Flight Plan.

EDITING A STAR FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **ARRIVE** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS.

3. Line Select Key - DEPRESS twice to position the cursor over the **STAR** field. This will erase the current **TRANSITION.**

NOTE: A list will appear with other available STARs.

4. Line Select Key - DEPRESS to position cursor over the desired **STAR.**

5. **ENTER** Key - DEPRESS to select desired **STAR.**

*NOTE: Cursor moves to the first waypoint of the **TRANSITION** list and the **TRANSITION** field is displayed in yellow.*

6. Line Select Key - DEPRESS to position the cursor over the desired transition waypoint.

7. **ENTER** Key - DEPRESS to select the **TRANSITION.** If the **STAR** is not runway dependent proceed to Step 10.

8. Line Select Key - DEPRESS to position the cursor over the desired runway on the **RUNWAY** list.

*NOTE: The **RUNWAY** can also be edited without changing the original **SID** if the **SID/TRANSITION** are compatible. This is done by pressing the Line Select Key adjacent to the **RUNWAY** field. Position the cursor over the desired **RUNWAY.** Press **ENTER** to load the desired **RUNWAY** on the **SID.***

9. **ENTER** Key - DEPRESS to select the **RUNWAY.**

10. Arrival **STAR** Waypoints - REVIEW, then DEPRESS **ENTER** Key to insert **STAR** into Active Flight Plan and return to the **ACTIVE FLIGHT PLAN** Page.

ERASING A STAR FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **ARRIVE** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS.

3. Line Select Key - DEPRESS to position cursor over **ERASE?** (Figure 3-49)


```
ARRIVAL KLAX      1/1
RUNWAY            -----
TRANSITION         AVE
STAR             MOOR3
WAYPOINTS OF STAR:
   AVE      FIM
   DERBB    PAULA
   REYES    ILEAN
   PIRUE    WAKER
                 ERASE?
```

Figure 3-49

4. **ENTER** Key - DEPRESS to erase **STAR** and return to **FLIGHT PLAN** Page.

ADDING WAYPOINTS WITHIN A STAR

NOTE: When a STAR is modified by adding or deleting waypoints, the sequence of waypoints is no longer identified as a STAR.

The following may be accomplished from any stored flight plan or the **ACTIVE FPL** Page.

1. Line Select Key - DEPRESS to position cursor over the **STAR** waypoint identifier that will follow the new entry on the Flight Plan page. (Figure 3-50)

2. Waypoint Ident - INSERT.

3. **ENTER** Key - DEPRESS twice.

Figure 3-50

NOTE: The previously indented STAR waypoints move over one space to the left on the screen and are treated as normal waypoints in the Flight Plan. (Figure 3-51)

DELETING WAYPOINTS OF A STAR

1. Line Select Key - DEPRESS to position cursor over the **STAR** waypoint identifier to be deletedon the Flight Plan page.

Figure 3-51

2. **BACK** Key - DEPRESS. A **DELETE?** prompt will appear adjacent to the waypoint to be deleted.

3. **ENTER** Key - DEPRESS. The waypoint will be erased and the waypoints of the STAR will move left one space. These waypoints will be treated as non-procedure waypoints in the flight plan.

ENTERING AN APPROACH ON A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over **APPROACH?** field on the **ACTIVE FPL** page. (Figure 3-52)

2. **ENTER** Key - DEPRESS to display **APPROACH** Page. (Figure 3-53)

3. **APPROACH** Airport identifier - VERIFY or INSERT valid ident.

NOTE: If there are no APPROACHes associated with the Approach Airport, the message "NO APPROACH AVAIL" appears and the airport ident field flashes. Depress FPL Key to return to Active Flight Plan.
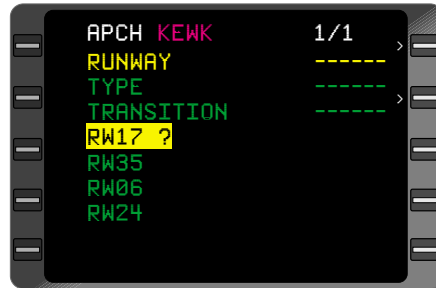
4. Line Select Key - DEPRESS to position cursor over the desired **RUNWAY** on the runway list. (Figure 3-54)

NOTE: If a circling Type Approach is desired, use line select to display type. Go to step 6.
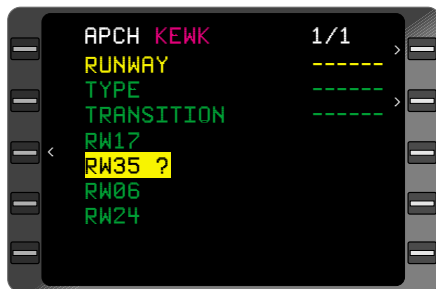
5. ENTER Key - DEPRESS to select **RUNWAY.** If a valid runway has been selected, the cursor moves to the first approach **TYPE**.

6. Line Select Key- DEPRESS to position cursor over the desired Approach **TYPE** if required.

Figure 3-52

Figure 3-53

Figure 3-54

7. **Enter** Key - DEPRESS to select Approach **TYPE**. (Figure 3-55)

*NOTE: If there is only one type of approach available the system automatically loads the approach **TYPE** and the cursor moves over the WPT in the transition list. Go to Step 8.*
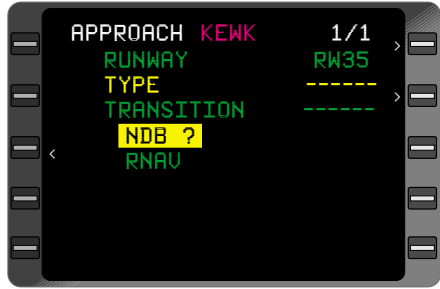
*NOTE: If the runway select-ed on the Approach Page differs from the runway dic-tated by the STAR, **"SEL RWY FROM STAR PG"** is displayed at the bottom of the screen.*

```
APPROACH KEWK      1/1
  RUNWAY          RW35
  TYPE          ------
  TRANSITION    ------
    NDB ?
    RNAV
```

Figure 3-55

8. Line Select Key - DEPRESS to position cursor over the desired **TRANSITION** if required. (Figure 3-56) If there is only one transition for the desired approach the system automatically loads the transition and

```
APPROACH KEWK      1/1
  RUNWAY          RW35
  TYPE             NDB
  TRANSITION    ------
    COBUS ?
    PNE
```

Figure 3-56

the WPTs of the approach are displayed. Go to step 10.

9. **ENTER** Key - DEPRESS to select **TRANSITION.**

The system will identify the following waypoints of an approach:

IAF - Indicates the initial approach fix.

ARC - DME Arc end point.

PT - A Procedure Turn will commence at that waypoint.

HP - A Holding Pattern is programmed at that waypoint.

FCF - Final Approach Course Alignment Fix

FAF - The Final Approach Fix.

MAP - The Missed Approach Point.

10. Approach Waypoints - REVIEW (Figure 3-57), then DEPRESS **ENTER** Key to insert **APPROACH** into Active Flight Plan and return to the **ACTIVE FLIGHT PLAN** Page.
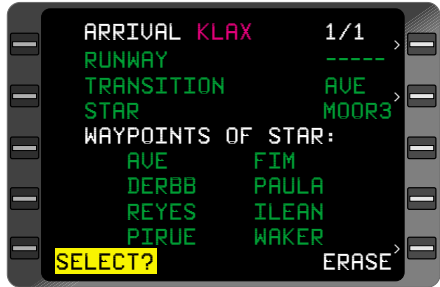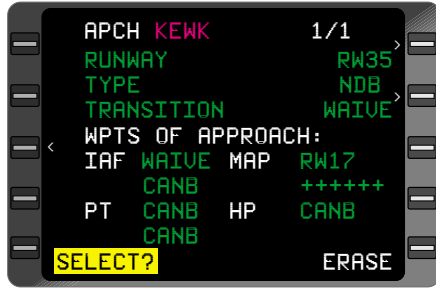
REVIEWING AN APPROACH FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **APPROACH** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS to review **APPROACH** (Figure 3-58)

3. **BACK** Key - DEPRESS to return to **FLIGHT PLAN** Page.
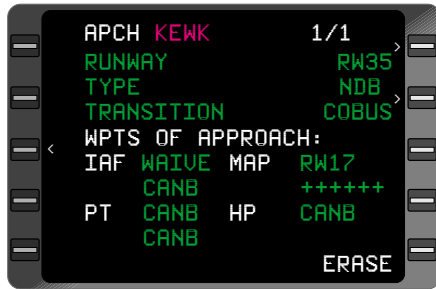
Figure 3-57

Figure 3-58

NOTE: SELECT will not appear as an option since an APPROACH already exists in the Flight Plan.

EDITING AN APPROACH FROM A STORED FPL OR THE ACTIVE FPL PAGE

1. Line Select Key - DEPRESS to position cursor over the **APPROACH** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS to display **APPROACH** Page.

The **RUNWAY, TYPE**, or **TRANSITION** may be edited by pressing the Line Select Key next to the field to be edited. That field will turn from green to yellow and the previous information will turn to dashes. Alternate options may be available depending on the information in the remaining two fields.

The most efficient way to edit an approach procedure is to change the **RUNWAY, TYPE,** and **TRANSITION** fields to dashes (------).

1. Line Select Key (adjacent to **RUNWAY** field) - DEPRESS to change the field to dashes.

2. Line Select Key (adjacent to **TYPE** and **TRANSITION** fields) - DEPRESS to change the field to dashes.

Using the same Line Select Keys, obtain a complete list of **RUNWAYS, TYPES**, and **TRANSITIONS.** Use the appropriate Line Select Keys to select the desired data from each list.

3. **ENTER** Key - DEPRESS to enter the selected data from each list. When all the fields have been filled.

4. **ENTER** Key - DEPRESS to select the new approach data, insert it into the flight plan, and return to the Flight Plan Page.

NOTE: Look carefully at the flight plan to determine if any waypoints are out of sequence and delete waypoints as necessary.

When an ***APPROACH*** *is modified by adding or deleting waypoints the sequence of waypoints is no longer identified as an* ***APPROACH*** *and the system will not enter the Approach Mode. An* ***APPROACH CANCELED*** *message will be displayed anytime a waypoint is deleted, added to an approach procedure on the Active Flight Plan, or when a Direct To the MAP is initiated..*

ERASING AN APPROACH FROM A STORED FPL OR THE ACTIVE FPL

NOTE: Erasing an Approach also erases the current destination airport identifier. This procedure should be used when an approach at a different airport is desired.

1. Line Select Key - DEPRESS to position cursor over **APPROACH** field on the **FLIGHT PLAN** Page.

2. **ENTER** Key - DEPRESS to display **APPROACH** Page.

Figure 3-59

3. Line Select Key - DEPRESS to position cursor over **ERASE?** (Figure 3-59)

4. **ENTER** Key - DEPRESS to erase **APPROACH** and return to the **FLIGHT PLAN** Page.
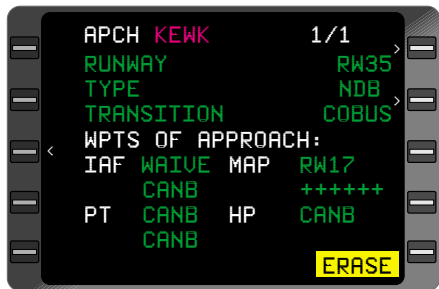
DELETING AN APPROACH WAYPOINT

1. Display the appropriate **FPL** Page.

2. Line Select Key - DEPRESS to position cursor over the **APPROACH** waypoint identifier to be deleted.

3. **BACK** Key - **DEPRESS.** A **DELETE?** prompt will appear adjacent to the waypoint.

4. **ENTER** Key - DEPRESS.

*NOTE: When an **APPROACH** is modified by adding or deleting waypoints (including waypoints between the "fence" and the Missed Approach Procedure waypoint), the sequence of waypoints is no longer identified as an (APPROACH) and the system will not enter the Approach Mode. An (**APPROACH CANCELED**) message will be displayed anytime a waypoint is deleted or added to an **Approach** procedure on the Active Flight Plan.*

*NOTE: Anytime a Direct To the MAP is performed and an approach is either armed or active, an **APPROACH CANCELED** message will appear. The approach functions will be disabled and the CDI scaling will return to the **Terminal** sensitivity of 1NM full scale deflection.*

USING A STAR AND AN APPROACH IN THE SAME FLIGHT PLAN

Since both the Arrival (STAR) and Approach procedures allow for entry of **AIRPORT** and **RUNWAY,** the following rules apply.

• Changing the **AIRPORT** on the **ARRIVAL** Page, and selecting an associated **STAR,** automatically erases the **APPROACH** procedure.

• Changing the **AIRPORT** on the **APPROACH** Page, and selecting an associated Approach, automatically erases the **STAR** procedure.

• Changing the **RUNWAY** on the **ARRIVAL** Page, and selecting it, automatically erases the **APPROACH** procedure.

• Changing the **RUNWAY** on the **APPROACH** Page, and selecting it, has no effect on the **STAR** procedure unless the **STAR** is runway dependent.

If the **STAR** is runway dependent, the message **"SEL RWY FROM STAR PG"** (Select **RUNWAY** from **STAR** Page) appears on the **APPROACH** Page. The pilot must return to the **ARRIVAL** Page to change the **RUNWAY** for the **STAR,** before changing the **RUNWAY** on the **APPROACH** Page.

SELECTING A COMPANY ROUTE AND ADDING IT TO THE ACTIVE FLIGHT PLAN

1. Display the **COMPANY ROUTES** Page (automatically after initialization, or by paging the **FPL** pages).

*NOTE: If the data base contains company routes, the first page displayed after system initialization will be the **COMPANY ROUTES** page in lieu of the **FLIGHT PLAN LIST** page. If both AFIS and Company Routes are present, the **COMPANY ROUTES** page is displayed first.*

*NOTE: Typically, the **COMPANY ROUTES** page will display the location entered on the initialization page (if available) in the Origin field, with the cursor over both the Origin and Destination field, ready for entry of the Destination.*

Figure 3-59a

2. Line Select Key LSR2 - If you desire to change the Origin entry, DEPRESS to position cursor over only **ORIGIN** field on the **COMPANY ROUTES** page, and type in desired identifier. (Figure 3-59a) If the cursor is over both fields, and the Origin is correct, proceed to the next step. (Figure 3-59b)

Figure 3-59b

3. **DESTINATION** identifier - VERIFY or INSERT valid ident. (Figure 3-59b)

4. **ENTER** Key - DEPRESS. (Figure 3-59c) If the pair is valid and has only one VIA, the ACTIVE FLIGHT PLAN page is now displayed with the waypoints of the pair added.

Figure 3-59c

*NOTE: If the pair is not valid, the **COMPANY ROUTES** page will remain, and a **ROUTE NOT FOUND** message will be displayed. (Figure 3-59d) If the route is valid, but the Active FPL is full, an **ACTIVE FPL FULL** message is displayed. (Figure 3-59e) A **WPT MEM FULL MESSAGE** will be displayed if the waypoint memory is full.*

NOTE: The Company Route can be selected either by the preceding method using an Origin/Destination city pair, or by selecting LSK L4 and entering the route number.

5. If the selected city pair has more than one VIA, the first one will be displayed. (Figure 3-59f)

6. Use the **PREV**, **NEXT**, or **BACK** keys to scroll through the list of VIAs (Figure 3-59g)

7. **ENTER** Key - DEPRESS. The ACTIVE FLIGHT PLAN page is now displayed with the waypoints of the pair added.

Figure 3-59d

Figure 3-59e
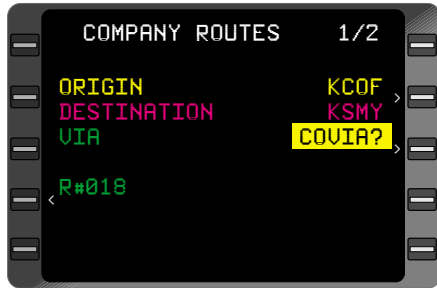
Figure 3-59f
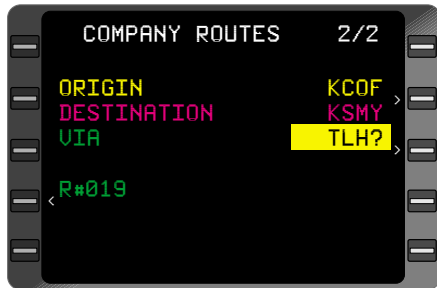
Figure 3-59g

Note: In order to execute approaches with a specific aircraft installation, the installation must meet the standards set forth by the governing certification agency. Consult the Aircraft Flight Manual Supplement for specific limitations.

EXECUTING APPROACHES

Warning: When entering PTs or HP airspace at high speed the FMS may not constrain the airplane from violating maneuvering airspace. Pilots are responsible for procedural compliance.

When the aircraft is within 30NM of the airport, the system will go into the Approach Armed mode. The CDI sensitivity will change from 5.0NM full scale deflection to 1.0NM full scale deflection. At this point the aircraft may bank slightly due to increased roll steering gains. Anytime the TO waypoint is part of an Approach Procedure, the **SXTK** field is disabled so that no parallel course can be entered.

The system is capable of executing GPS, GPS Overlay, NDB, RNAV, CIRCLING, and VOR approaches only. No LOC, ILS or MLS capability is available.

If **RAIM** is not available at 2NM from the FAF, an **APPROACH WARN** message will appear on the **SYSTEM MESSAGES** Page. Also, the HSI flag will be set invalid. At this point the appropriate missed approach procedures should be executed. The system will remain in the Approach Mode and the discrete **APPROACH** annunciator will remain illuminated until the HSI is set valid. To set the HSI valid, cancel the Approach on the **SYSTEM MESSAGES** Page by pressing the **ENTER** Key.

The system will not display any interim waypoints between the **FAF** and the **MAP**, even though a waypoint may be shown on the approach plate. **The system may not give vertical guidance to the interim waypoint. Pilots are responsible for procedural compliance.**

*NOTE: If the **MAP** is abeam or beyond the threshold, or the approach is a circling approach, no altitude constraints will be displayed at the **MAP** from the database. Constraints may be entered manually.*

When the Approach is flown, the system will provide guidance along the final approach course to the Missed Approach Point.

When initially executing a missed approach procedure, use the FMS Heading Mode or manually fly the procedure to ensure proper track and turn direction.

*NOTE: A "fence" (++++++) separates the Missed Approach Procedure waypoint from the MAP, the last waypoint of the Approach. No Auto Leg change (waypoint sequencing) will occur to waypoints beyond the "fence" (++++++) once the airplane passes the **MAP**.*

*At the **MAP** the pilot must manually or via the HDG Mode maneuver the aircraft to the Missed Approach Procedure waypoint. If, after the missed approach, an approach at a different airport is desired, erase the current approach procedure before selecting a procedure at the new airport. This will insure proper waypoint sequencing on the Active Flight Plan.*

LOADING A GPS/GPS OVERLAY APPROACH

1. **FPL** Key - DEPRESS until the **ACTIVE FPL** Page appears. (Figure 3-60)

2. Line Select Key - DEPRESS to position the cursor over **APPROACH?**

3. **ENTER** Key - DEPRESS. APPROACH page is now displayed. (Figure 3-61)

Figure 3-60

4. Airport Identifier - INSERT or VERIFY.

5. **ENTER** Key - DEPRESS twice, if required, to display runway list if not already displayed.

If a circling type approach is desired:

Line Select Key - DEPRESS to position cursor over **TYPE.**

Figure 3-61

ENTER Key - DEPRESS to display the **TYPE** list. Proceed to Step 10.

6. Line Select Key - DEPRESS to position cursor over desired runway.

7. **ENTER** Key - DEPRESS.

8. **TYPE** - SELECT if required.

9. **ENTER** Key - DEPRESS.

10. **TRANSITION** - SELECT if required.

11. **ENTER** Key - DEPRESS.

12. Approach Waypoints - REVIEW.

13. **ENTER** Key - DEPRESS **ACTIVE FPL** Page is displayed. VER-
IFY the approach appears as selected.

14. Waypoint Sequencing - Edit, if required, based on assigned route.

EXECUTING A GPS/GPS OVERLAY APPROACH

*NOTE: To fly a full procedure DME ARC or Procedure Turn, either
coupled or using own navigation, follow the FMS and
EFIS/Instrument displays.*

USING RADAR VECTORS TO FINAL APPROACH COURSE

1. **FPL** Key - DEPRESS to
display the **ACTIVE FPL**
Page. (Figure 3-62)

2. Approach and Waypoint
Sequencing - VERIFY
they appear as selected.

3. **MSG** Key - VERIFY
approach is armed within
30NM of the airport and
the HSI scaling output
has changed to **TRMNL**
on **NAVIGATION** Page 2.


```
   ACTIVE FPL   1/1
‹  KEED      - KPRC
‹  EED
   DRK
‹  KPRC

‹ DEPART
‹ ARRIVE            ETA ›
  APPROACH?        ERASE ›
```

Figure 3-62

4. FMS Mode - SELECT or VERIFY the appropriate mode for guid-
ance if required.

5. Flight   Director   or
Autopilot - ENGAGE the
appropriate mode if
required.

6. **HDG** Key - DEPRESS to
display the **HEADING
VECTOR** Page. (Figure
3-63)

7. Heading - INSERT as
assigned by ATC.


```
   HEADING VECTOR 1/1

‹ HDG  155

  CANCEL

  TO DRK     DTK    197

  ENTER HDG
```

Figure 3-63

8. **ENTER** Key - DEPRESS twice to engage Heading Select mode. (Figure 3-64)

After receiving the final intercept vector from ATC:

9. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page. (Figure 3-65)

```
┌─────────────────────────┐
│     HEADING VECTOR 1/1   │
│                          │
│ ‹HDG  155                │
│                          │
│ ▐HDG SELECT ?▌           │
│                          │
│ ‹TO DRK      DTK    197 ›│
│                          │
│   OK? ENTER              │
└─────────────────────────┘
```
Figure 3-64

10. **ENTER** Key - DEPRESS.

11. **BACK** Key - DEPRESS to display **INTERCEPT?**

12. **ENTER** Key - DEPRESS cursor moves to the **TO** field.

13. **BACK** Key - If Required, DEPRESS until the FAF waypoint is displayed.

```
┌─────────────────────────┐
│     HEADING VECTOR 1/1   │
│                          │
│ ‹HDG  155                │
│                          │
│ ▐INTERCEPT ?▌            │
│        FAF               │
│ ‹TO DRK      DTK    197 ›│
│                          │
│   OK? ENTER              │
└─────────────────────────┘
```
Figure 3-65

14. **ENTER** Key - DEPRESS cursor moves to the **DTK** field.

15. Final Approach Course - INSERT if a Procedure Turn type approach or VERIFY if any other type approach.

16. **ENTER** Key - DEPRESS twice.

17. CDI Display - VERIFY the HSI course needle slews to the final approach course or manually select the course.

18. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

USING OWN NAVIGATION - NO DME ARC

1. **FPL** Key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-66)

2. Approach and Waypoint Sequencing - VERIFY they appear as selected.

3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.

```
     ACTIVE FPL   1/1
<    KEED     - KPRC
<    EED
     DRK
<    KPRC

 <DEPART
  ARRIVE              ETA>
  APPROACH?          ERASE>
```

Figure 3-66

4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance.

5. Flight Director or Autopilot - ENGAGE the appropriate mode.

6. Waypoints and HSI Course - VERIFY proper sequencing during the approach.

7. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

PROCEDURE TURN

The following is a brief description of the screen displays typically seen while executing a Procedure Turn.

As the aircraft approaches the **PT** waypoint, a message is displayed on the fourth line of the CDU indicating the next action the aircraft will take. This message is displayed 30 seconds prior to

```
    NAVIGATION  1/4
<DIRECT           13:48
<PT DRK           ALT ?
 NX PT OVERFLY TO   305>
 DIS               0.2
 ETE            00:00.0
 DTK               301
 GS                150>
 WIND           ---/---
        -AUTO-
```

Figure 3-67

the event and disappears when the action is initiated. Figure 3-67 indicates the aircraft is flying **DIRECT** to **DRK** where a Procedure Turn **(PT)** will take place. Line four indicates the aircraft will turn to a heading of 305° upon reaching **DRK.** While flying the Procedure Turn, the **TO DRK** will change to **TO INTCPT.** When the Procedure Turn is completed, and the aircraft is inbound, the **TO INTCPT** field changes to **TO** (the FAF).

NOTE: When flying the approach on a transition that specifies NoPT and a "PT" waypoint is depicted on the flight plan, it will be necessary to do a DIRECT TO the next waypoint beyond the "PT" waypoint to avoid flying the Procedure Turn.

*NOTE: When a Procedure Turn is initiated, the outbound course is displayed on the **NAVIGATION 1** Page. If the course arrow does not automatically slew to the outbound course, it must be manually set to the outbound course so that the CDI sensing is correct.*


```
       NAVIGATION 1/4
  PROCEDURE TURN
  TO INTCPT            -----
  NX RIGHT TO            350
  DIS (1.3)             14.7
  ETE               00:05.9
  OUTBOUND CRS           305
  GS                     150
  WIND              ---/---
            -AUTO-
```
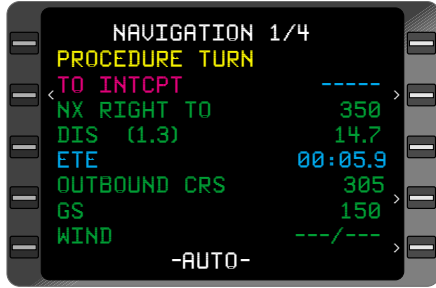
Figure 3-68

Figure 3-68 indicates a right turn to 350° is upcoming.

See the following diagram and Figures 3-70 through 3-73 as the aircraft sequences through the turn.

```
      NAVIGATION 1/4
  PROCEDURE TURN
  TO INTCPT           -----
< NX LEFT INTCPT        125 >
  DIS  (2.5)            12.9
  ETE              00:04.8
  DTK                  350
  GS                   150 >
  WIND             ---/---
```

Figure 3-70

```
      NAVIGATION 1/4
  PROCEDURE TURN
  TO INTCPT           -----
< NX LEFT INTCPT        125
  DIS  (5.2)             6.3
  ETE              00:02.5
  INBOUND CRS          125
  GS                   150 >
  WIND             ---/---
```

Figure 3-71

```
      NAVIGATION 1/4
  PROCEDURE TURN
  TO DRK              -----
< NX MA11RC
  DIS                   7.8
  ETE              00:03.1
  INBOUND CRS          125
  GS                   150 >
  WIND             ---/---
```

Figure 3-72

```
      NAVIGATION 1/4
  FR DRK             11:45
  TO MA11RC          5083G
<                          >
  DIS                   2.5
  ETE              00:00.7
  DTK                  125
  GS                   199 >
  WIND             ---/---
```
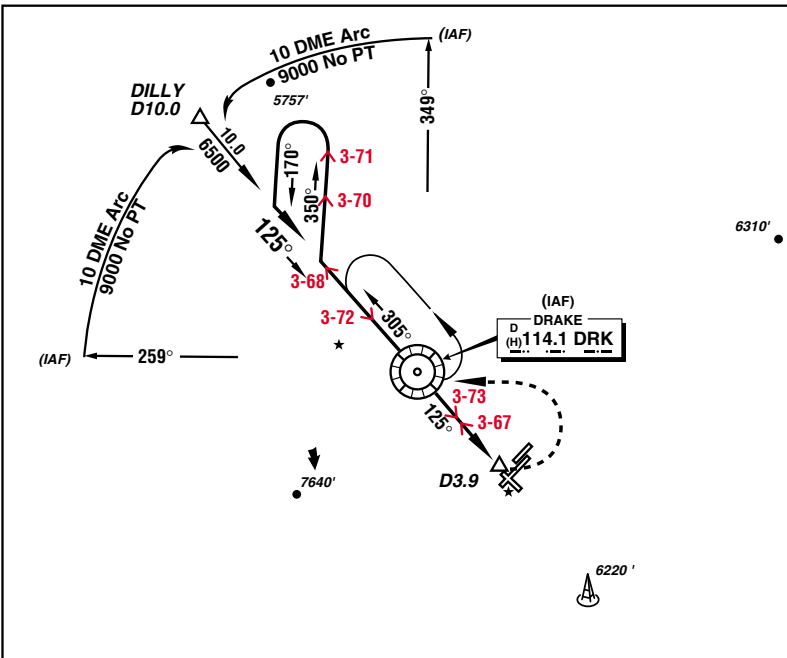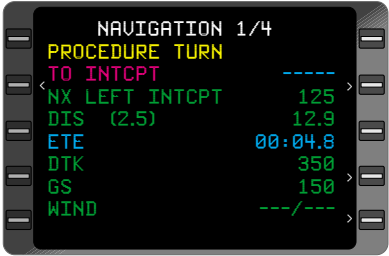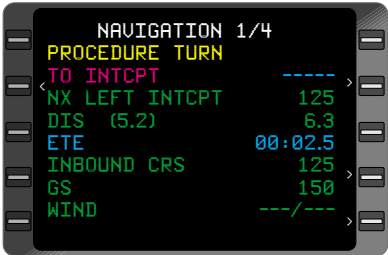
Figure 3-73

*NOTE: If aircraft is configured for dual systems no **XFILL?** prompt will be displayed during a **PT** even if dissimilar data exists in each system.*

*Estimated Time Enroute **(ETE)** that is dispayed after crossing the IAF on the procedure turn is the time from the aircraft's present position to where the airplane intercepts the final approach course inbound (**INTCPT**). After crossing this intercept point, the ETE shown will be from the airplane's present position to the FAF.*

DIS that is displayed after crossing the IAF on the procedure turn is the distance from the aircraft's present position to where the airplane intercepts the final approach course inbound (INTCPT). The **DIS** shown in parentheses is the straight-line distance from the aircraft's present position to the procedure turn fix.

NOTE: The bearing and distance are with respect to the procedure turn fix.

After crossing this intercept point the **DIS** shown will be from the airplane's present position to the FAF and the **DIS** in parentheses will be removed. **TO** the FAF will be displayed at this time having changed from **TO INTCPT** on NAV Page1.

USING RADAR VECTORS TO INTERCEPT A DME ARC

1. **FPL** Key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-74)

2. Approach and Waypoint Sequencing - VERIFY they appear as selected.

3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.


```
   ACTIVE FPL    1/1
<  KEED    - KPRC
   EED
   DRK
<  KPRC
<DEPART
 ARRIVE            ETA >
 APPROACH?         ERASE
```

Figure 3-74

4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance.

5. Flight Director or Autopilot - ENGAGE the appropriate mode.

6. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page. (Figure 3-75)

```
    HEADING VECTOR 1/1

  HDG  080

  CANCEL

  TO DRK      DTK      080


  ENTER HDG
```

Figure 3-75

7. Heading - INSERT as assigned by ATC.

8. **ENTER** Key - DEPRESS twice to engage **HDG SELECT** mode.

After receiving ARC intercept vector from ATC:

9. **HDG** Key - DEPRESS to display the **HEADING VECTOR** Page.

10. Heading - INSERT.

11. **ENTER** Key - DEPRESS.

12. **BACK** Key - DEPRESS to display **INTERCEPT?** (Figure 3-76)

```
    HEADING VECTOR 1/1

  HDG 205

  INTERCEPT ?
    ARC
  TO DILLY      DTK      011
```

Figure 3-76

13. **ENTER** Key - DEPRESS cursor moves to the **TO** field.

14. **BACK** Key - DEPRESS until the ARC End/Final Approach Course Way-point is displayed.

NOTE: If an intermediate waypoint exists on the ARC between the ARC beginning point and the ARC end point, the ARC intercept point should be approximated so it can be determined whether the ARC end or intermediate waypoint should be used as the TO waypoint. NO ARC INTERCEPT may be displayed if the wrong waypoint is selected.

15. ENTER Key - DEPRESS twice (accepts the default **DTK)**.

16. CDI Display - VERIFY course needle is set to the **DTK** shown on the **HEADING VECTOR** Page.

17. Waypoints and HSI Course - VERIFY proper sequencing during the approach.

18. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

USING OWN NAVIGATION TO FLY DME ARC

1. **FPL** Key - DEPRESS to display the **ACTIVE FPL** Page. (Figure 3-77)

2. Approach and Waypoint Sequencing - VERIFY they appear as selected.

3. **MSG** Key - VERIFY approach is armed within 30NM of the airport and the HSI scaling output has changed to **TRMNL** on **NAVIGATION** Page 2.

Figure 3-77

4. FMS Mode - SELECT or VERIFY the appropriate mode for guidance.

5. Flight Director or Autopilot - ENGAGE the appropriate mode.

6. Waypoints and HSI Course - VERIFY proper sequencing during the approach.

7. Approach Annunciator - When over the FAF, VERIFY annunciation and the HSI scaling output has changed to **APPR** on **NAVIGATION** Page 2.

The following is a brief description of the screen displays typically seen flying a DME Arc.

NOTE: Certain EFIS map displays do not support curved lines to draw DME Arcs. In this case the map will only display waypoints up to and including the IAF waypoint at the beginning of the arc. No waypoints will be displayed while on the arc. Once the aircraft has passed the arc end waypoint, the map will display the remaining waypoints of the active flight plan. Although no waypoints will be displayed during the DME Arc Procedure, the FMS page displays will be as depicted in Figures 3-78 through 3-82
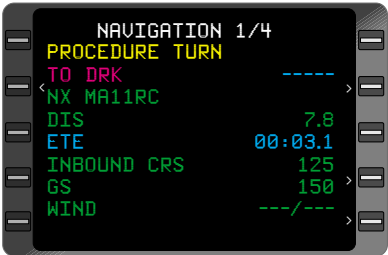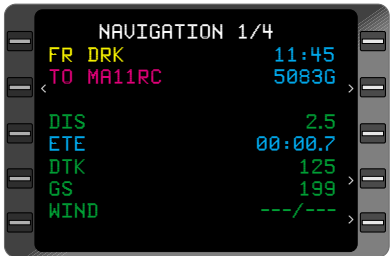
*NOTE: If aircraft is configured for dual systems no **XFILL**? prompt will be displayed during a **DME ARC** procedure even if dissimilar data exists in each system.*
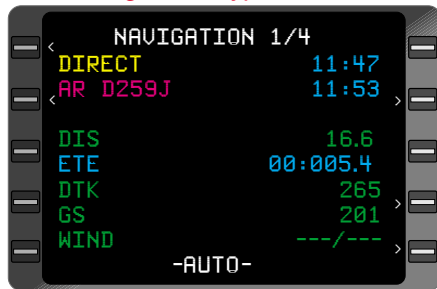
Figure 3-78

As the aircraft approaches the **AR** waypoint, a message is displayed on the fourth line of the CDU indicating the next action the aircraft will take **(NX DME ARC)**. This message is displayed thirty seconds prior to the event and disappears when the action is initiated. Figure 3-78 indicates the aircraft is fly-

Figure 3-79

```
       NAVIGATION 1/4
DIRECT              11:47
AR D259J            11:53
NX  DMEARC           355
DIS                  27
ETE             00:001.0
DTK                 239
GS                  150
WIND            ---/---
           -AUTO-
```


Figure 3-80

```
       NAVIGATION 1/4
DMEARC
TO DILLY          9000A
DIS     (ARC 10.0)  7.0
ETE            00:03.0
DTK                 355
GS                  150
WIND            ---/---
```

ing **DIRECT** to **D259J** where the aircraft will begin flying a DME Arc **(AR).**

Figure 3-79 shows the aircraft is within thirty seconds of intercepting the DME Arc at **D259J.**
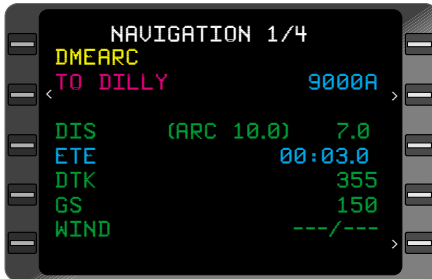
NOTE: The naming convention for ARC waypoints is as follows: **D** *indicates DME.* **259** *indicates the radial from the ARC center NAVAID.* **J** *indicate the ARC distance. i.e. A=1nm J=10nm.*
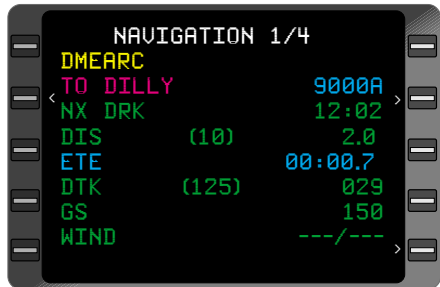
Figure 3-80 shows the aircraft is flying the DME Arc to **DILLY. (ARC 10.0)** in the **DIS** field indicates the arc center is 10.0 NM from the aircraft's present position.

Figure 3-81

```
       NAVIGATION 1/4
DMEARC
TO DILLY          9000A
NX DRK            12:02
DIS     (10)        2.0
ETE            00:00.7
DTK     (125)       029
GS                  150
WIND            ---/---
```
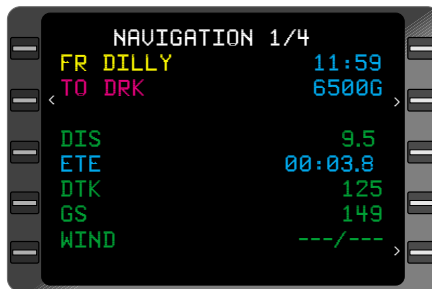
NOTE: Distance **(DIS)** *displayed is the straight line distance from the present aircraft position to the TO waypoint.*

Estimated Time Enroute **(ETE)** *is the time around the arc path to the TO waypoint.*

Figure 3-82

```
       NAVIGATION 1/4
FR DILLY           11:59
TO DRK            6500G
DIS                 9.5
ETE            00:03.8
DTK                 125
GS                  149
WIND            ---/---
```

Use one of the following options to sequence to the missed approach waypoint.

OPTION 1, Direct To the Missed Approach Procedure waypoint

1. ⤴ Key - DEPRESS. The **DIRECT** Page will be displayed.

2. Line Select Key - DEPRESS to position the cursor over the Missed Approach Procedure waypoint, if required.

3. **ENTER** Key - DEPRESS to sequence to the Missed Approach Procedure waypoint.

NOTE: If the direction the airplane will turn is in question and the turn direction may not be in accordance with the missed approach procedure, manually turn the airplane toward the missed approach fix then perform the ⤴ to procedure.

OPTION 2, Heading to intercept a course to the Missed Approach Procedure waypoint

1. **HDG** Key - DEPRESS. The **HEADING VECTOR** Page appears with the cursor over the **HEADING** field. Type in the appropriate heading using a preceding **R** or **L** to establish the turn direction (i.e. L150). (Figure 3-83)

Figure 3-83

2. **ENTER** Key - DEPRESS. The cursor moves to the Heading Mode field and **HDG SELECT?** is in the cursor. (Figure 3-84)

*NOTE: Prior to step 3 the enter key may be pressed with the cursor over **HDG** select field so that the airplane can begin the intercept process. Repeat the procedure from step1 to complete the **HDG** intercept procedure.*

Figure 3-84

3. **BACK** Key - DEPRESS until **INTERCEPT?** is displayed.

4. **ENTER** Key - DEPRESS. The cursor moves to the **TO** field. (Figure 3-85)

5. **BACK** Key - DEPRESS until the Missed Approach Procedure waypoint is displayed.

6. **ENTER** Key - DEPRESS. The cursor moves to the **DTK** field. Type in the desired track to be intercepted to the Missed Approach Procedure waypoint. (Figure 3-86)

7. **ENTER** Key - DEPRESS TWICE. The **NAVIGATION** Page will be displayed with the **HDG** and **DTK** displayed in yellow. The autopilot may now be re-engaged if required to fly to the Missed Approach Procedure waypoint.

Figure 3-85

Figure 3-86

It is recommended that the **ETA** field on **NAVIGATION** Page 1 be changed to **ALT** during approach procedures for a display of the altitude constraints at the current TO waypoint. To change the field from **ETA** to **ALT,** perform the following:

1. Line Select Key - DEPRESS to position the cursor over the **ETA** field.

2. **BACK** Key - DEPRESS. **ALT?** will be displayed in the cursor. (Figure 3-87)

3. **ENTER** Key - DEPRESS to change the field to altitude.

*NOTE: If no altitude constraint is programmed at the current TO waypoint, the **ALT** field will display dashes.*

Figure 3-87

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ENROUTE

DIRECT TO - ACTIVE FLIGHT PLAN WAYPOINT

➡️ function enables the pilot to fly direct to any lateral waypoint on the Active Flight Plan without reinserting the waypoint identifier.

NOTE: If a Direct To the MAP on the active flight plan is initiated, the selected Approach Procedure will be canceled as indicated by the waypoints of the approach no longer being indented and a MSG.

1. ➡️ Key - DEPRESS. A **DIRECT TO** Page will appear with the cursor over the current TO waypoint. (Figure 3-88)

2. Line Select Key - DEPRESS to position the cursor over the desired identifier.

NOTE: Active Flight Plans exceeding 18 waypoints will be continued on subsequent pages. Press ➡️, NXT or PRV Key to access remaining waypoints.

Figure 3-88

3. **ENTER** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1.

NOTE: The system must compute a turn from a wings level position. If the aircraft is in a turn when the ➡️ Key pressed, the aircraft will roll to wings level position momentarily. The aircraft will then continue the turn toward the Direct To waypoint.

*If an offset waypoint was selected, an **OFFSET WPT** Page is displayed. Verify data and DEPRESS **ENTER.** The **DIRECT** Page is displayed with cursor over the Offset Waypoint. Press **ENTER** again **to proceed direct to the WPT.** Display automatically advances to **NAVIGATION** Page 1.*

4. **DIS, DTK** - CHECK.

DIRECT TO - HP WAYPOINT

1. ↦ Key - DEPRESS. A **DIRECT TO** Page appears with the cursor over the current TO waypoint.

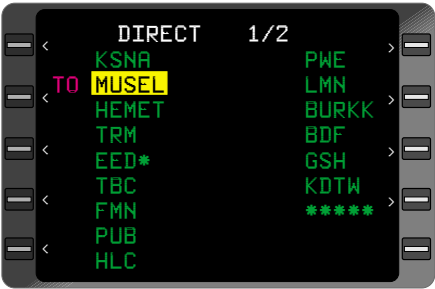2. Line Select Key - DEPRESS to position the cursor over the desired **HP** identifier. (Figure 3-89)

NOTE: Active Flight Plans exceeding 18 waypoints will be continued on subsequent pages. Press ↦, NXT or PRV Key to access remaining waypoints.
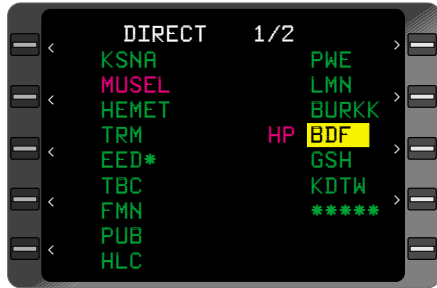
3. **ENTER** Key - DEPRESS to display the **HOLDING PATTERN** Page with both the **OK? ENTER** and **CANCEL** option. (Figure 3-90)

NOTE: The holding pattern may be edited if required , at this time. See Page 3-67 for details.
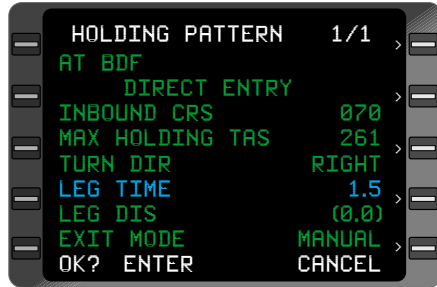
To Select and Go Direct To HP Waypoint:

4. **ENTER** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1.

5. **DIS, DTK** - CHECK.

```
        DIRECT    1/2
‹  KSNA              PWE     ›
   MUSEL             LMN
‹  HEMET             BURKK   ›
   TRM           HP  BDF
‹  EED*              GSH     ›
   TBC               KDTW
‹  FMN               *****   ›
   PUB
‹  HLC                       ›
```

Figure 3-89

```
   HOLDING PATTERN    1/1  ›
 AT BDF
       DIRECT ENTRY        ›
 INBOUND CRS          070
 MAX HOLDING TAS      261   ›
 TURN DIR           RIGHT
 LEG TIME            1.5    ›
 LEG DIS            (0.0)
 EXIT MODE         MANUAL   ›
 OK? ENTER         CANCEL
```

Figure 3-90

To Cancel Holding Pattern:(from the Holding Pattern page)

1. Line Select - DEPRESS to position cursor over desired HP waypoint.

2. Hold Key - DEPRESS

3. Line Select Key - DEPRESS to position the cursor over **CANCEL?.**

4. **ENTER** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1 and aircraft proceeds Direct To the waypoint with the Holding Pattern canceled.

DIRECT TO - RANDOM WAYPOINT

This procedure enables the pilot to add a random waypoint to the **ACTIVE FLIGHT PLAN** in the desired sequence and proceed direct to it.

1. ↈ Key - DEPRESS. The cursor will automatically appear over the current **TO** waypoint on the **DIRECT TO** Page.

2. Line Select Key - DEPRESS to position the cursor over the identifier to follow the new entry. (Figure 3-91)
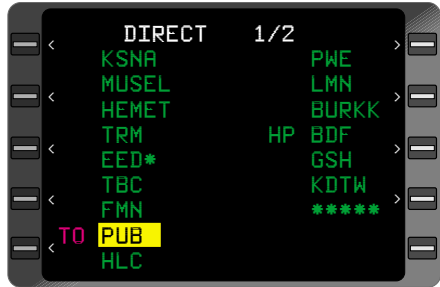
3. Type in the waypoint identifier.

4. **ENTER** Key - DEPRESS.

5. Waypoint Page Coordinates - VERIFY or INSERT. To insert Waypoint Coordinates (cursor over **POS** field):

   a. Latitude - INSERT (**N** or **S** first, then degrees, minutes and hundredths (6 characters)).

   b. **ENTER** Key - DEPRESS.

   c. Longitude - INSERT (**E** or **W** first, then degrees, minutes and hundredths (7 characters)).

6. **ENTER** Key - DEPRESS.

7. Waypoint Sequence - VERIFY that the waypoint is in the proper location. (Figure 3-92)

8. **ENTER** Key - DEPRESS. Display automatically advances to **NAVIGATION** Page 1.

NOTE: If Direct To a pilot entered waypoint is desired, a latitude and longitude entry may be required.

Figure 3-91

Figure 3-92

A. *Latitude - Insert **N** or **S** first, then degrees, minutes, and hundredths (6 characters)*

B. *Longitude - Insert **E** or **W** first, then degrees, minutes, and hundredths (7 characters)*

If Direct To an offset waypoint is desired, the radial and distance entry from the parent waypoint may be required.

*NOTE: If **ENTER** Key is not depressed prior to leaving **DIRECT** Page, the waypoint identifier will not appear on the Active Flight Plan, the aircraft will not proceed DIRECT TO this waypoint and will need to be re-entered.*

9. **DIS, DTK** - CHECK.

*NOTE: A Direct To function may also be accomplished from **NAVIGATION** Page 1, 2, or 3 by placing the cursor over the **TO** waypoint and typing in the desired waypoint if required. Depress the **ENTER** Key and the system will proceed Direct To the selected waypoint.*

If the selected waypoint was not on the active FPL a fence will be added to the FPL and no AUTO LEG CHG will occur beyond this waypoint.

*Anytime the Direct To function is used to go Direct To the MAP the Approach Procedure will be canceled. The **SYSTEM message** page will display **APPROACH CANCELED** and the CDI sensitivity will return to Terminal scale of 1NM full scale deflection.*

DIRECT TO - CLOSEST AIRPORT

This procedure allows the pilot to select a desired airport and proceed DIRECT TO it.

1. **⤵** Key- DEPRESS until **DIR CLOSEST ARP** Page appears. (Figure 3-93)

    When initially accessed the cursor will be over the airport closest to the aircraft's present position at that time.

Figure 3-93

2. Line Select Key - DEPRESS to position the cursor over the desired airport identifier and press **ENTER. NAVIGATION** Page 1 will be displayed and the airplane will proceed **⤵** to the selected airport.

NOTE: The bearing and distance values to the closest airports are based on the aircraft's present position at the time this page is accessed. The values are not updated while the page is being displayed. To obtain updated information, it is necessary to exit the page then return.

PSEUDO-VORTAC (SELECTED COURSE)

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1.

*NOTE: The system must be proceeding Direct To a waypoint or **DTK** will not be an enterable field. If system is proceeding Direct To the desired waypoint, proceed to Step 5. If system is not currently proceeding direct to a waypoint, continue with Step 2.*

2. Line Select Key - DEPRESS to position cursor over **TO** field.

3. **TO** Waypoint Identifier - INSERT (if necessary).

4. **ENTER** Key - DEPRESS.

If Waypoint Page Appears:

    a. Waypoint Page Co-ordinates - VERIFY or INSERT.
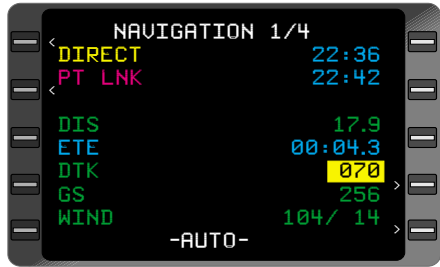
    b. **ENTER** Key - DE-PRESS.

5. Desired Track **(DTK)** - INSERT. (Figure 3-94)

Figure 3-94

6. **ENTER** Key - DEPRESS. If the **DTK** entry positions the aircraft on the FROM, or far, side of the TO waypoint, the Leg Change Mode switches to **-MAN-**, otherwise it remains in **-AUTO-.** (Figure 3-95) The pilot must determine if **-MAN-** or **-AUTO-** is appropriate.
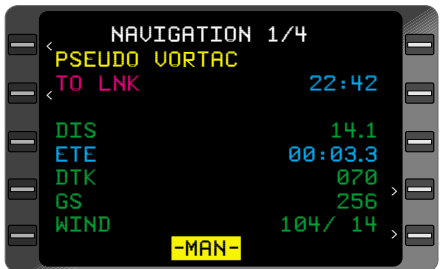
Figure 3-95

NOTE: The system will turn the aircraft to intercept the DTK at up to a 45° angle if coupled to the autopilot.

NOTE: The ↵ *function may also be used to initiate a Pseudo-VORTAC. Following the Direct To entry using the* ↵ *Key the display automatically advances to* **NAVIGATION** *Page 1. Manually position the cursor over DTK field and continue as described above in Steps 5 and 6. To exit Pseudo-VORTAC Mode make any leg change (e.g.* ↵ *Key press and enter current TO waypoint). When exiting Pseudo-VORTAC the system may return to the* **-AUTO-** *Leg Change Mode unless the system was in* **-MAN-** *prior to initiating Pseudo-VORTAC.*

A manual leg change means the system will not automatically sequence to the next waypoint on the active flight plan. To sequence to the next waypoint in the flight plan, use the Direct To function or place the cursor over **-MAN-.** *Press the* **BACK** *Key and* **AUTO?** *will be displayed. Press the* **ENTER** *Key and the system will return to the automatic leg change mode.*

USING HEADING VECTOR

This procedure enables the pilot to program and fly a specific heading vector as well as program an automatic intercept of a specified leg.

PROGRAMMING A HEADING VECTOR

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page with cursor over the **HDG** field.

2. Heading - INSERT desired Heading in whole degrees, preceded by **R** or **L,** if applicable, to indicate a turn direction. (Figure 3-96)

*NOTE: **R** or **L** should be used for a heading change greater than 180° from the present heading. A **T** in the **HDG** and **DTK** fields indicates the system is operating in the true heading mode.*
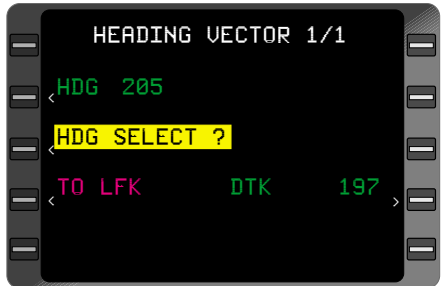
3. **ENTER** Key - DEPRESS. The cursor advances to Heading Mode field. (Figure 3-97)

4. **ENTER** Key - DEPRESS to select Heading Select Mode and return to **NAVIGATION** Page 1.

*NOTE: **HDG SELECT** and the programmed heading are displayed on **NAVIGATION** Page 1 indicating the aircraft is in Heading Select Mode. (Figure 3-98)*

Figure 3-96

Figure 3-97

Figure 3-98

CHANGING HEADING VECTOR WHILE IN HEADING SELECT MODE

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page with cursor over the **HDG** field.

2. Heading - INSERT desired Heading.

3. **ENTER** Key - DEPRESS.

*NOTE: Cursor moves to the Heading Mode field, but it is not necessary to depress **ENTER** Key because the system is already in heading select mode..*

4. **NAV** or **ENTER** Key - DEPRESS to check heading and return to **NAVIGATION** Page 1.

CHANGING TO WAYPOINT WHILE IN HEADING SELECT MODE

*NOTE: This procedure establishes a leg between the new **TO** Waypoint and the waypoint preceding it on the Active Flight Plan or a Pseudo-VORTAC. If crosstrack distance exceeds 125nm, the **HEADING** Mode will be canceled and the **STRG INVALID** message will be displayed.*

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page.

2. Line Select Key - DEPRESS to position the cursor over **TO** Waypoint. (Figure 3-99)

3. **BACK** Key - DEPRESS to cycle through waypoints on the Active Flight Plan or INSERT alternate waypoint.

4. **ENTER** Key - DEPRESS.

Figure 3-99

If Waypoint Page Appears:

   a. Waypoint Page Coordinates - VERIFY or INSERT.

   b. **ENTER** Key - DEPRESS. Cursor moves to **DTK** field.

5. Desired Track **(DTK)** - VERIFY or INSERT.

6. **ENTER** Key - DEPRESS.
   OK? ENTER message
   appears. (Figure 3-100)

7. **ENTER** Key - DEPRESS
   to select **TO** Waypoint
   and return to **NAVIGA-
   TION** Page 1. The cur-
   sor may be positioned
   over the Leg Change
   Mode field.

```
┌──────────────────────────┐
│    HEADING VECTOR 1/1     │
│                          │
│ ‹HDG 205                 │
│                          │
│ ‹HDG SELECT              │
│                          │
│ ‹TO IAH      DTK    193 ›│
│                          │
│   OK? ENTER              │
└──────────────────────────┘
```

Figure 3-100

*NOTE: If the Desired Track
is changed, a Pseudo-VORTAC is programmed. If the **DTK** entry
positions the aircraft on the FROM, or far-side of the **TO** waypoint,
the Leg Change Mode displayed on **NAVIGATION** Page 1 switches
to **-MAN-,** otherwise it remains in **-AUTO-.** The pilot must determine
if **-MAN-** or **-AUTO-** is appropriate.*

CANCELING HEADING SELECT MODE

Initiate a DIRECT TO procedure, using the ⇸ and **Enter** Keys, which
immediately cancels the commanded heading or perform the follow-
ing:

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page.

2. Line Select Key - DEPRESS to position the cursor over **HDG
   SELECT.**

3. **BACK** Key - DEPRESS until **CANCEL?** is displayed.

4. **ENTER** Key - DEPRESS to cancel Heading Vector and return to
   NAVIGATION Page 1.

*NOTE: The system may turn the aircraft to intercept the current
TO/FROM leg at up to a 45° angle.*

PROGRAMMING AN INTERCEPT

1. **HDG** Key - DEPRESS to display **HEADING VECTOR** Page with
   cursor over the **HDG** field.

2. Heading - INSERT desired Heading in whole degrees, preceded
   by **R** or **L,** if applicable, to indicate a turn direction.

*NOTE: **R** or **L** should be used for a heading change greater than
180° from the present heading. A **T** indicates the system is operating
in the true heading mode.*

3. **ENTER** Key - DEPRESS. The cursor advances to Heading Mode field.

4. **BACK** Key - DEPRESS to select **INTERCEPT?** (Figure 3-101)

Figure 3-101

5. **ENTER** Key - DEPRESS. Cursor moves to the **TO** Waypoint field.

6. **BACK** Key - DEPRESS, if required, to cycle through waypoints on the Active Flight Plan or INSERT an alternate waypoint. (Figure 3-102)

7. **ENTER** Key - DEPRESS.

If Waypoint Page Appears:

a. Waypoint Page Coordinates - VERI-FY or INSERT.

Figure 3-102

b. **ENTER** Key - DEPRESS. Cursor moves to DTK field.

8. Desired Track **(DTK)** - VERIFY or INSERT.

*NOTE: If the Desired Track is changed, a Pseudo-VORTAC is programmed. If the **DTK** entry positions the aircraft on the FROM, or far, side of the **TO** waypoint, the Leg Change Mode on NAV page 1 switches to **-MAN-,** otherwise it remains in **-AUTO-.** The pilot must determine if **-MAN-** or **-AUTO-** is appropriate.*

*NOTE: If a DME Arc endpoint is selected as the **TO** waypoint, a default DTK will be displayed based on the point at which the ARC will be intercepted and DTK is not selectable.*

9. **ENTER** Key - DEPRESS. An Intercept Message may appear **(NO COURSE INTERCEPT, NO ARC INTERCEPT,** or **INTER-CEPT BEYOND FIX** (Figure 3-103). If no message appears the intercept will occur on the **TO** side of the selected **TO** waypoint.

Figure 3-103

The intercept messages are based on the current aircraft heading and track. Once the selected heading has been established, the **HEADING VECTOR** Page may be viewed to determine the intercept status. If **NO COURSE INTERCEPT** or **NO ARC INTERCEPT** occurs, the message light will illuminate and these messages will be displayed on the **SYSTEM MESSAGES** Page. To view one of these messages on the HDG Page, use the Line Select Key to remove the cursor from the page.

*NOTE: **BUSY - STANDBY** may be displayed in yellow momentarily while the intercept is calculated.*

10. **ENTER** Key - DEPRESS to accept data and return to NAV page 1. The cursor is positioned over the Leg Change Mode if the **DTK** has been entered manually on the Heading Page.

PROGRAMMING A HEADING INTERCEPT TO THE FINAL APPROACH COURSE

This procedure non-precision approach may be accomplished using the following steps:

1. **HDG** - DEPRESS to display the **HEADING VEC-TOR** Page.

2. Type in the assigned heading. (Figure 3-104)

3. **ENTER** Key - DEPRESS. The cursor moves to the heading mode field.

Figure 3-104

4. **BACK** Key - DEPRESS to display the **INTERCEPT?** prompt. (Figure 3-105)

5. **ENTER** Key - DEPRESS. The cursor moves to the **TO** field.

```
    HEADING VECTOR 1/1

 HDG  205

 INTERCEPT ?
      FAF
 TO DRK        DTK       125

 OK? ENTER
```

6. **BACK** Key - DEPRESS until the FAF waypoint is displayed.

7. **ENTER** Key - DEPRESS.

Figure 3-105

8. Enter the inbound final approach course in the **DTK** field if required.

9. **ENTER** Key - DEPRESS Twice to return to Navigation Page 1.

NAVIGATION Page 1 will be displayed with the **TO** waypoint, the FAF, and waypoint previous to the FAF in the **FR** field if no manual **DTK** was entered. The system will now intercept the Final Approach course and sequence to the MAP.

*NOTE: If an intercept is programmed to a FAF that is part of a Procedure Turn the **DTK** must be manually entered. This will cause PSEUDO VORTAC to be displayed on NAV Page 1.*

PROGRAMMING A HOLDING PATTERN

Warning: When entering PTs or HP airspace the FMS may not constrain the airplane from violating maneuvering airspace. Pilots are responsible for procedural compliance.

This procedure enables the pilot to program a Holding Pattern (HP) at a specific waypoint.

An HP is automatically programmed from the database when it is part of an Arrival or Approach procedure.

NOTE: No HP can be programmed at an ARC end point on the final Approach course manually.

1. **NAV, FPL,** or ✈ Key - DEPRESS to display applicable page.

2. Line Select Key - DEPRESS to position the cursor over desired waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected, and on the **Active Flight Plan** Page, a Holding Pattern cannot be programmed at the **FR** or **TO** Waypoint.*

NOTE: If WPT is a duplicate WPT the country code will be displayed in this field in parenthesis (in green) (Figure 3-104)

3. **HOLD** Key - DEPRESS to display **HOLDING PATTERN** Page with cursor over the **INBOUND CRS** field. (Figure 3-106)

4. **INBOUND CRS** - VERIFY or INSERT.
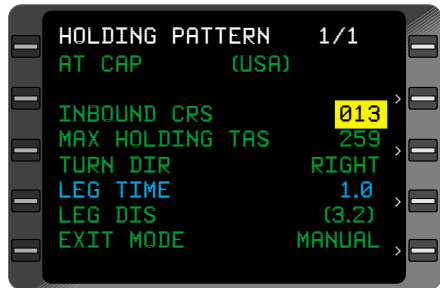
*NOTE: A verified Inbound Course programs a **DIRECT ENTRY** procedure. The system Defaults to the inbound course between the previous*

```
HOLDING PATTERN    1/1
AT CAP      (USA)

INBOUND CRS         013 >
MAX HOLDING TAS     259 >
TURN DIR          RIGHT
LEG TIME            1.0 >
LEG DIS           (3.2)
EXIT MODE        MANUAL >
```

Figure 3-106

WPT on the FPL and the waypoint at which the hold is desired. If a Direct **TO** Leg is displayed on the NAV pages the inbound course defaults to the leg between the aircraft's present position and the current **TO** waypoint. When an inserted Inbound Course value is beyond the **DIRECT ENTRY** parameters, then a **TEARDROP** or **PARALLEL** pattern is programmed.*

When a Holding Procedure is initiated, the inbound course is displayed on **NAVIGATION** Page 1. If the CDI needle does not automatically slew to the inbound course, manually set the CDI needle to the inbound course so that the course needle sensing is correct.

*A **T** adjacent to the value displayed in the **INBOUND CRS** field indicates the course is referenced to true north.*

5. **ENTER** Key - DEPRESS. The type of entry is displayed. Cursor moves to the **LEG TIME** field. (Figure 3-107)

6. **LEG TIME** - VERIFY or INSERT (valid range 1.0 to 9.9 min).

7. If Holding Pattern is complete proceed to Step 11. If Optional Entries are required, continue with Steps 8, 9, or 10.

```
HOLDING PATTERN    1/1
AT TRM       (USA)
      DIRECT ENTRY
INBOUND CRS         013
MAX HOLDING TAS     259
TURN DIR          RIGHT
LEG TIME            1.0
LEG DIS           (3.2)
EXIT MODE        MANUAL
```
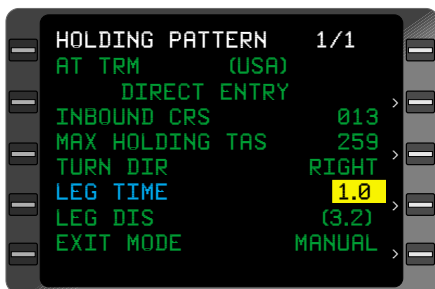
Figure 3-107

Optional Entry: Turn Direction

8. Line Select Key - DEPRESS to position the cursor over TURN DIR.

   a. **BACK** Key - DEPRESS to change direction.

   b. **ENTER** Key - DEPRESS.

Optional Entry: Leg Distance

9. Line Select Key - DEPRESS to position the cursor over **LEG DIST.**

   a. Leg Distance - INSERT or VERIFY (valid range 1.0nm to 50nm).

   b. **ENTER** Key - DE-PRESS.

NOTE: When the leg distance is entered, the leg time will be computed as indicated by parentheses and vice-versa. (Figure 3-108)

```
HOLDING PATTERN    1/1
AT TRM       (USA)
      DIRECT ENTRY
INBOUND CRS         013
MAX HOLDING TAS     259
TURN DIR          RIGHT
LEG TIME          (1.0)
LEG DIS            3.2
EXIT MODE         AUTO
```

Figure 3-108

Selecting Exit Mode:

10. Line Select Key - DE-PRESS to position the cursor over **MANUAL** or **AUTO.** Press the **BACK** key to change exit mode option. Selecting **MANU-AL** will initiate a continu-ous hold. Selecting **AUTO** will exit the hold the next time the HP fix is crossed or after the entry procedure is completed. (Figure 3-109)

```
HOLDING PATTERN    1/1
AT TRM      (USA)
     DIRECT ENTRY
INBOUND CRS         013
MAX HOLDING TAS     259
TURN DIR          RIGHT
LEG TIME            1.0
LEG DIS           (3.2)
EXIT MODE        MANUAL
OK? ENTER
```
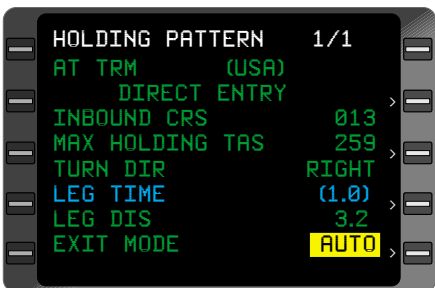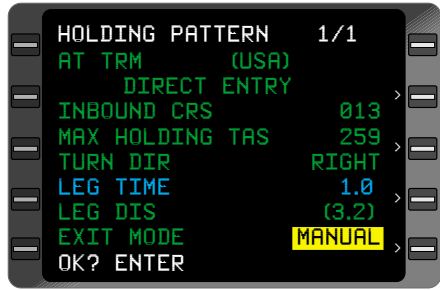
Figure 3-109

11. **ENTER** Key - DEPRESS. **OK? ENTER** prompt will appear. Verify inputs.

12. **ENTER** Key - DEPRESS to load the Holding Pattern at the selected waypoint and return to the **NAVIGATION, DIRECT TO,** or **FPL** Page.

REVIEWING, EDITING, OR CANCELING A HOLDING PATTERN

This procedure enables the pilot to review, edit, or cancel a Holding Pattern at a specific waypoint.

REVIEWING

1. **NAV, FPL,** or ✈ Key - DEPRESS to display applicable page.

2. Line Select Key - DEPRESS to position the cursor over desired **HP** waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be select-ed, and on the Active Flight Plan, the **TO** Waypoint can only be reviewed.*

3. **HOLD** Key - DEPRESS to display **HOLDING PATTERN** Page. (Figure 3-110)

4. Holding Pattern - REVIEW.

```
HOLDING PATTERN    1/1
AT TRM      (USA)
     DIRECT ENTRY
INBOUND CRS         013
MAX HOLDING TAS
TURN DIR          RIGHT
LEG TIME            1.0
LEG DIS           (3.2)
EXIT MODE        MANUAL
OK? ENTER       CANCEL
```

Figure 3-110

EDITING

5. Line Select Key - DEPRESS to position cursor over desired field.

    a. INSERT value for I**NBOUND CRS, LEG TIME,** or **LEG DIST** or
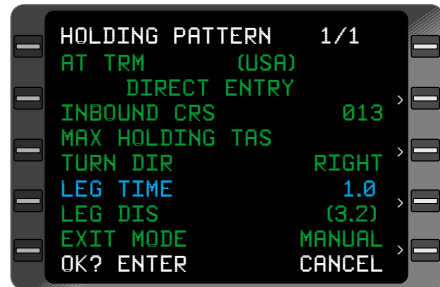
    b. **BACK** Key - DEPRESS to change **TURN DIR** or **EXIT MODE.**

6. **ENTER** Key - DEPRESS. The **OK? ENTER** prompt will appear.

*NOTE: A re-entry to the Holding Pattern must be flown if the Inbound Course or Turn Direction are changed while holding at the **HP** Waypoint. No XFILL capability is available to the other system in a dual system installation from one or both systems when a holding pattern is in progress.*

7. **ENTER** Key - DEPRESS to return to the **NAVIGATION, DIRECT TO**, or **FPL** Page.

CANCELING

1. Line Select Key - DEPRESS to position the cursor over the **CANCEL?** prompt. (Figure 3-111)

2. **ENTER** Key - DEPRESS. The **HP** annunciation is erased from **NAVIGATION, DIRECT TO**, and **FPL** Pages.

```
HOLDING PATTERN   1/1
AT CAP      (USA)
    DIRECT ENTRY
INBOUND CRS        013
MAX HOLDING TAS    259
TURN DIR         RIGHT
LEG TIME           1.0
LEG DIS          (3.2)
EXIT MODE       MANUAL
            CANCEL ?
```
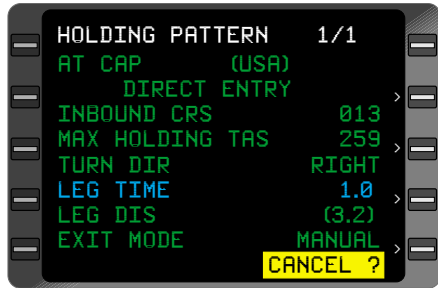
Figure 3-111

*NOTE: If canceling holding pattern at the current **TO** Waypoint, **HP** or **AT** is replaced by "TO".*

EXITING A HOLDING PATTERN

This procedure gives the pilot three options to exit a Holding Pattern: exiting the next time over a holding fix, going Direct To the holding fix, or performing a Leg Change.

EXITING HOLDING PATTERN NEXT TIME OVER HOLDING FIX

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1, 2 or 3.

2. Line Select Key - DEPRESS to position the cursor over **MANUAL.** (Figure 3-112)

3. **BACK** Key - DEPRESS to display **AUTO?.** (Figure 3-113)

4. **ENTER** Key - DEPRESS. The **NAVIGATION** Page indicates that the aircraft will **EXIT HOLD** the next time over the holding fix (aircraft will complete the loop around the holding pattern). (Figure 3-114)

NOTE: The next (NX) way-point information may also appear if the exit is made during Waypoint Alert.
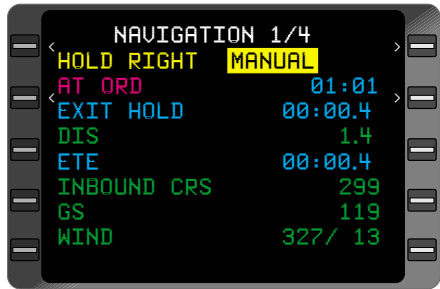
Figure 3-112
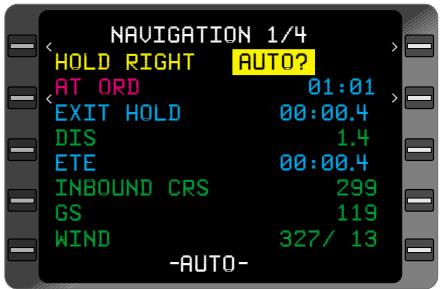
Figure 3-113
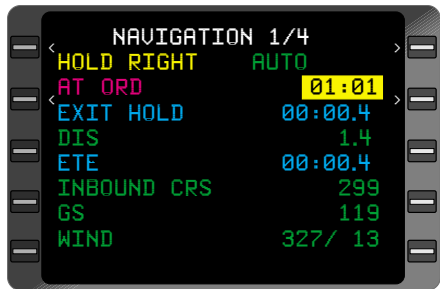
Figure 3-114

EXITING HOLDING PATTERN BY GOING DIRECT TO HOLDING FIX

1. ⇥ Key - DEPRESS to display Direct To Page with cursor over current **HP** Waypoint. (Figure 3-115)

2. **ENTER** Key - DEPRESS to display **HOLDING PATTERN** Page with cursor over **CANCEL?.** (Figure 3-116)

3. **ENTER** Key - DEPRESS to go Direct To current **TO** Waypoint (Holding Fix) and cancel Holding Pattern.

EXITING HOLDING PATTERN BY PERFORMING A LEG CHANGE

1. **NAV** Key - DEPRESS to display the **NAVIGATION** Page 1.

2. Line Select Key - DEPRESS to position the cursor over **FROM** field **(HOLD RIGHT/LEFT)**. (Figure 3-117)

3. **FR** Waypoint - INSERT desired waypoint.
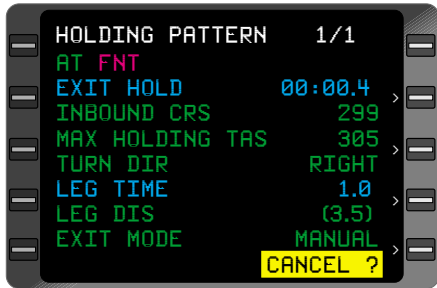
Figure 3-115
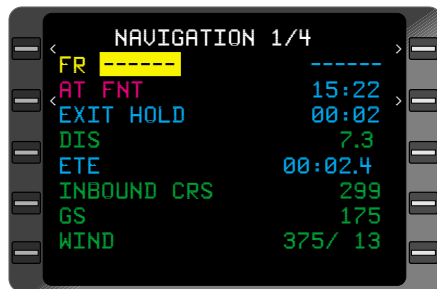
Figure 3-116

Figure 3-117

4. **ENTER** Key - DEPRESS. The next waypoint in the Active Flight Plan sequence will appear in the **TO** field. (Figure 3-118)

5. **TO** Waypoint - VERIFY. To change the **TO** Waypoint, insert the desired identifier.

6. **ENTER** Key - DEPRESS to activate the new leg and cancel the Holding Pattern.

```
           NAVIGATION 1/4
  ‹                            ›
  FR HASTE               ------
  ‹
  TO PMM                  15:22   ›
  EXIT HOLD               00:02
  DIS                        7.3
  ETE                    00:02.4
  INBOUND CRS                299
  GS                         175
  WIND                   375/ 13
```
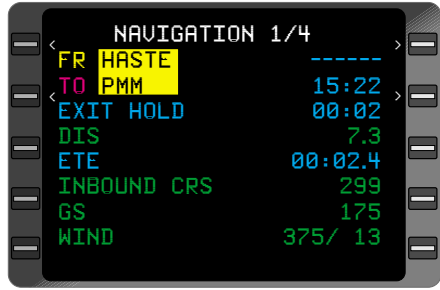
Figure 3-118

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VERTICAL NAVIGATION (VNAV) OPERATION - PRE-DEPARTURE

SETTING CRUISE ALTITUDE, TRANSITION LEVEL, AND DEFAULT FLIGHT PATH ANGLE

This procedure allows the pilot to define a Cruise Altitude and change the default values for Transition Level and Flight Path Angle.

After Initial Leg Selection:

1. **VNAV** Key - DEPRESS to display **VNAV** Page 1.

2. Line Select Key - DEPRESS to position cursor over **DATA?.** (Figure 3-119)

3. **ENTER** Key - DE-PRESS to display **VNAV DATA** Page with cursor over the **CRUISE ALT** field.

4. Cruise Altitude - INSERT. (Figure 3-120)
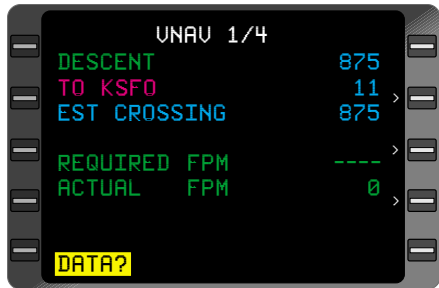
   Only two or three digits are required to input an altitude, i.e. enter 80 and 8000 is displayed, enter 120 and 12000 is displayed.

   Any altitude value entered greater than the **TRANS LEVEL,** altitude value which normally defaults to FL180, is converted and displayed as flight level **(FL).** Entering 210 will display FL210.

   An altitude less than 1000 feet must be entered with a preceding zero, i.e., enter 052 and 52 is displayed.

Figure 3-119

Figure 3-120

*NOTE: **CRUISE ALT** may also be inserted on **VNAV** Page 1, line 3 (adjacent to the TO waypoint field) when #TOC or #TOD are the TO waypoint. The cruise ALT may automatically be entered by the pres-elector if the preselector has the capability and the system is config-ured for digital preselector.*

*A (at or above) or B (at or below) constraint entries are not applicable on this page. Setting a cruise altitude will establish a **#TOD** (Top of Descent) waypoint or a **#TOC** (Top of Climb) waypoint if VNAV is valid. A **#TOC** will be established only if there are no altitude con-straints between the aircraft and **#TOC** and the aircraft is climbing.*

5. **ENTER** Key - DEPRESS.

6. Transition Level - INSERT or VERIFY. (Figure 3-121)

*NOTE: Field defaults to FL180 if pilot does not enter a value. Anytime a **TRANS ALT** is entered, the value will remain in non-volatile memory even after the sys-tem is shut down.*

```
         VNAV DATA 1/1
  CRUISE ALT        FL210
  TRANS LEVEL       FL180  ›
  DEFAULT FPA         3.0

                           ›

  PRESEL  ALT       FL210
  RANGE  (NM)       150.5  ›
  ETE             00:15.6
```
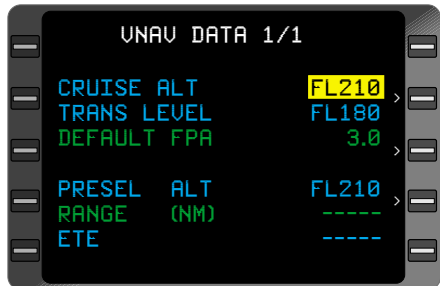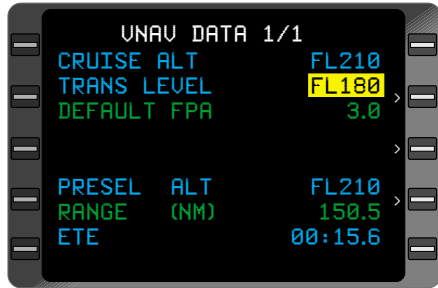
Figure 3-121

7. **ENTER** Key - DEPRESS.

8. Default Flight Path Angle **(DEFAULT FPA)** - INSERT or VERIFY (in degrees and tenths, 0.1 to 6.0 range).

*NOTE: Field defaults to **3.0** if pilot does not enter a value. Anytime an **FPA** is entered, the value will remain in non-volatile memory even after the system is shut down.*

If configured, altitude preselector information will be displayed at the bottom of the screen. If the aircraft is in a climb or descent, distance and ETA information to the preselected altitude will be displayed. (Figure 3-119)

9. **ENTER** Key - DEPRESS to return to **VNAV** Page 1.

CREATING/CHANGING VNAV WAYPOINTS

Vertical navigation constraints can only be programmed for waypoints on the Active Flight Plan, and though all Active Flight Plan waypoints are displayed on **VNAV** Pages, new waypoints must be added to the Active Flight Plan before they appear on the VNAV Flight Plan way-point pages.

After initial leg selection on NAV page 1:

1. **NAV, FPL,** or ⏏ Key - DEPRESS to display applicable page.

2. Line Select Key - DEPRESS to position cursor over desired way-point.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected. If the waypoint is selected from either the NAV, or Direct pages, Direct FPA information pages will be displayed on the last line of the screen. (Figure 3-123)*

3. **VNAV** Key - DEPRESS to display **VNAV WAY-POINT** Page for selected waypoint. (Figure 3-122)

4. **ALT** - INSERT altitude constraint followed by **A** (at or above) or **B** (at or below), if applicable. Only two or three digits are required to input an altitude, i.e. enter 30A and 3000A is displayed.
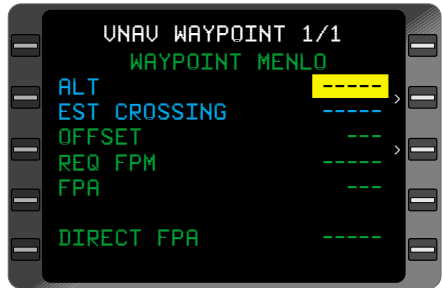
Figure 3-122

Full digit entry may be used to enter an altitude. Altitudes less 1000 feet enter a preceding zero, i.e. enter 054 and 54 feet is displayed.

Any altitude entered greater than the transition level is converted and displayed as flight level **(FL).**

NOTE: If the waypoint is part of a SID, STAR or Approach proce-dure, appropriate altitude constraints will prefill from the database.

5. **ENTER** Key - DEPRESS. Cursor moves to **OFFSET** field. (Figure 3-123)

6. **OFFSET** - If applicable, INSERT value in nautical miles (-99 to +99 range).

   a. If the offset is prior to the waypoint, enter the range value and a **(-)** prefills as a default or
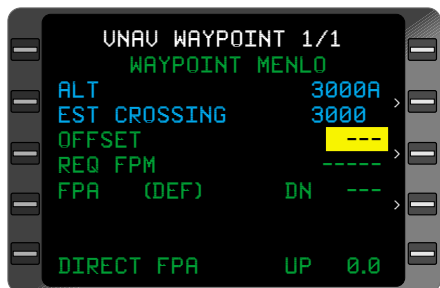
Figure 3-123

b. Enter a **(+)**, then the range value to indicate the offset is beyond the waypoint.

c. To erase the offset value, INSERT **0** and press **ENTER** Key. The field changes to dashes, indicating no offset is programmed.

7. **ENTER** Key - DEPRESS. The cursor moves to the **FPA** field only if the entered constraint is below the aircraft's present altitude.

NOTE: A climb FPA cannot be programmed but the direct FPA field will display the up angle between the aircraft's present altitude and the altitude constraint that was entered. If an FPA is programmed to a direct FPA up waypoint it will be a DN (descent) FPA and an ambiguity will be displayed on the VNAV waypoint page.

To program a Path Descent

8. Flight Path Angle (**FPA**) - INSERT or VERIFY (valid range is 0.1 to 6.0). (Figure 3-124)


```
    VNAV WAYPOINT 1/1
       WAYPOINT MENLO
  ALT              3000
  EST CROSSING     2900
  OFFSET            ---
  REQ FPM         -----
  FPA   (DEF)   DN  3.0

  DIRECT FPA    DN  0.0
```

Figure 3-124

*NOTE: The **FPA** value field prefills with the default **(DEF)** value programmed on the **VNAV DATA** Page if this waypoint was accessed from the FPL Page. If accessed from the **NAV** or ⊕ Page, the **FPA** field prefills with the* **(DIR)** *value. If an **FPA** is manually entered, the **FPA** type field changes to* **(MAN).**

With the cursor over the **FPA** value, Depressing the BACK Key will cycle through all or some of the following:

• **(DEF)**
• **(DB)**
• **(AUTO)**
• **(DIR)**
• **(MAN)**

To cancel the **FPA,** INSERT **0** and press **ENTER** Key. The field changes to dashes, indicating no **FPA** is programmed, the vertical deviation output is invalid and no vertical deviation information will be

displayed on the CDU or the ADI/HSI.

9. **ENTER** Key - DEPRESS to load or verify the **FPA** value.

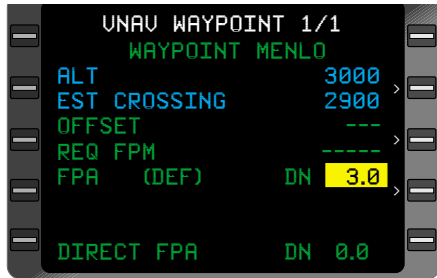*NOTE: When a descent **FPA** is programmed at a waypoint, a **G** appears next to the altitude constraint indicating a Glide Path and vertical deviation guidance and information will be available.*

REVIEWING VNAV WAYPOINTS

When SIDs, STARs or Approaches have altitude constraints at waypoints on the procedure, the system automatically loads the altitude constraints from the database on to the Active Flight Plan. No altitude will be loaded at the MAP if the approach is a circling approach, or the MAP is abeam or beyond the runway threshold. The system will not load any "expect to cross" altitudes from the database on to the SIDS or STARS, as part of **ACTIVE FLIGHT PLAN** or **VNAV** Pages. No altitudes are loaded from the database when an approach procedure contains a Procedure Turn.

NOTE: The system will not fly a full SID or STAR procedure.

Using Active Flight Plan Page

1. **FPL** Key - DEPRESS to display the **ACTIVE FLIGHT PLAN** Page.

2. Line Select Key - DEPRESS to position the cursor over the desired waypoint.

3. **VNAV** Key - DEPRESS. The **VNAV WAYPOINT** Page appears with the cursor over the **ALT** field. (Figure 3-125)

4. **ALT** - REVIEW.
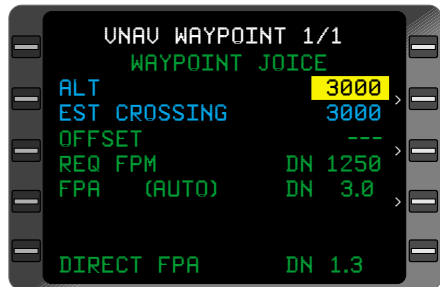
*NOTE: If **(AUTO) FPA** is displayed, the system has automatically programmed a waypoint-to-waypoint **FPA** for the procedure.*


```
      VNAV WAYPOINT 1/1
        WAYPOINT JOICE
ALT                    3000
EST CROSSING           3000
OFFSET                  ---
REQ FPM             DN 1250
FPA   (AUTO)        DN  3.0

DIRECT FPA          DN  1.3
```

Figure 3-125

5. **ENTER** Key - DEPRESS until display returns to A**CTIVE FLIGHT PLAN** Page or depress the **FPL** Key.

6. Repeat Steps 2 through 5 to review VNAV waypoint data at remaining waypoints.

Using VNAV Flight Plan Waypoints Page

1. **VNAV** Key - DEPRESS to display the **VNAV FLIGHT PLAN WAYPOINTS** Pages.

2. Line Select Key - DEPRESS to position the cursor over the desired waypoint.

3. **ENTER** Key - DEPRESS. The **VNAV WAYPOINT** Page appears with the cursor over the **ALT** field. (Figure 3-126)

4. **ALT** - REVIEW or INSERT new value.

*NOTE: If the **FPA** was retrieved from the database, **(DB)** appears in the **FPA** type field. (Figure 3-126)*

5. **ENTER** Key - DEPRESS to return to the **VNAV FLIGHT PLAN WAY-POINTS** Page.

6. Repeat Steps 2 through 5 to review or change altitude constraints at remaining waypoints.
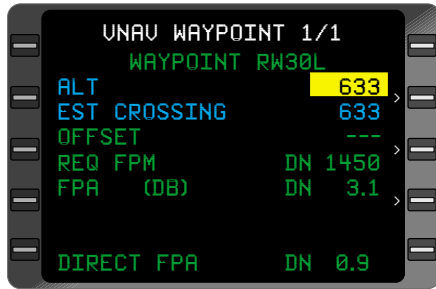
Figure 3-126

VERTICAL NAVIGATION - ENROUTE

PROGRAMMING VERTICAL PATH DESCENTS

The pilot can use various methods to load a Flight Path Angle (FPA) and determine the aircraft's descent path.

NOTE: When the system detects a rapid change of baro altitude set-ting, non-continuous data from an air data computer, vertical speed change of more than 40ft/sec, or sequencing to the next waypoint on the active flight plan, the vertical deviation output is momentarily set Invalid. When vertical deviation returns to a valid state, the appropri-ate value of vertical deviation will again be displayed.

Using Database (DB) FPA

The GNS-XLs database contains Flight Path Angles associated with waypoints on SIDs, STARs, and Approaches, that prefill when these procedures are programmed into the Active Flight Plan. The **FPA** field on the **VNAV WAYPOINT** Page displays **(DB),** which indicates an FPA from the database is loaded and Vertical Deviation is provided at the programmed angle when the waypoint becomes the Vertical **TO** Waypoint. If the **FPA** at the **(DB)** VNAV waypoint is changed in any way, the **(DB) FPA** will no longer be available.

Using Default (DEF) FPA

The default **FPA** value will automatically be displayed if an altitude is programmed on the **VNAV WAYPOINT** Page, except if the **FPA** comes from the database or the **VNAV WAYPOINT** Page was accessed using a Direct To function.

The pilot can load the Default FPA (set on the **VNAV DATA** Page) by pressing the **ENTER** Key when the cursor is on the **FPA** field of the **VNAV WAYPOINT** Page. The **FPA** field displays **(DEF)** and Vertical Deviation is provided at the programmed angle when the waypoint becomes the Vertical **TO** Waypoint. (Figure 3-127)

```
       VNAV WAYPOINT 1/1
          WAYPOINT CIVET
    ALT    14000A   FL180B
    EST CROSSING     FL230
    OFFSET             ---
    REQ FPM        DN  450
    FPA   (DEF)    DN  3.0

    DIRECT FPA     DN  1.3
```
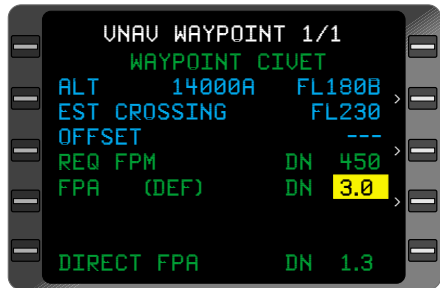
Figure 3-127

Using Manual (MAN) FPA

The pilot can type in a desired Flight Path Angle on the **VNAV WAY-POINT** Page within the valid range, 0.1 to 6.0 degrees. When the **ENTER** Key is depressed the **FPA** is loaded, the **FPA** field indicates **(MAN)** and Vertical Deviation is provided at the programmed angle when the waypoint becomes the Vertical **TO** Waypoint.

Using Automatic (AUTO) FPA

The **(AUTO)** mode is pro-
vided to link together
descent waypoints that
have Cross-At type con-
straints and provide a com-
puted Flight Path Angle
between them. (Figure 3-
128)
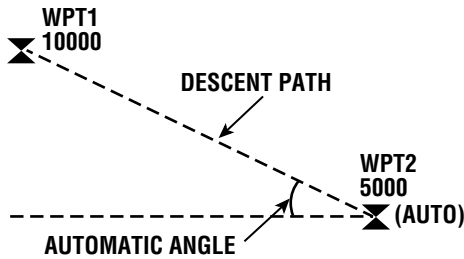
The **(AUTO)** mode may be
selected ONLY if the cho-
sen waypoint has a Cross-
AT type constraint pro-

Figure 3-128

grammed. All Cross-AT waypoints that are a part of a STAR or
APPROACH are automatically put into **(AUTO)** mode when the pro-
cedure is retrieved from the database and loaded onto the Active
Flight Plan.

If the waypoint prior to the selected **(AUTO) FPA** waypoint has a
Cross-AT-or-ABOVE, Cross-AT-or-BELOW, or Cross-BETWEEN
constraint programmed, an automatic angle is assigned and will be
the same angle as the programmed Default Angle on **VNAV DATA**
Page. Vertical Deviation is provided at the programmed angle when
the waypoint becomes the Descent Reference Waypoint.

*NOTE: If no **ALT** constraints are programmed before the selected
(AUTO) FPA waypoint, the **(AUTO) FPA** is the same as the **(DEF) FPA**.*

*Unless an **FPA** is programmed at a waypoint, the system uses the
(DEF) FPA to the first waypoint on the flight plan with an altitude con-
straint to establish a **#TOD** point. To help establish **#TOD,** the sys-
tem will automatically load the destination airport elevation on the
flight plan, provided the flight plan was not obtained from AFIS. An
altitude constraint and **FPA** must be loaded using the ENTER Key to
establish a Path Descent and activate Vertical Deviation to any way-
point except a (DB) WPT.*

EDITING ALTITUDE CONSTRAINTS

The following pages allow the pilot to edit altitude constraints for way-points on the **VNAV WAYPOINT** Page, **VNAV** pages, referred to as **VNAV FPL** Pages. One of the three following options may be used:

OPTION 1: Using the **VNAV** Page.

OPTION 2. Using the **VNAV FPL WAYPOINT** Pages.

OPTION 3: Using the **VNAV WAYPOINT** Page.

Option 1: Using VNAV Page

1. **VNAV** Key - DEPRESS to display **VNAV 1/2** Page. The altitude constraint may be changed on this page if the current TO waypoint has a constraint programmed. Type the new altitude in the altitude field adjacent to the TO WPT. All parameters associated with the former constraint will remain unchanged, i.e., FPA, A, B, G, or OFFSET. (Figure 3-129)
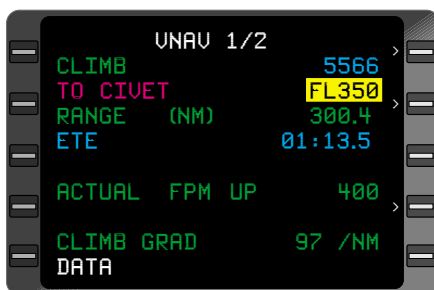
Figure 3-129

2. **ENTER** Key - DEPRESS.

Option 2: Using VNAV FPL WAYPOINT Page

1. **VNAV** Key - DEPRESS to display the **VNAV 2/2** Page.

NOTE: More VNAV Pages will be available if the active flight plan has several pages of waypoints.

2. Line Select Key - DEPRESS to position the cursor over the desired waypoint altitude. (Figure 3-130)
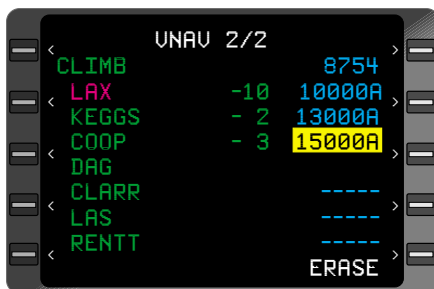
Figure 3-130

3. Altitude Constraint - INSERT new altitude constraint followed by **A** (at or above) or **B** (at or below), if applicable. Any altitude value entered greater than the Transition Level value on the data page is converted and displayed as **FL** (flight level, rounded off to the nearest hundred feet). An altitude less than 1000 feet must be entered with a preceding zero.

4. **ENTER** Key - DEPRESS.

Option 3: Using the VNAV WAYPOINT Page

1. **NAV, FPL,** or ⊕ Key - DEPRESS to display applicable page.

2. Line Select Key - DEPRESS to position cursor over desired waypoint.

*NOTE: On **NAVIGATION** Pages, only the **TO** Waypoint can be selected.*

3. **VNAV** Key - DEPRESS to display **VNAV WAY-POINT** Page for selected waypoint. (Figure 3-131)

4. **ALT** - INSERT new altitude constraint followed by **A** (at or above) or **B** (at or below), if applicable. Only two or three digits are required to input an altitude, i.e. enter 30A and 3000A is displayed.
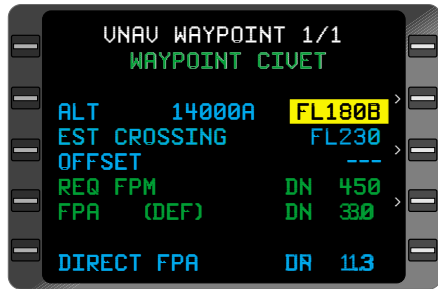
Figure 3-131

Any altitude value entered greater than the Transition Level value on the data page is converted and displayed as flight level **(FL).** An altitude less than 1000 feet must be entered with a preceding zero.

NOTE: If the waypoint is part of a SID, STAR or Approach procedure, the altitude constraint prefills from database. "Cross-Between two Altitudes" type constraints, as shown in Figure 3-130, cannot be programmed manually.

5. **ENTER** Key - DEPRESS. Cursor moves to **OFFSET** field.

6. **ENTER** Key - DEPRESS. The cursor moves to the **FPA** field.

7. **ENTER** Key - DEPRESS to return to the page where the VNAV waypoint was accessed.

DIRECT TO - VNAV WAYPOINT AS LATERAL WAYPOINT

This procedure enables the pilot to proceed Direct To a waypoint, both vertically and laterally by means of a Vertical Path Descent.

If the current To waypoint is the desired VNAV Direct To waypoint, go to Step 4.

1. Line Select Key (on **NAVIGATION** Page 1) - DEPRESS to position the cursor over the **TO** waypoint field. Type in the desired waypoint and press **ENTER** or,

   ↦ Key - DEPRESS. A **DIRECT TO** Page appears with the cursor over the current **TO** waypoint.
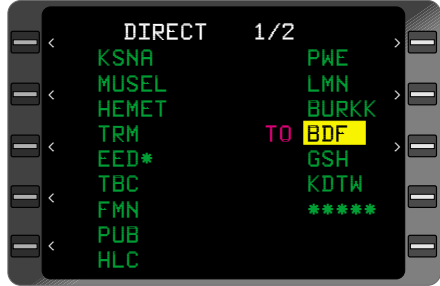
2. Line Select Key - DEPRESS to position cursor over desired waypoint. (Figure 3-132)

```
       DIRECT   1/2
  KSNA            PWE
  MUSEL           LMN
  HEMET           BURKK
  TRM         TO  BDF
  EED*            GSH
  TBC             KDTW
  FMN             *****
  PUB
  HLC
```

Figure 3-132

*NOTE: Active Flight Plans containing more than 18 waypoints will display the remaining waypoints on subsequent pages. Press ↦ key again, or **NXT** Key, to access remaining pages.*

A Random Waypoint may also be used. See DIRECT TO - Random Waypoint.

3. **ENTER** Key - DEPRESS. CDU screen automatically advances to **NAVIGATION** Page 1.

*NOTE: If an offset waypoint was selected, the system first displays the **OFFSET WPT** Page. Verify data and DEPRESS **ENTER**. The **DIRECT** Page will again be displayed with the cursor over the Offset Waypoint. Press **ENTER**. The display automatically advances to **NAVIGATION** Page 1.*
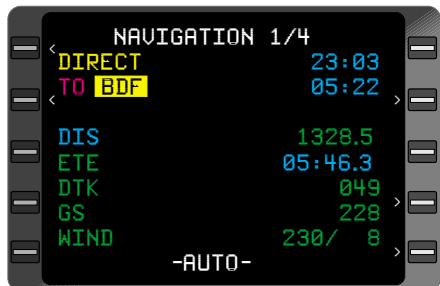
4. Line Select Key - DEPRESS to position cursor over **TO** Waypoint on **NAVIGATION** Page 1. (Figure 3-133)

```
    NAVIGATION 1/4
  DIRECT          23:03
  TO BDF          05:22

  DIS            1328.5
  ETE           05:46.3
  DTK              049
  GS               228
  WIND          230/  8
        -AUTO-
```

Figure 3-133

5. **VNAV** Key - DEPRESS to display the **VNAV WAYPOINT** Page for **TO** Waypoint.

6. **ALT** - INSERT or VERIFY. If an altitude constraint has already been programmed, the cursor will be displayed over the **FPA (DIR)** field value. You may proceed to Step 10. (Figure 3-135)

*NOTE: If the waypoint is part of a SID, STAR or Approach proce-dure, the **ALT** constraint field prefills from the database.*

7. **ENTER** Key - DEPRESS. Cursor moves to **OFFSET** field. (Figure 3-134)

8. **OFFSET** - If applicable, INSERT value in nautical miles (-99 to +99 range)

Figure 3-134

   a. If the offset is prior to the waypoint, enter the range value and a **(-)** pre-fills as a default or

   b. enter a **(+)**, then the range value to indi-cate the offset is beyond the waypoint.
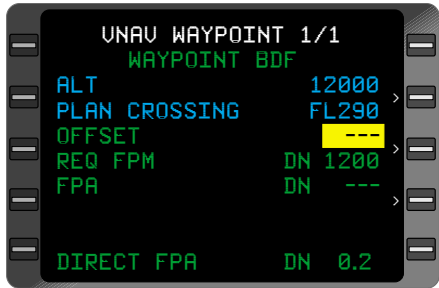
*NOTE: To erase the offset value, INSERT **0** and press **ENTER** Key. The field changes to dashes, indicat-ing no offset is programmed.*

9. **ENTER** Key - DEPRESS. Cursor moves to the **FPA** field.

Figure 3-135

*NOTE: Cursor only moves to the **FPA** field if altitude constraint is below current baro altitude.*
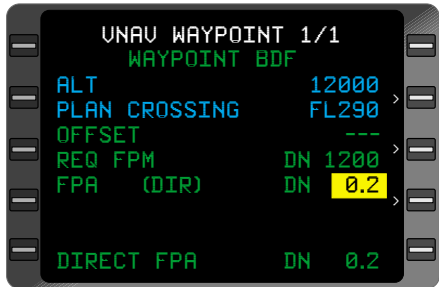
10. Flight Path Angle - VERIFY Direct Flight Path Angle is desirable to fly.

NOTE: Direct Flight Path Angle prefills if it is within the valid range (0.1 to 6.0). (Figure 3-135)

11. **ENTER** Key - DEPRESS to accept waypoint entries. **VNAV** Page 1 is displayed, a Vertical Path Descent has been established, and Vertical Deviation information and guidance is enabled if a descent has been programmed.

DIRECT TO - VNAV WAYPOINT

This procedure allows the pilot to program a Direct To on the Vertical Flight Plan, while still flying the lateral waypoints on the Active Flight Plan. The VNAV Direct To function automatically deletes any intermediate altitude constraints and sets up a Path Descent to the Vertical TO Waypoint using the Direct Flight Path Angle.
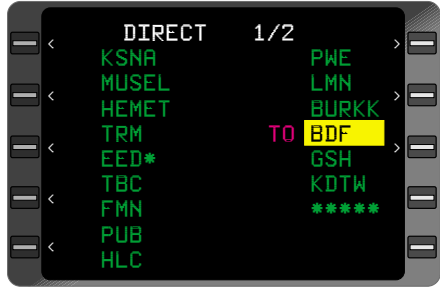
Figure 3-136

1. ⊅→ Key - DEPRESS. A **DIRECT TO** Page will appear with the cursor over the current **TO** waypoint.
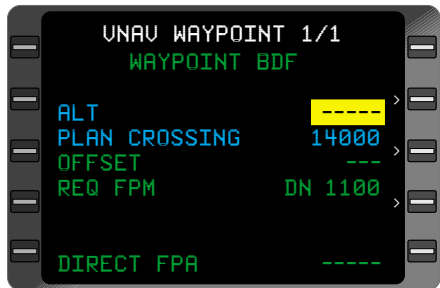
2. Line Select Key - DEPRESS to position cursor over desired waypoint. (Figure 3-136)

3. **VNAV** Key - DEPRESS. **VNAV WAYPOINT** Page appears. If necessary, position cursor over **ALT** field (Figure 3-137). If an altitude constraint has already been programmed, the cursor will appear over the **FPA** value field (Figure 3-138). Go to Step 8.
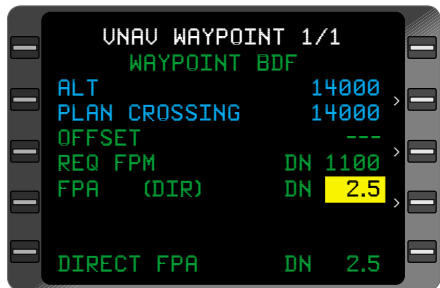
Figure 3-137

Figure 3-138

4. **ALT** - INSERT or VERIFY.

5. **ENTER** Key - DEPRESS. Cursor moves to **OFFSET** field.

6. OFFSET - If applicable, INSERT value in nautical miles (-99 to +99 range).

    a. If the offset is prior to the waypoint, enter the range value and a (-) prefills as a default or

   b. enter a (+), then the range value to indicate the offset is beyond the waypoint

7. **ENTER** Key - DEPRESS. Cursor moves to **FPA** field.

8. Flight Path Angle - VERIFY or INSERT (in degrees and tenths, 0.1 to 6.0 range).

NOTE: Direct Flight Path Angle prefills if it is within the valid range and an ALT is programmed. (Figure 3-138)

9. **ENTER** Key - DEPRESS to accept waypoint entries and return to **VNAV** Page 1.

CREATING VNAV PROFILE WAYPOINTS

VNAV profile waypoints **(#TOC, #TOD,** and **#PRESL**) are used to provide a prediction of the position of the aircraft on the vertical flight path. These are non-enterable waypoints computed by the system based on current ground speed and vertical speed.

Top of Climb (#TOC)

Top of Climb Altitude is obtained from either the **CRUISE ALT** entered by the pilot on the **VNAV DATA** Page, or from the Altitude Preselector setting, if available. When the aircraft arrives at the pre-selected altitude, the system will automatically set cruise altitude to the pre-selected altitude which will then provide a **#TOD** prediction.

If vertical climb constraints are programmed, **#TOC** will automatically appear as the Vertical To Waypoint when the aircraft laterally passes within 1 mile the last vertical waypoint on the active flight plan that has a climb constraint. Once the aircraft has crossed the final climb constraint waypoint, **#TOC** will then become the Vertical To Waypoint. If there are no vertical constraints programmed for climb, **#TOC** will be displayed as the first vertical waypoint as long as the aircraft is in a climb.

When the programmed cruise altitude is reached, **#TOC** is removed from the VNAV Flight Plan, and **#TOD** becomes the Vertical To Waypoint.

When #TOC is the TO Waypoint:

The pilot may obtain range and **ETE** to any altitude above the aircraft during a climb.

1. **VNAV** Key - DEPRESS to display **VNAV** Page 1.

2. Line Select Key - DEPRESS to position the cursor over the **#TOC** altitude field. (Figure 3-139)

3. Alternate Altitude - INSERT. This value may be above or below the altitude pre-select value, but must be above the current baro altitude.

4. **ENTER** Key - DEPRESS and observe the change in **RANGE** and **ETE.** (Figure 3-140)

5. Repeat steps 2 thru 4 to return to previous **#TOC** altitude setting.
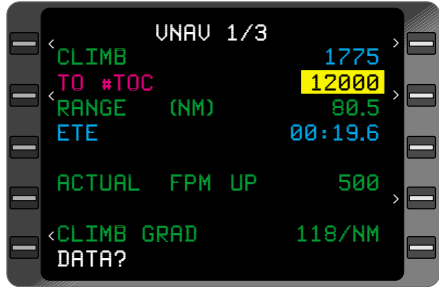
Figure 3-139
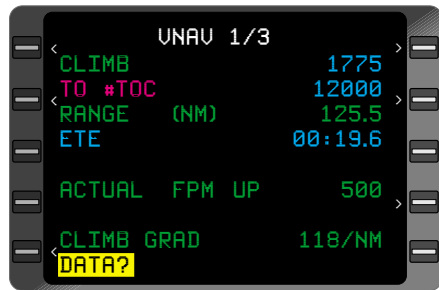
Figure 3-140

Top of Descent (#TOD)

The Top of Descent waypoint is the position where the aircraft intercepts the descent path at the cruise altitude. The system calculates the **#TOD** by establishing a valid Descent Reference Waypoint, then uses either the **CRUISE AL**T entered by the pilot on the **VNAV DATA** Page, or the Altitude Preselector setting, if available. The default FPA maybe used in this calculation.

If no Descent Reference Waypoint with FPA and crossing altitude is programmed, the system will use the arrival airport and elevation (ARP Reference Point, not a runway) and the default FPA to fix Top of Descent as long as the active flight plan is not an AFIS flight plan.

*NOTE: The default FPA may be used to establish **#TOD,** but no Vertical Deviation Valid will occur until the FPA is actually loaded from the **VNAV WPT** Page.*

One minute prior to arriving at **#TOD,** the system issues the **VNAV WPT ALERT** message and the discrete waypoint light will flash for 10 seconds, then go steady.

NOTE: Changing ***CRUISE ALT*** *on the CDU to a lower altitude should only be done after the aircraft has departed cruise altitude, or* ***#TOD*** *at the current cruise altitude will be lost.*

Pre-Selected Altitude Intercept Point (#PRESL)

When the system has an input from an Altitude Pre-selector and the aircraft is flying toward this altitude, a profile waypoint **(#PRESL)** appears on the **VNAV** Page. **#PRESL,** however, never becomes the Vertical To Waypoint. When the Pre-selector input is valid, **ETE** and **RANGE** to **#PRESL** can be found on the **VNAV DATA** Page.

NOTE: With certain types of Pre-Selectors installed (analog), it may be necessary to manually enter a ***CRUISE ALT*** *when the* ***PRESEL ALT*** *is set higher than the cruise altitude. The system does not read analog Pre-selector output until the aircraft's baro is within approximately 1000ft of the pre-selected value.*

Descent Reference Waypoints

Descent Reference Waypoints have a fixed altitude crossing, i.e. Cross-At type altitude constraint. To create a Descent Reference Waypoint, the pilot can program a Flight Path Angle or a Cross-At altitude constraint.

If a programmed **FPA** violates a prior vertical constraint, the system reassigns the Descent Reference Waypoint, using the Default **FPA** from the **VNAV DATA** Page, as illustrated in Figure 3-141.

Cruise Altitude FL210   #TOD

Vertical Constraint
FL180B

16500 PLAN CROSSING

CIVET

14000A
Vertical Constraint

Programmed FPA   3.0

8000

FUELR
Descent Reference
Wpt

126
KLAX

As shown, FUELR is the Descent Reference Waypoint that establishes #TOD. Because the programmed FPA allows for a vertical descent that meets the vertical constraints at CIVET, FUELR remains the Descent Reference Waypoint.

Cruise Altitude FL210   #TOD

FL180B

Default FPA   3.0

14000 PLAN CROSSING

CIVET Descent Reference Wpt

14000A

Programmed FPA   1.0

8000

FUELR
Descent Reference
Wpt

126
KLAX

In this case, since the programmed FPA at FUELR is too shallow to meet the vertical constraints at CIVET, the system reassigns CIVET at the Descent Reference Waypoint, using the default FPA to compute #TOD.

Top of Descent and Descent Reference Waypoint

Figure 3-141

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REMOTE TUNING

TUNING COMMS

This procedure enables the pilot to keyboard tune the aircraft radios via the CDU. Some control heads may require placement in the Remote Mode in order to accept tuning data from the CDU keyboard.

NOTE: If system is configured for 3 Comms the tune section will consist of 4 pages.

1. **TUNE** Key - DEPRESS. The Comm Radio **TUNE** Page will be displayed.

2. Line Select Key - DEPRESS (if necessary) to position cursor over appropriate **PRESET** field.

3. Frequency - INSERT. (Figure 3-142)
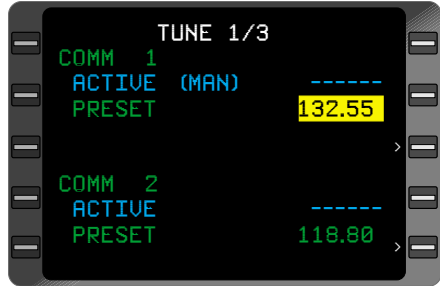
Figure 3-142

NOTE: Trailing zeroes are not required.

4. **ENTER** Key - DEPRESS. **TRANSFER?** will automatically appear. (Figure 3-143)

5. **ENTER** Key - DEPRESS. The entered **PRESET** frequency transfers to **ACTIVE.** The new frequency also displays as the **ACTIVE** frequency on the appropriate Comm control head.

Figure 3-143

NOTE: Keyboard tuned frequencies may display for a few seconds then go to dashes if the frequency read back from the radio or the control head is not available.

NOTE: (MAN) adjacent to Active Comm frequency indicates that the frequency has been entered using the COMM control head. No prompts are displayed when Active Comm frequency has been keyboard entered.

*The **PRESET** frequency displayed on the control head is not neces-
sarily the **PRESET** frequency displayed on the CDU. Each may be
entered independently.*

*Depending on the system configuration the cursor can appear over
the **PRESET** field for either **COMM 1** or **COMM 2.***

TUNING NAVs

Keyboard Method

If Station Identifier Is Used:

1. **TUNE** Key -DEPRESS until **NAV TUNE** Page is displayed. (Figure 3-144)

2. Line Select Key - DEPRESS to position cursor opposite the desired radio: **NAV 1** or **NAV 2.**

3. Station Identifier - INSERT or VERIFY entry. (Figure 3-145)

4. **ENTER** Key - DEPRESS. The new frequency is displayed immediately and is annunciated with **(KEY)** adjacent to the frequency field. If the identifier is not found immediately, the **IDENT** field will go to dashes until the station is located in the database. Once located, the identifier will be displayed and the **(KEY)** annunciation will shift to the identifier line. (Figure 3-146)
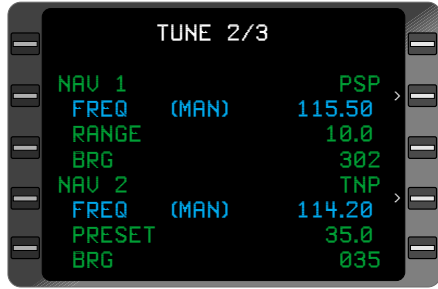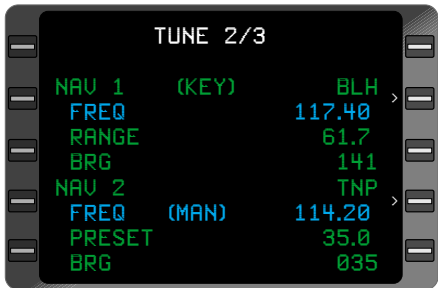
Figure 3-144

Figure 3-145

Figure 3-146

*NOTE: NAV tuning is designed to enhance the VPU (VORTAC Position Unit). The VPU will only use VOR/DME or DME only navaids (includes TACAN and ILS) therefore, only VOR/DME or DME only navaids will be displayed. In areas where a VOR only and a DME only are on the same frequency and within line of sight of the aircraft, entering the VOR identifier will result in the database replacing the VOR identifier with the "usable" DME identifier. When this occurs, the **RANGE** and **BRG** displays remain associated with the VOR even though it is no longer displayed. This ambiguity will occur when the frequency rather than the identifier is entered.*

When the CDU keyboard is used to tune a navaid, the local VPU database is searched for the tuned frequency. If found it is paired with the nearest usable Navaid identifier associated with that frequency. If the station identifier tuning method is used to tune the radio. the identifier ultimately paired with the tuned frequency may differ from the identifier originally entered. If the navaid is unusable, that is, out of range, or a frequency conflict exists, dashes will be displayed in the IDENT field and the new frequency will be displayed.

5. Frequency - VERIFY that the **ACTIVE** frequency on the control head and CDU displays agree.

If Station Frequency is Used:

1. **TUNE** Key -DEPRESS until NAV **TUNE** Page is displayed.

2. Line Select Key - DEPRESS to position cursor over desired **FREQ** field.

3. Frequency - INSERT or VERIFY. (Figure 3-147)

NOTE: Trailing zeroes are not required.

4. **ENTER** Key - DEPRESS.

5. Frequency - VERIFY that control head display is tuned to the desired frequency.

```
            TUNE 2/3

NAV 1                    BLH  >
  FREQ    (MAN)        115.50
  RANGE                  10.0
  BRG                     302
NAV 2                    TNP  >
  FREQ    (MAN)        114.20
  PRESET                 35.0
  BRG                     035
```
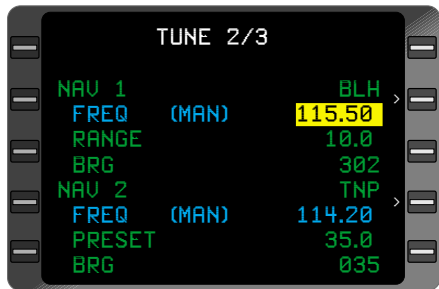
Figure 3-147

When the station is located in the VPU database the identifier will be displayed and the **(KEY)** annunciation will shift to the identifier line. (Figure 3-148)

6. **RANGE** and **BRG** - CHECK.

Figure 3-148

*NOTE: **(MAN)** adjacent to the **FREQ** field indicates that the frequency has been entered manually from the NAV control head.*

Auto Tune Method

Certain control heads will require placement in the Remote Mode at the control head in order to recognize the tuning data from the GNS-XLS. Only NAV/DME radios may be placed in the **AUTO TUNE** mode.

DME HOLD, Manual Control Head Tuning, Keyboard Tuning or use of the AUTO/MAN Switch will take the GNS-XLS out of the Auto/Tune Mode.

1. **TUNE** Key - DEPRESS to display the NAV **TUNE** Page.

2. Line Select Key - DEPRESS to place cursor over **IDENT** or **FREQ** field of **NAV 1** or **2.** (Figure 3-149)

Figure 3-149

3. **BACK** Key - DEPRESS, **AUTO?** is displayed in place of **(KEY)** or **(MAN).** (Figure 3-150)
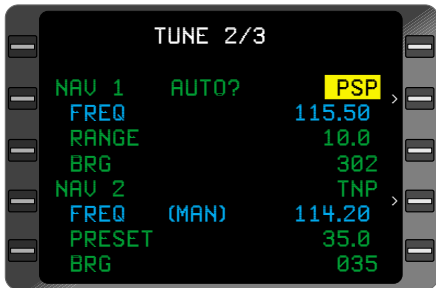
4. **ENTER** Key - DEPRESS to place system in AUTO TUNE Mode. After a brief

Figure 3-150

pause the CDU and control head information will change to reflect the Identifier chosen by the system. (Figure 3-151)

NOTE: No prompt is displayed adjacent to the **IDENT** field when system is in AUTO TUNE mode.

```
           TUNE 2/3

NAV 1                   MZB
  FREQ               117.80
  RANGE                74.9
  BRG                   204
NAV 2                   TNP
  FREQ     (MAN)     114.20
  PRESET               35.0
  BRG                   035
```
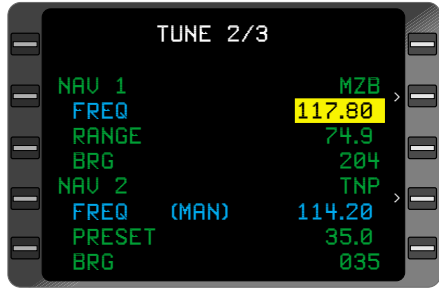
Figure 3-151

5. **FREQ, RANGE** and **BRG** - CHECK that the **FREQ** of the control head and CDU display agree and that range and bearing are reasonable.

TRANSPONDER AND ADF KEYBOARD TUNE

1. **TUNE** Key - DEPRESS to display the page with **XPDR** and **ADF.**

2. Line Select Key - DEPRESS to position the cursor over the desired code or frequency field. (Figure 3-152)
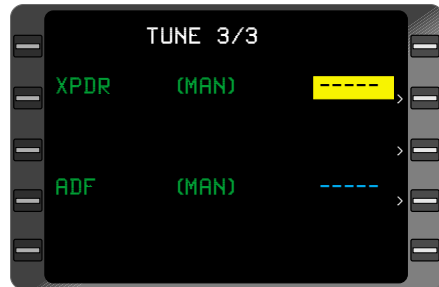
3. Code or Frequency - INSERT and verify new value.(Figure 3-153)

4. **ENTER** Key - DEPRESS. **(MAN)** field disappears indicating radios have been keyboard tuned. Verify the code or frequency changes on CDU and control head displays.
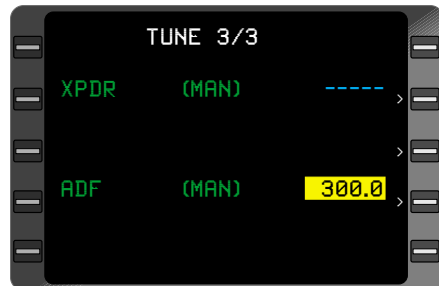
NOTE: **(MAN)** adjacent to **ADF** or **XPDR** indicates that the frequency or code has been entered manually from the control head.

```
           TUNE 3/3

XPDR      (MAN)       -----

ADF       (MAN)       -----
```

Figure 3-152

```
           TUNE 3/3

XPDR      (MAN)       -----

ADF       (MAN)       300.0
```

Figure 3-153

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PLANNING PROCEDURES

FUEL PLANNING

1.   **PLAN** Key - DEPRESS to display **FUEL STATUS** Page.

*NOTE: **REMAINING** and **RESERVE** quantities are stored in non-volatile memory after system shutdown. Upon system turn-on, **VERIFY INPUTS** is displayed and **REMAINING, RESERVE,** and **FLOW** values will flash.*

2.   Line Select Key - DEPRESS to position cursor over **REMAINING** field. (Figure 3-154)
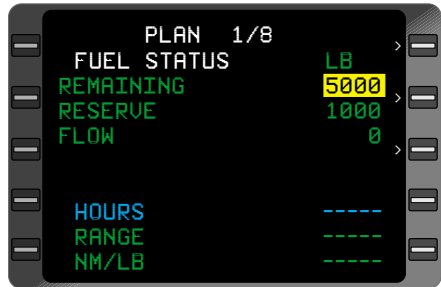
3.   Fuel Quantity Remaining - VERIFY or INSERT.

4.   **ENTER** Key - DEPRESS.

5.   Fuel Reserve - VERIFY or INSERT.

6.   **ENTER** Key - DEPRESS.

Figure 3-154

7.   Fuel Flow - INSERT or VERIFY.

*NOTE: No fuel flow entry is required in the Automatic Fuel Flow mode. All flashing fields must be verified or values inserted using the **ENTER** Key, in order for **HOURS** field to display information. **RANGE** and **NM/LB** fields will display information when a valid ground speed is recognized.*

8.   **ENTER** Key - DEPRESS. If a manual fuel flow is entered the **VERIFY INPUTS** message changes to **LAST INPUT**: and sets the time at :00 minutes. **(MAN)** will be displayed adjacent to the **FLOW** field.

   When the **LAST INPUT** field exceeds 15 minutes, the **REMAINING, RESERVE,** and **FLOW** fields blink indicating verification or update is required. **REMAINING, RESERVE** and **FLOW** must be manually verified.

*NOTE: Auto fuel flow can be reselected by positioning the cursor over the manual fuel flow and depressing the **BACK** Key. **AUTO?** is displayed. The current auto fuel flow is displayed in the cursor. Depressing **ENTER** Key will select the auto fuel flow. When going from Manual to Automatic Fuel Flow Mode the **REMAINING, RESERVE** and **FLOW** fields will blink. Verifying inputs is required, Repeat Steps 2 through 7.*

*NOTE: **HOURS** of fuel and **RANGE** are calculated to the **RESERVE** fuel, not "0" fuel, unless the **RESERVE** fuel is "0".*

To change the unit of measurement (LB or KG):

a. Line Select Key - DEPRESS to position the cursor over the **REMAINING** field. DEPRESS the Line Select Key above to position the cursor over the unit field **(LB** or **KG).**

b. **BACK** Key - DEPRESS. The field will display **LB?** or **KG?** to notify the pilot of the pending change. (Figure 3-155)

c. **ENTER** Key - DEPRESS. The units field on the title line and specific range line will change. All fuel figures are recalculat-ed to reflect the new units of measurement.

```
      PLAN  1/8
  FUEL STATUS       LB?
 REMAINING          5000
 RESERVE            1000
 FLOW               1200
 LAST INPUT:       00:05

 HOURS             03+19
 RANGE              1341
 NM/LB             0.335
```
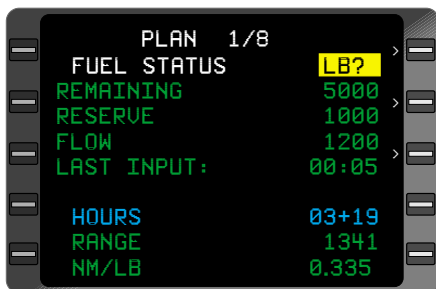
Figure 3-155

TRIP PLANNING

The **TRIP PLAN** Page provides the capability to calculate information for Active or Stored Flight Plans, **DIRECT TO** legs, or Random legs without affecting any of the system's navigation functions.

1. **PLAN** Key - DEPRESS to display **TRIP PLAN** Page.

*NOTE: Initially the **TRIP PLAN** Page will display the Active Flight Plan (if present). The initial leg displayed will be DIRECT TO the current **TO** waypoint on the active flight plan or the first **TO** waypoint on the flight plan selected. (Figure 3-156)*

```
      PLAN  2/8
    TRIP PLAN        A
 DIRECT            KDAL
 TO LIT            KHPN
 GS                 407
 DIS/DTK      258.1/060
 ETE            00:38.2
 FPL        1242/03+03
 ETA @KHPN        04:00
 RAIM @KHPN       AVAIL
```

Figure 3-156

2. Line Select Key - DEPRESS to position the cursor over the **TRIP PLAN** field.

3. Desired Flight Plan - INSERT Flight Plan Number (Figure 3-157) or **"A"** for Active Flight Plan. (Figure 3-158).

4. **ENTER** Key - DEPRESS.

*NOTE: If a Flight Plan number is left in the **TRIP PLAN** field and not returned to **"A"**, no updated Active Flight Plan information will be displayed. Figures 3-156 and 3-157 show how the screen appears when an Active FPL has been selected and the airplane is airborne.*
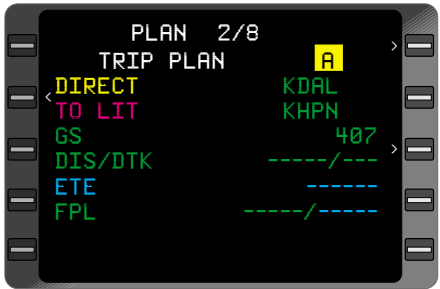
5. **FR** Waypoint - VERIFY or INSERT as required. (Figure 3-159)

6. **ENTER** Key - DEPRESS.

7. **TO** Waypoint - VERIFY or INSERT as required.

Figure 3-157

Figure 3-158

Figure 3-159

*NOTE: With **TRIP PLAN A** selected, the **TRIP PLAN** leg will automatically advance to display **DIRECT TO** the current **NAVIGATION** Page **TO** Waypoint each time the **TRIP PLAN** Page is accessed. (Figure 3-160)*

8. **ENTER** Key - DE-PRESS (Figure 3-161). Selected leg information and time distance for the remainder of the Flight Plan are displayed. Information between the remaining legs of the Flight Plan can be reviewed by pressing the **ENTER** Key for each subsequent leg.

9. Groundspeed - VERIFY. Current aircraft ground-speed is displayed unless a manual entry is made.

Figure 3-160

Figure 3-161

To Enter Manual Groundspeed:

a. Line Select Key - DEPRESS to position cursor over **GS** value field.

b. Groundspeed - INSERT.

c. **ENTER** Key - DEPRESS. **(MAN)** will appear adjacent to the **GS** field.

To Return to Automatic Groundspeed:

a. Line Select Key - DEPRESS to position cursor over **GS** value field.

b. **BACK** Key - DEPRESS. **AUTO?** appears in the **GS** field to inform pilot of the pending change and current **GS** is displayed in the cursor.

c. **ENTER** Key - DEPRESS.

10. Data - CHECK. When **DIRECT** is displayed all data except **DTK** is updated continuously.

If data is not continuously updated, it will be recalculated each time:

a. The **TRIP PLAN** Page is selected.

b. A **TRIP PLAN** is entered.

c. A leg change is made on the **TRIP PLAN** Page. **ETE** and **FPL** time are recalculated whenever the groundspeed changes.

d. Leg or **GS** change is made on **FUEL PLAN** Page.

*NOTE: **ETA @** the destination and **RAIM @** the destination are displayed only when **DIRECT** legs are being viewed. (Figure 3-163)*

*If the **TRIP PLAN** Page is being displayed during a leg change on the **ACTIVE FLIGHT PLAN** the new **TO** Waypoint is not displayed. Exit and return to the **TRIP PLAN** Page to view the updated **TO** Waypoint.*

11. To review the remainder of the Flight Plan: Position cursor over **TO** field, DEPRESS **ENTER** Key TWICE to call up next leg. DEPRESS **ENTER** Key ONCE for each subsequent leg. (Ground-speed should be updated if necessary.)

Figure 3-162

*NOTE: Information between any desired waypoints can be reviewed by selecting the **TRIP PLAN** Page and entering a **FROM** and **TO** waypoint (Figure 3-162) or performing the present position direct procedures (Figure 3-163). If the **TO** waypoint is not on the selected Flight Plan, the Flight Plan number and origin/destination fields will display dashes.*
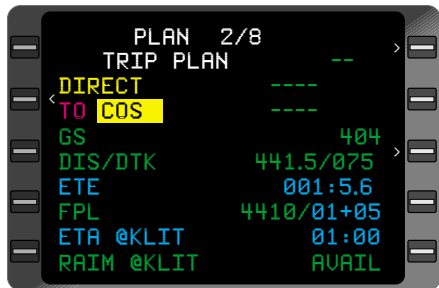
Figure 3-163

To update the TRIP PLAN leg to the current TO waypoint with an Active Flight Plan selected:

    a. Line Select Key - DEPRESS to position cursor over **TRIP PLAN** field.

    b. **ENTER** the letter **[A]** in the cursor.

    c. **ENTER** Key - DEPRESS twice to display information in the data fields.

*NOTE: If an offset waypoint is in the **TO** field the **OFFSET WPT** Page will appear. The **ENTER** Key must be depressed again.*

The **TRIP PLAN** leg will display **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

Selecting another display page (other than **MSG** and **FUEL PLAN**) and returning to the **TRIP PLAN** Page will also update the leg with **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

FLIGHT PLAN FUEL PLANNING

The **FUEL PLAN** Page provides the capability to calculate fuel consumption information for Active or Stored Flight Plans, DIRECT TO Legs or Random Legs without affecting any of the system's navigation functions.

The Fuel Plan Number and Origin and Destination identifiers, TO/FROM leg and groundspeed value on this page will be identical to the **TRIP PLAN** Page. Changing **GS** or the current leg on the **FUEL PLAN** Page also affects the **TRIP PLAN** Page. Pilot initiated changes made to the **FLOW** field on the **FUEL STATUS** Page are reflected on the **FUEL PLAN** Page.

1. **PLAN** Key - DEPRESS to display **FUEL PLAN** Page.

Figure 3-164

*NOTE: Initially the **FUEL PLAN** will display the Active Flight Plan (if selected). The initial leg displayed will be **DIRECT TO** the current **TO** waypoint from NAV page 1. (Figure 3-164)*

2. Line Select Key -

DEPRESS to position the cursor over the **FUEL PLAN** field.

3. Desired Flight Plan - INSERT Flight Plan Number (Figure 3-165) or **"A"** for Active Flight Plan.

4. **ENTER** Key - DEPRESS.

NOTE: If a flight plan number is left in the Fuel Plan field and not returned to "A", no updated Active Flight Plan information will appear.

5. **FR** Waypoint - VERIFY (Figure 3-166) or INSERT as required.

6. **ENTER** Key - DEPRESS.

7. **TO** Waypoint - VERIFY or INSERT as required.

*NOTE: With **FUEL PLAN A** selected the **FUEL PLAN** leg automatically advances to display **DIRECT TO** the **NAVIGATION** Page **TO** waypoint each time the **FUEL PLAN** or **TRIP PLAN** Page is accessed.*

8. **ENTER** Key - DEPRESS twice to display **LEG** and **FPL FUEL** information. (Figure 3-167).

9. Groundspeed - VERIFY. The current aircraft groundspeed is displayed unless a manual entry is made.

Figure 3-165

Figure 3-166

Figure 3-167

To Enter Manual Groundspeed:

    a. Line Select Key - DEPRESS to position cursor over **GS** value field.

    b. Groundspeed - INSERT.

    c. **ENTER** Key - DEPRESS. **(MAN)** will appear adjacent to the **GS** field.

To Return To Automatic Groundspeed:

    a. Line Select Key - DEPRESS to position cursor over **GS** value field.

    b. **BACK** Key - DEPRESS. **AUTO?** appears in the **GS** field to inform pilot of the pending change and current **GS** is displayed under the cursor.

    c. **ENTER** Key - DEPRESS.

10. Fuel Flow - VERIFY. Current aircraft total fuel flow is displayed unless a manual entry is made.

To Enter A Manual Fuel Flow:

    a. Line Select Key - DEPRESS to position cursor over **FLOW** value field.

    b. Fuel Flow - INSERT.

    c. **ENTER** Key - DEPRESS. **(MAN)** will appear adjacent to the **FLOW** field.

To Return to Automatic Fuel Flow:

    a. Line Select Key -DEPRESS to position cursor over **FLOW** field.

    b. **BACK** Key - DEPRESS. **AUTO?** appears adjacent to the **FLOW** field to inform pilot of the pending change and current flow is displayed under cursor.

    c. **ENTER** Key- DEPRESS.

11. Data - CHECK. When **DIRECT** is displayed all data is continuously updated. If data is not continuously updated, it will be recalculated each time:

    a. The **TRIP PLAN** Page has changes in **FR/TO** leg or **GS**.

b. The **FUEL PLAN** Page is selected.

c. Leg or **GS** change is made on the **FUEL PLAN** Page. **LEG FUEL** and **FPL FUEL** are recalculated whenever the **FLOW** changes.

d. **FUEL FLOW** is changed on **FUEL STATUS** Page.

*NOTE: The **REM @** field only appears when a **DIRECT TO** leg is displayed. (Figure 3-169) The **REM @** Field will be displayed in yellow anytime the REM @ value falls below the reserve fuel programmed on Plan Page 1.*

12. To review the remainder of the Flight Plan: position cursor over **TO** field, DEPRESS **ENTER** Key TWICE to call up next leg. (Groundspeed and/or Fuel Flow should be updated if necessary).

*NOTE: Information between any desired waypoints can be reviewed by selecting the **FUEL PLAN** Page and entering a **FROM - TO** leg from the Flight Plan. (Figure 3-168) or by executing the present position direct procedures (Figure 3-169). If the **TO** waypoint is not on the selected Flight Plan, the Flight Plan number and origin/destination fields will display dashes.*

To update the Fuel Plan leg to the current TO leg of the Active Flight Plan:

a. Line Select Key - DEPRESS to position cursor over **FUEL PLAN** field.

b. **ENTER** the letter **[A]** in the cursor.

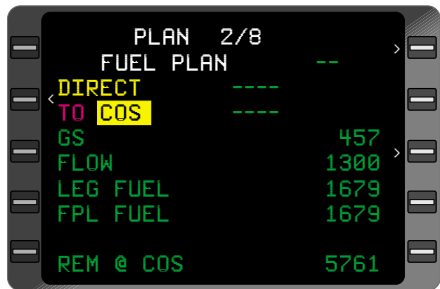c. **ENTER** Key - DEPRESS TWICE to display information in data fields.

Figure 3-168

Figure 3-169

The **FUEL PLAN** leg displays **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

Selecting another display page (other than **MSG** and **TRIP PLAN**) and returning to **FUEL PLAN** Page also updates the leg with **DIRECT TO** the current **NAVIGATION** Page **TO** waypoint.

VERIFYING OR CHANGING DATE AND TIME

DEPRESS the Plan Key until the DATE/GMT Page appears

DATE:

VERIFY or INSERT

Position cursor with Line Select Key and follow procedure in INITIAL-IZATION PAGE section.

GMT:

VERIFY or INSERT

Position cursor with Line Select Key and follow procedure in INITIAL-IZATION PAGE section.

*NOTE: If GPS time is available, **GMT** is automatically updated to GPS time. (Figure 3-170)*

TAKEOFF:

The **GMT** at weight-off-wheels plus 10 seconds. (Figure 3-170)

LAND:

The **GMT** at weight-on-wheels. This field is not dis-played until 10 seconds after weight-on-wheels occurs. (Figure 3-170)

```
        PLAN  5/8

DATE          18 FEB 95
GMT              14:13

TAKEOFF          20:43
LAND             22:45

FLIGHT TIME      02+02
```

Figure 3-170

*NOTE: **TAKEOFF** and **LAND** data may be based on groundspeed and/or TAS valids depending upon system configuration.*

FLIGHT TIME:

The elapsed flight time is displayed in hours and minutes. (Figure 3-170)

*NOTE: **TAKEOFF** and Flight times will be altered if the GMT is changed during flight.*

VERIFYING OR CHANGING AIRCRAFT WEIGHT PARAMETERS

This procedure allows the pilot to confirm or adjust basic operating weight, payload, or fuel to current on board data.

1.   **PLAN** Key - DEPRESS to display **AIRCRAFT WEIGHT** Page

*NOTE: **BASIC OP WT, PAYLOAD**, and **FUEL ON BOARD** fields will be blinking if update has not been entered after system power up.*

FUEL USED *will remain dashes until auto fuel flow is detected.*

2.   Line Select Key - DEPRESS to place the cursor over flashing weight field. (Figure 3-171)

3.   **BASIC OP WT** - VERIFY or INSERT.

4.   **ENTER** Key - DEPRESS.

5.   **PAYLOAD** - VERIFY or INSERT.

6.   **ENTER** Key - DEPRESS.

7.   **FUEL ON BOARD** - VERIFY or INSERT.

8.   **ENTER** Key - DEPRESS.

*NOTE: **VERIFY INPUTS** field disappears and a **GROSS WT** value replaces dashes, and weight fields no longer blink. (Figure 3-172)*

__VERIFY FUEL__ message replaces __VERIFY INPUTS__ message when __MAN__ fuel flow is being used and __FUEL ON BOARD__ has not been verified or updated on __PLAN__ Page __1__ or __6.__

Figure 3-171

Figure 3-172

*All blinking weight fields must be verified or values inserted using the **ENTER** Key, for **GROSS WT** field to display information.*

RESETTING FUEL USED

1. **PLAN** Key - DEPRESS to display aircraft weight page.

2. Line Select Key - DEPRESS to place the cursor over **FUEL USED**. The field will display **ZERO?**. (Figure 3-172a)

*NOTE: To leave the **FUEL USED** field without changing the value, depress the line select key when the field displays **ZERO?**. The cursor will be removed from the page.*

3. ENTER Key - DEPRESS to reset fuel used to zero.


```
         PLAN  6/8

      AIRCRAFT  WEIGHT

   BASIC OP WT      7400
   PAYLOAD           400
   FUEL ON BOARD    1600

   FUEL USED       ZERO?
   GROSS WT         9400
```

Figure 3-172a

SPECIAL PROCEDURES

The following are various procedures that can be performed during navigation, when applicable.

PILOT ENTERED LEG CHANGE

1. **NAV** Key - DEPRESS to select **NAVIGATION** Page 1. A pilot entered leg change may be accomplished on any **NAVIGATION** Page with a **FR/TO** field. However, **NAVIGATION** Page 1 is recommended to simplify a reasonability check of **DIS** and **DTK.**

2. Line Select Key - DEPRESS to position the cursor over the **FR** field.

3. FR Waypoint Identifier - INSERT or VERIFY.

4. **ENTER** Key - DEPRESS. If inserting a Waypoint Identifier not found in the Active Flight Plan, or an offset waypoint, a Waypoint Page appears. The following procedure should be performed:

   If Waypoint Page Appears:

   a. Waypoint Page Coordinates - VERIFY Database Waypoint or INSERT Waypoint Data.

      To Insert Waypoint Coordinates (cursor over **POS** Field):

      (1) Latitude - INSERT **(N** or **S** first, then degrees, minutes, and hundredths).

      (2) **ENTER** Key - DEPRESS.

      (3) Longitude - INSERT **(E** or **W** first, then degrees, minutes, and hundredths).

   b. **ENTER** Key - DEPRESS.

5. If VERIFYING current **FR** Waypoint - DEPRESS **ENTER** and cursor box expands to enclose both **FR** and **TO** Waypoint Identifiers, which activates the **TO** field.

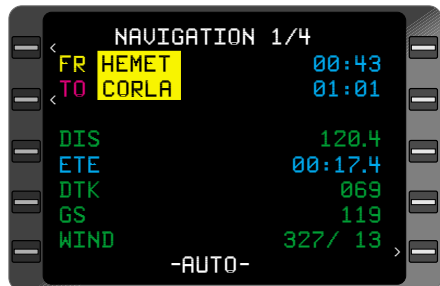6. TO Waypoint Identifier - INSERT or VERIFY. (Figure 3-173)

Figure 3-173

7. **ENTER** Key - DEPRESS.

If Waypoint Page Appears:

a. Waypoint Page Co-ordinates - VERIFY Database Waypoint or INSERT Waypoint Data. (Figure 3-174)

To Insert Waypoint Coordinates (cursor over **POS** Field):

```
┌─────────────────────────────┐
│   DATABASE WPT    1/1        │
│                             │
│   WAYPOINT    CORLA         │
│                             │
│      POS  N 3338.30         │
│           W116 16.70        │
│                             │
│                             │
│   NDB-ENTER                 │
└─────────────────────────────┘
```

Figure 3-174

(1) Latitude - IN-SERT **(N** or **S** first, then de-grees, minutes, and hundredths).

(2) **ENTER** Key - DEPRESS.

(3) Longitude - IN-SERT **(E** or **W** first, then de-grees, min-utes, tenths and hundredths).
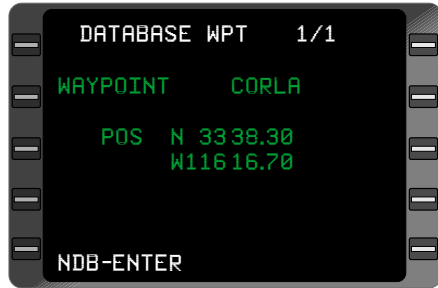
b. **ENTER** Key - DEPRESS.

8. **DIS, DTK** - CHECK.

*NOTE: The Pilot Entered Leg Change procedure inserts a "fence" indicated by (----) on the **DIRECT TO** and **ACTIVE FPL** pages pre-venting Auto Leg Change beyond the **TO** waypoint, if the **TO** waypoint was not on the original Active Flight Plan (Figure 3-175) The **MSG** light illuminates and the **SYSTEM MESSAGE** Page displays **NO AUTO LEG CHG**, however the **AUTO** field on **NAVIGATION** Page 1 continues to display **AUTO.***

```
┌─────────────────────────────┐
│   ACTIVE FPL    1/2         │
│ FR HEMET              7      │
│ TO CORLA    00:20    8      │
│    ------                   │
│    KSNA    -KDTW            │
│    MUSEL                    │
│    HEMET                    │
│  DEPART                     │
│  ARRIVE             ETA     │
│  APPROACH          ERASE    │
└─────────────────────────────┘
```

Figure 3-175

*To jump the fence and continue with the flight plan use the ⅅ➔ Key then the Line Select Keys to positionthe cursor over a way point beyond the fence then press **ENTER** Key*

PREVENTING AUTOMATIC LEG CHANGES

The Auto Leg change function allows the system to automatically sequence from waypoint to waypoint on the Active Flight Plan. When the system is initialized it is in the Automatic Leg Change Mode unless changed by the pilot. The following procedure inhibits automatic leg changes.

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1.

2. Line Select Key - DEPRESS to position cursor over **-AUTO-.**

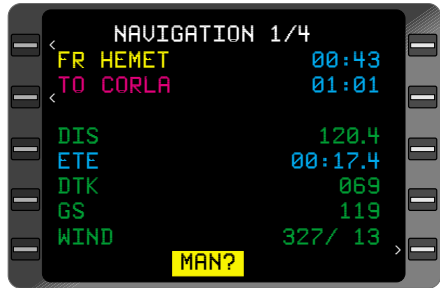3. **BACK** Key - DEPRESS. Cursor field displays **MAN?** to inform the pilot of the pending change. (Figure 3-176)

4. **ENTER** Key - DE-PRESS. The cursor disappears and **-MAN-** remains in the field confirming that leg changes must be made manually. **NO AUTO LEG CHG**

Figure 3-176

message appears on the **SYSTEM MESSAGES** Page, however the **MSG** light does not illuminate.

Returning to Automatic Leg Change Mode

1. **NAV** Key - DEPRESS to display **NAVIGATION** Page 1.

2. Line Select Key - DEPRESS to position cursor over **-MAN-.**

3. **BACK** Key - DEPRESS. Cursor field displays **AUTO?** to inform the pilot of the pending change.

4. **ENTER** Key - DEPRESS. The cursor disappears and **-AUTO-** remains in the field confirming return to the Automatic Leg Change Mode. **NO AUTO LEG CHG** message on the **SYSTEM MESSAGES** Page disappears unless the current **TO** waypoint is the last waypoint on the Active Flight Plan.

NOTE: Certain HDG Intercept and Pseudo VORTAC Procedures automatically put the leg change mode into -MAN-. The pilot must determine if -MAN- or -AUTO- is appropriate then select the desired leg change mode.

POSITION CHECK AND UPDATE PROCEDURES

Using a Sensor

A position update may also be performed using any one of the navigating interfaced position sensors as a reference. The following procedure describes this action:

1. **HOLD** Key -DEPRESS.

2. Line Select Key - DEPRESS ONCE to place the cursor over the **FIX** field. The field will display **FIX?** (Figure 3-177)

```
        POSITION FIX

    POS   N 40    59.80
          W096    17.00

    IDENT          ----
  FIX ?   N 40    59.80
          W096    17.00
  DIF     S        0.00
          E        0.00
```

Figure 3-177

3. **BACK** Key - DEPRESS until the desired sensor (preferably the GPS sensor) to be used as the update reference appears in the cursor. The position of each sensor will appear sequentially along with the **DIF** to the composite position. (Figure 3-178)
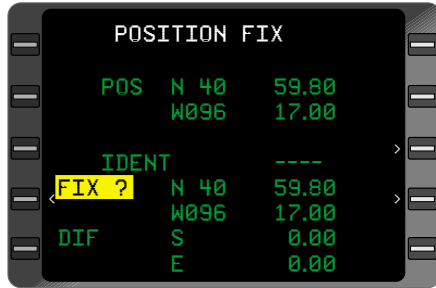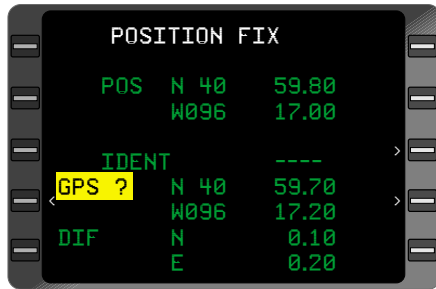
4. **ENTER** Key - DEPRESS. The cursor will advance to the **DIF** field displaying the direction and distance in degrees, minutes, and hundredths of minutes from the sensor position to the composite position.

```
        POSITION FIX

    POS   N 40    59.80
          W096    17.00

    IDENT          ----
  GPS ?   N 40    59.70
          W096    17.20
  DIF     N        0.10
          E        0.20
```

Figure 3-178

5. **ENTER** Key - DEPRESS to update composite position to the selected sensor. NAV Page 1 will be displayed.

Over Known Point

This procedure is used to cross check or update the system by over-flying a known reference point such as a radio navaid or visual check point.

1. **HOLD** Key - DEPRESS over known point.

2. Known Point - ENTER using either:

Option 1: **IDENT**

or

Option 2: Coordinates for check points not in memory.

Option 1: **IDENT**

    a. IDENT - INSERT.

    b. **ENTER** Key - DEPRESS.

    c. Waypoint Page Coordinates - VERIFY.

    d. **ENTER** Key - DEPRESS. The **DIF** display shows the direction and distance in degrees, minutes and hundredths of minutes from the **FIX** position to the composite position. (Figure 3-179)
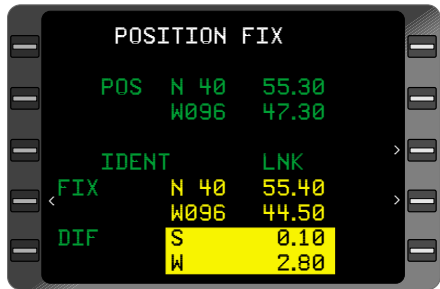

Figure 3-179

    e. **ENTER** Key - DEPRESS if position update is desired. **NAVIGATION** Page 1 is displayed.

Option 2: Coordinates

    a. Line Select Key (cursor over **FIX** coordinates). (Figure 3-180)
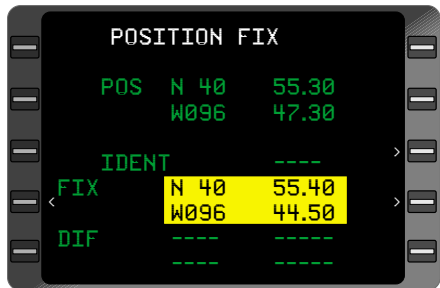

Figure 3-180

b. Latitude - INSERT **(N** or **S** first, then degrees, minutes, and hundredths).

c. **ENTER** Key - DEPRESS.

d. Longitude - INSERT **(E** or **W** first, then degrees, minutes, and hundredths).

e. **ENTER** Key - DEPRESS.

The **DIF** display shows the direction and distance in degrees, minutes and hundredths of minutes from the **FIX** position to the composite position.

f. **ENTER** Key - DEPRESS if position update is desired. **NAVI-GATION** Page 1 is displayed

NOTE: If coordinate field flashes after entry, verify coordinates and depress **ENTER** *again.*

Using An Offset

This procedure is used to cross-check or update the system using an offset from a known point such as VORTAC Radial and Distance.

Record Radial and Distance at the same time as performing Step 1.

NOTE: Overflying a predetermined radial and distance is not necessary.

1. **HOLD** Key - DEPRESS.

2. Offset Waypoint IDENT - INSERT.

NOTE: If necessary, refer to the procedure for Creating An Offset Waypoint.

3. **ENTER** Key - DEPRESS.

4. Recorded Radial - INSERT.

5. **ENTER** Key - DEPRESS.

6. Recorded Distance - INSERT (NM and tenths).

7. **ENTER** Key - DEPRESS.

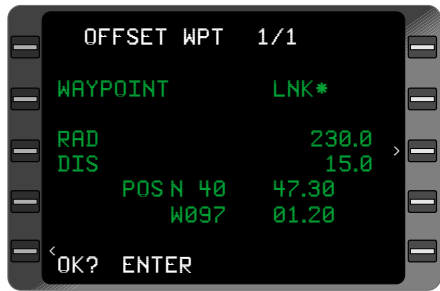8. Waypoint Coordinates - VERIFY for reasonability. (Figure 3-181)

9. **ENTER** Key - DEPRESS. The **DIF** display shows the direction and distance in degrees, minutes, and hundredths of minutes from the **FIX** position to the composite position. (Figure 3-182)

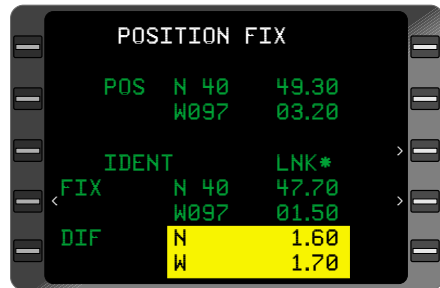10. **ENTER** Key - DEPRESS, if position update desired.

```
┌──────────────────────────┐
│     OFFSET WPT  1/1       │
│                          │
│ WAYPOINT        LNK*     │
│                          │
│ RAD             230.0    │
│ DIS              15.0  > │
│      POS N 40   47.30    │
│          W097   01.20    │
│                          │
│ ‹OK?  ENTER              │
└──────────────────────────┘
```

Figure 3-181

```
┌──────────────────────────┐
│      POSITION FIX         │
│                          │
│   POS  N 40    49.30     │
│        W097    03.20     │
│                          │
│   IDENT        LNK*    > │
│ ‹FIX    N 40   47.70     │
│         W097   01.50  > │
│ DIF    N        1.60     │
│        W        1.70     │
└──────────────────────────┘
```

Figure 3-182

PARALLEL COURSE

This procedure is used to establish an offset course (steering reference) parallel to the current leg. This field is inactive when in APPROACH ARMED mode (within 30 nm of the destination airport).

1. **NAV** Key - DEPRESS to display **NAVIGATION** 2/4 Page with **SXTK.**

2. Line Select Key - DEPRESS to position cursor over **SXTK** field.

3. **L** or **R** Key - DEPRESS.

4. Offset Distance - INSERT (NM and tenths). The maximum value that can be entered is 99.9 NM.

5. **ENTER** Key - DEPRESS. **XTK** deviation remains referenced to the original track. However the **HSI** will display a centered needle when the SXTK has been captured. **BRG, DIS, ETE** remain referenced to the current **TO** waypoint.

*NOTE: If the system is coupled to the autopilot, the roll command will turn the aircraft to intercept the parallel course at the selected **SXTK** distance.*

*If **XTK** is greater than 12.5NM, VNAV will become INVALID and no vertical deviation information will be displayed.*

Canceling Parallel Course

1. **NAV** Key - DEPRESS to display page with **SXTK.**

2. Line Select Key - DEPRESS to position cursor over **SXTK** field .

3. **BACK** Key - DEPRESS. The cursor field will display **CANCEL?** to inform the pilot of the pending change. (Figure 3-183).
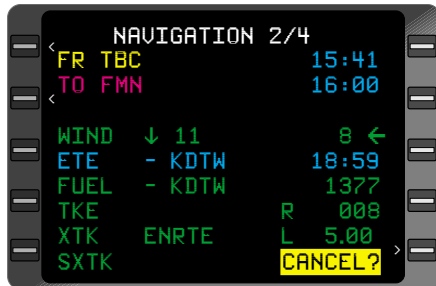

Figure 3-183

4. **ENTER** Key - DEPRESS. The steering reference will be to the original desired track.

*NOTE: Any Leg Change (manual or automatic) including **DIRECT TO** will also cancel selected crosstrack **(SXTK).***

MANUAL MAGNETIC VARIATION ENTRY

A manual magnetic variation entry is required north of 70° N latitude and south of 60°S latitude.

1. **NAV** Key - DEPRESS to display **NAVIGATION 3/4** Page with **VAR.**

2. Line Select Key - DEPRESS to position cursor over **VAR** field.

3. Local Variation - INSERT **(E** or **W** first).

4. **ENTER** Key - DEPRESS. **(MAN)** will be annunciated adjacent to the **VAR** field.

RETURNING TO AUTOMATIC VARIATION

This checklist must be accomplished to return to Automatic Variation following a Manual Variation entry.

1. **NAV** Key - DEPRESS to display page with **VAR.**

2. Line Select Key - DEPRESS to position cursor over **VAR** field.

3. **BACK** Key - DEPRESS. **AUTO?** will appear in the **VAR** field to inform the pilot of pending change. The automatic variation value will appear in the cursor.

4. **ENTER** Key - DEPRESS.

SELECTING ETE, ETA, DIS, OR ALT DISPLAY OPTION (Active Flight Plan Page)

The pilot can view the estimated time enroute, the estimated time of arrival, the distance, or altitude constraints of waypoints on the Active Flight Plan.

1. **FPL** Key - DEPRESS to display **ACTIVE FPL** Page.

2. Line Select Key - DEPRESS to position cursor over **ETE, ETA, DIS,** or **ALT** field. (Figure 3-184)

3. **BACK** Key - DEPRESS to display desired option.

Figure 3-184

4. **ENTER** Key - DEPRESS to select option. (Figure 3-185)

*NOTE: To display numbers when the **DIS** option is selected, a Flight Plan must be selected and a leg defined. To display numbers when the **ETE** or **ETA** option is selected, a valid ground speed is required. Altitude constraints and waypoint off-sets are only displayed if programmed.*

Figure 3-185

SELECTING NAV PAGE ETA OR ALT DISPLAY OPTION (NAV Page 1, 2, or 3)

The pilot can view the esti-mated time of arrival or alti-tude constraint of TO way-point on the NAV Pages.

Selecting ALT Display:

1. **NAV** Key - DEPRESS to display the **NAVIGA-TION** Page.

2. Line Select Key - DEPRESS to position the cursor over the **ETA** field. (Figure 3-186)

Figure 3-186

3. **BACK** Key - DEPRESS. **ALT?** appears in cursor.

4. **ENTER** Key - DEPRESS to display Altitude Constraint. (Figure 3-187)
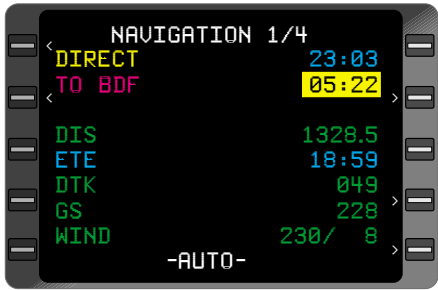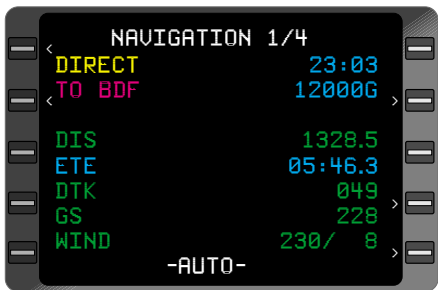
*NOTE: Altitude constraint and waypoint offset are only displayed if a VNAV Waypoint is programmed at the **TO** Waypoint and VNAV is valid. The altitude cannot be changed on these pages. The **ALT** display should always be selected during SID, STAR, or Approach procedures.*

Figure 3-187

To Return to ETA:

5.   Line Select Key - DEPRESS to position the cursor over the altitude constraint field.

6.   **BACK** Key - DEPRESS. **ETA?** appears in cursor.

7.   **ENTER** Key - DEPRESS to display **ETA.**

SENSOR DESELECTION

The deselection of a position sensor on **NAVIGATION** Page 4 completely eliminates the sensor's contribution to the composite (blended) position. This is only recommended if the pilot can determine which position keeping sensor is inaccurate or by flying over a known location and then comparing the sensor position against the known position.

To Deselect a Sensor:

1.   **NAV** Key - DEPRESS until **NAVIGATION** Page 4 is displayed.

2.   Line Select Key - DEPRESS to position the cursor over sensor to be deselected.

3.   **BACK** Key - DEPRESS. **OUT?** will appear to inform the pilot of the pending change. (Figure 3-193)

4.   **ENTER** Key - DEPRESS. **"OUT"** will remain in the sensor field and **"DESELECTED"** appears beside the corresponding sensor on the

```
      NAVIGATION 4/4

   IDENT  ------            ›

   POS  N 33 43.33          ›
        W116 54.37
                 VPU ?  OUT?
  ‹                        ›

   IRS   0.2   GPS    0.1   ›
```
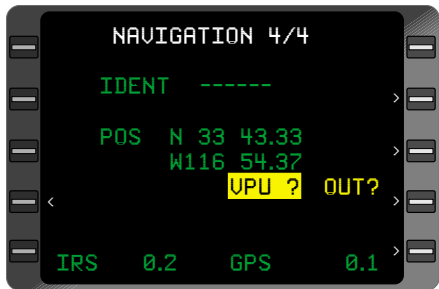
Figure 3-193

   SENSOR MESSAGES Page.

To Restore a Sensor:

   a.   **NAV** Key - DEPRESS to display **NAVIGATION** Page 4.

   b.   Line Select Key - DEPRESS to position cursor over sensor to be restored.

   c.   **BACK** Key - DEPRESS. **IN?** appears to inform the pilot of the pending change.

   d.   **ENTER** Key - DEPRESS to restore the sensor.

NOTE: If GPS is deselected, the remaining sensor radial error fields will turn from yellow to green, indicating that those sensors are now contributing to the composite position. Under normal circumstances, the GPS is the sole contributor to the composite position. The IRS contributes to GPS accuracy by providing GPS with velocity aiding. It will always be displayed in green.

EXTERNAL WAYPOINT ACCEPTANCE

Up to 99 external waypoints may be accepted from an interfaced radar or EFIS system.

When a waypoint is generated from this equipment, a DIRECT TO leg change is made to that waypoint.

Figure 3-194

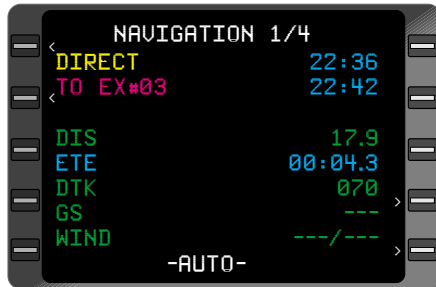The generated waypoint will be designated EX#01 to EX#99. (Figure 3-194)

As the External Waypoint **(EX#)** is off the Flight Plan it will be separated from the Active Flight Plan waypoint sequence by a fence - - - - -. **"NO AUTO LEG CHG"** message will appear on the **SYSTEM MESSAGES** Page. The following procedure may be used to link the **EX#** waypoint into the Flight Plan sequence.
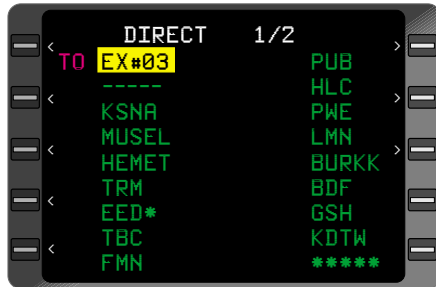

Figure 3-195

1.   ⌐B➜ Key - DEPRESS. The display will show Direct To the **EX#** waypoint with the waypoints of the Active Flight Plan listed below. (Figure 3-195).

2.   Line Select Key - DEPRESS to position the cursor over the waypoint to follow the EX# waypoint. (Figure 3-196)

Figure 3-196

3. **EX#** Waypoint Identifier - INSERT.

4. **ENTER** Key - DEPRESS.

*NOTE: The **EX#** waypoint identifier will flash if an unassigned number is entered. **EX#** waypoint coordinates can ONLY be assigned by an external source (radar or EFIS).*

5. Waypoint Page Coordinates - VERIFY.

6. **ENTER** Key - DEPRESS.

7. Waypoint Sequence - VERIFY. (Figure 3-197)

8. **ENTER** Key - DEPRESS. CDU display will automatically advance to **NAVIGATION** Page 1. **"NO AUTO LEG CHG"** message will be removed from the **SYSTEM MESSAGES** Page.
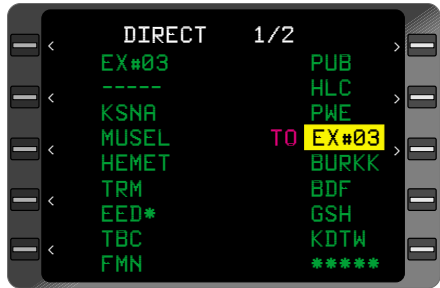

Figure 3-197

PRESENT POSITION AS A WAYPOINT

A special waypoint location is reserved for storing present position coordinates as a waypoint. The identifier for this waypoint is inserted as **"#1."** As well, the identifier may be used as a parent identifier for an offset waypoint by adding an asterisk ("*").

Waypoint **#1** is redefined each time the **HOLD** Key is depressed. An example of the application of waypoint **#1** is to store the coordinates of a point overflown to which you may wish to return. This is accomplished by depressing the **HOLD** Key directly over that desired point. In this case these coordinates would be stored under identifier **"#1"** until either the HOLD Key is depressed again, updating **#1**, or the system is shut down.

*NOTE: Since waypoint **#1** is frequently redefined, it is not retained in non-volatile memory and the identifier **#1** cannot be entered on a stored flight plan. However, the coordinates of WPT #1 can be stored on a Flight Plan by making them part of a pilot entered waypoint. See page 3-125 for creating pilot entered waypoints. It does, however, use up one of the 999 available waypoints, as do **#OFF, #0** and **EX** (external) Waypoints.*

NAVIGATION AT EXTREME LATITUDES (North of 70° N or South of 60° S)

CAUTION: THE PROCEDURES LISTED IN THIS SECTION CON-TAIN INSTRUCTIONS FOR OPERATION OF THE GNS-XIs AT SPECIFIED LATITUDES BEYOND THE AUTO-COMPUTED MAG-NETIC VARIATION MODEL. IN ALL CASES THE FLIGHT CREW OF ANY AIRCRAFT OPERATING AT THESE LATITUDES MUST CONSULT THE FLIGHT MANUAL SUPPLEMENT IN ORDER TO OBTAIN SATISFACTORY PERFORMANCE AND ACCURACY.

Manual Magnetic Variation Entry

1. **NAV** Key - DEPRESS to display until **NAVIGATION** Page 3 is displayed.

2. Line Select Key - DEPRESS to place cursor over the **VAR** value field.

3. Local Variation - INSERT **(E** or **W** first).

4. **ENTER** Key - DEPRESS. **(MAN)** will be annunciated adjacent to the **VAR** field.

Returning To Automatic Variation

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 3 is displayed.

2. Line Select Key - DEPRESS to place cursor over the **VAR** value field.

3. **BACK** Key - DEPRESS. **AUTO?** will be displayed to advise the pilot of the impending change.

4. **ENTER** Key - DEPRESS.

*NOTE: Insertion of **E** or **W** followed by **ENTER** will also revert the system to Auto Variation.*

TRUE HEADING

Aircraft Equipped With TRUE/MAG Switch

1. TRUE/MAG Switch - Place in TRUE position.

*NOTE: Once the TRUE/MAG Switch is placed in the TRUE position **T** is displayed adjacent to **BRG, HDG** and **TK** since they are now ref-erenced to true north.*

Aircraft Not Equipped With A TRUE/MAG Switch

NOTE: This procedure must be accompanied by the input of TRUE heading into the system.

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 3 appears.

2. LINE SELECT Key - DEPRESS to place cursor over the **VAR** field.

3. INSERT **E0.**

4. **ENTER** Key - DEPRESS.

*NOTE: The Variation is now **E0** and the system will be referenced to TRUE north. There will be no **T** annunciation adjacent to **BRG, HDG** and **TK**.*

SET HEADING ENTRY

When an IRS is placed in the Attitude Mode the message ENTR SET HDG appears on the SENSOR MESSAGES Page. It is necessary to enter a set heading in order to allow the IRS to output valid magnetic heading data.

Figure 3-198

To Enter A Set Heading:

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 3 is displayed. The heading field may appear as dashes. (Figure 3-198)

2. Line Select Key - DEPRESS to place the cursor over **HDG** field. The last valid heading value appears. (Figure 3-199)

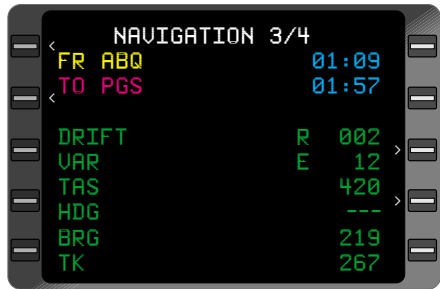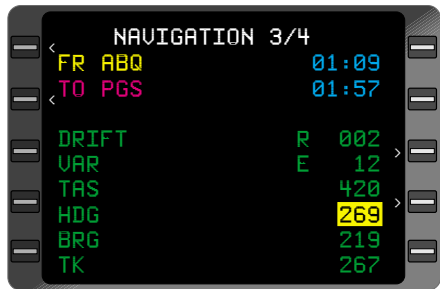*Figure 3-199*

3. **HDG** - VERIFY or INSERT.

4. **ENTER** Key - DEPRESS

*NOTE: In some cases, (MAN) will appear in the **HDG** field and the **SYSTEM MESSAGES** Page will display **USING MAN HDG** message.*

LOSS OF POWER IN FLIGHT

THIS PROCEDURE SHOULD ONLY BE USED IN A REMOTE AREA WHERE NAVAIDS ARE UNAVAILABLE AND THERE IS REASON TO BELIEVE THE SENSORS CONTRIBUTING TO THE COMPOSITE POSITION MAY BE IN ERROR.

The procedure allows the pilot to initialize enroute when the aircraft has sustained a loss of power for more than 7 seconds. The Power Off Waypoint, **"#OFF",** provides a snapshot of system data at the moment power was lost.

To Initialize when power is restored:

*NOTE: When power returns, system performs Self Test and displays the **INITIALIZATION** Page.*

1. **DATE** and **GMT** - VERIFY or ENTER current **DATE** and **GMT** if required.

2. **ENTER** Key - DEPRESS to place the cursor over the **POS** field, if required.

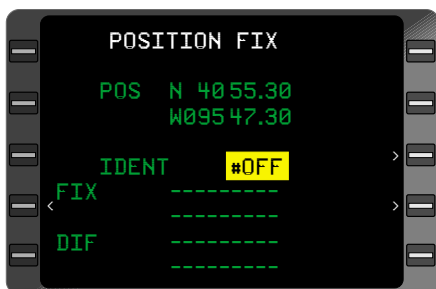*NOTE: The coordinates are a rolling display of the real time blended position of the sensors being updated.*

3. **ENTER** Key - DEPRESS to accept real time position.

4. **HOLD** Key - DEPRESS.

5. Power Off Waypoint IDENT - INSERT **"#OFF".** (Figure 3-200).

6. **ENTER** Key - DEPRESS.

7. **MINUTES OFF, LAST TK, LAST GS** - VERIFY and RECORD for future use. (Figure 3-201).
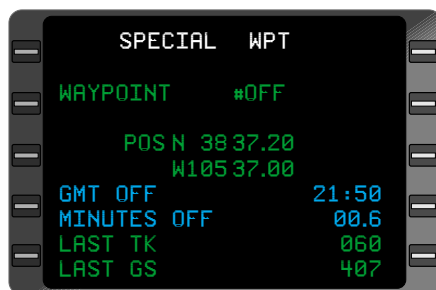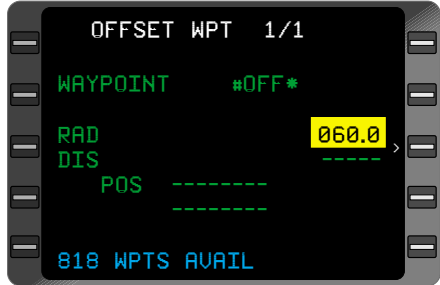

Figure 3-200

Figure 3-201

8. **BACK** Key - DEPRESS to return to **HOLD** Page.

NOTE: An Offset Waypoint (#OFF) can be input with a radial based on the **LAST TK** value and distance calculated from the **LAST GS** value as well as the time elapsed from power off, provided significant changes to aircraft track or groundspeed have not been made. If the aircraft has turned or if the speed has changed, the pilot should estimate the track and distance traveled since the loss of power.*

9. Offset Waypoint IDENT - INSERT.

10. **ENTER** Key - DEPRESS.

11. Recorded or Estimated Radial - INSERT **LAST TK** value or averaged value. (Figure 3-202)

12. Distance - INSERT calculated distance in NM and tenths.

Figure 3-202

13. **ENTER** Key - DEPRESS.

14. Waypoint Coordinates - VERIFY for reasonability.

15. **ENTER** Key - DEPRESS.

16. **DIF** - CHECK

If Update Desired:

17. **ENTER** Key - DEPRESS. The VLF (RPU) sensor and the VPU interfaced to the updated CDU are updated as well as the composite position.

If Update Not Desired:

18. **NAV, PLAN, FPL, TUNE, VNAV, HDG,** or ⤴ Key - DEPRESS to cancel the HOLD.

CREATING/CHANGING PILOT ENTERED (PERSONALIZED) WAYPOINTS

A personalized waypoint may be created by entering a non-NDB (Nav Data Base) waypoint identifier and inserting the desired position coordinates on the Waypoint Page.

The CDU has non-volatile storage for up to 999 waypoints which are retained in memory ONLY if the waypoints are entered on a Stored Flight Plan. The ICAO identifiers stored in the database can not be used for personalized waypoints.

Attempting to enter more than 999 pilot entered waypoints in memory causes **MEM FULL** to be displayed on the **FLIGHT PLAN** Page. The message light will flash and **WPT MEM FULL** will be displayed on the **SYSTEM MESSAGES** Page.

Select the desired Flight Plan and position the cursor over the desired field. If necessary, refer to the procedure for Creating a Flight Plan or Modifying a Flight Plan.

Creating Pilot Entered (Personalized) Waypoints:

1. Personalized IDENT- INSERT.

2. **ENTER** Key- DEPRESS. (Figure 3-203)

3. Latitude- INSERT (**N** or **S** first, then degrees, minutes, and hundredths).

4. **ENTER** Key - DEPRESS.

5. Longitude- INSERT (**E** or **W** first, degrees, then minutes, and hundredths).

Figure 3-203

6. **ENTER** Key- DEPRESS. The display will change to the appropriate **FLIGHT PLAN** or **DIRECT** Page.

Changing Pilot Entered (Personalized) Waypoints:

1. Personalized IDENT- INSERT.

2. **ENTER** Key- DEPRESS. **PILOT ENTERED WPT** Page will appear.

3. Line Select Key - DEPRESS to position the cursor over **POS** field.

4. Repeat Steps 4 - 6 above.

*NOTE: If an offset waypoint from a pilot entered waypoint is programmed, the **RAD** and **DIS** can be changed, but the coordinates cannot be manually inserted.*

CREATING AN OFFSET WAYPOINT

This procedure enables the system to create a waypoint at a given radial and distance from a known point. The known point (parent waypoint) may be any stored personalized or database waypoint.

An offset waypoint may be inserted in any Waypoint IDENT field. The offset waypoint is retained in memory after system shutdown ONLY if entered on a Stored Flight Plan.

Position the cursor over the desired waypoint IDENT field.

NOTE: The offset waypoint uses station declination, if available, or it uses the calculated magnetic variation of the parent waypoint. All waypoints defined by a VHF Navaid in the National/International Airspace System are based on the VHF Navaid station declination. Since the magnetic variation and station declination may not be the same at a given Navaid, the calculated position and the defined FMS position may differ.

1. Parent Waypoint IDENT-
    INSERT with an * follow-
    ing the entry. (Figure 3-
    204)

NOTE: More than one offset waypoint is allowed from one parent, using *, *1, *A1, etc., as identifying notation.

Figure 3-204

2. **ENTER** Key-DEPRESS.

NOTE: If field blinks, Parent Waypoint does not exist in CDU memory or in database and must be defined on a Flight Plan Page.

3. Desired Radial- INSERT. The degrees can be entered as whole numbers and the .0 will be loaded automatically. i.e. type 77, 077.0 will be displayed. If a of a degree is desired, all 4 digits must be entered. 0775 will be displayed as 077.5, 3001 will be displayed as 300.1 etc.

4. **ENTER** Key-DEPRESS.

5. Desired Distance-INSERT (NM and tenths, 1999.9 NM maximum).

6. **ENTER** Key-DEPRESS.

7. **POS** Coordinates- VER-
   IFY for reasonability.
   (Figure 3-205)

8. **ENTER** Key-DEPRESS.

NOTE: An Offset Waypoint is used in the same manner as any other waypoint.
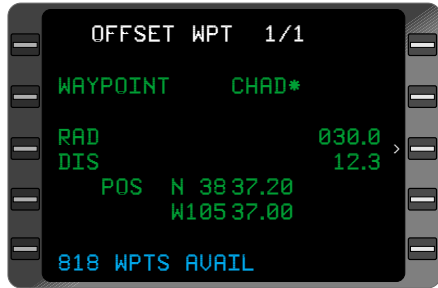


```
OFFSET WPT   1/1

WAYPOINT    CHAD*

RAD              030.0
DIS               12.3
    POS  N 38 37.20
         W105 37.00

818 WPTS AVAIL
```

Figure 3-205

PERFORMING FDE PREDICTION FOR OCEANIC/REMOTE OPERATION

All references to FDE prediction do not apply to 17960-0101 units. FDE prediction is only available in 17960-0102, 17960-0203 and 17960-0204 units.

This procedure must be performed prior to departure for a flight plan involving Oceanic/Remote operation where GPS is to be the sole source of navigation. The maximum segment length for which FDE prediction can be calculated is 25 hours at a ground speed of 100 Kts.


```
PLAN  7/8
     FDE
DEPART DT   20 DEC 95
DEPART GMT      --:--
ROUTE SPACING      --
EXPECTED GS       ---
START FDE WPT   -----
END FDE WPT     -----
EXCLUDE SATS  (QTY 0)
  PREDICTION UNAVAIL
```

Figure 3-206

1. **PLAN** Key - DEPRESS to display **PLAN 7/8 FDE** Page. See Figure 3-206

2. Line Select Key - DEPRESS if necessary to place the cursor over the **DEPART DT** field. Enter the departure date for which FDE prediction is desired.

NOTE: The date entered may be up to six months either side of the current date.


```
PLAN  7/8
     FDE
DEPART DT   25 DEC 95
DEPART GMT      13:00
ROUTE SPACING      35
EXPECTED GS       300
START FDE WPT     JFK
END FDE WPT      EBBR
EXCLUDE SATS  (QTY 0)
START CALC? ENTER
```

Figure 3-207

3. **ENTER** Key - DEPRESS.

4. Enter the departure time for which FDE prediction desired.

5. **ENTER** Key - DEPRESS.

6. Enter the desired route spacing in nautical miles. 60NM is normal.

7. **ENTER** Key - DEPRESS.

8. Enter the expected ground speed in knots. A value of 100 to 999 Kts may be entered.

9. **ENTER** Key - DEPRESS.

10. Enter the starting waypoint of the active flight plan leg for which FDE prediction is being calculated. Pressing the **BACK** Key will cycle through the waypoints on the active flight plan. Dashes are displayed prior to the last waypoint on the flight plan. Pressing **ENTER** while the dashes are displayed will clear the start and end waypoints, resulting in an undefined Oceanic/Remote segment.

11. **ENTER** Key - DEPRESS.

12. Enter the ending waypoint of the active flight plan leg for which FDE prediction is being calculated. The **BACK** and dashes operate the same here as in the previous step.

13. **ENTER** Key - DEPRESS.

14. If no satellites are to be excluded from the FDE prediction, DEPRESS the lower right Line Select Key and proceed to Step 20. If specific satellites are to be excluded from the FDE prediction, go to Step 15.

15. **ENTER** Key - DEPRESS to display the **FDE EXCLUDE SATS 1/1** Page. See Figure 3-208

16. Line Select Key - DEPRESS to position the cursor in the **SAT #** field.
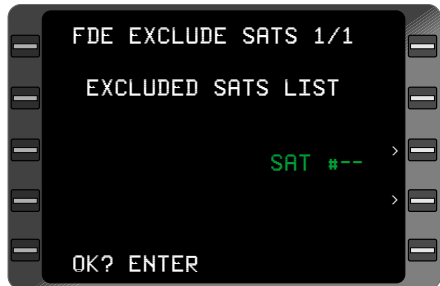
17. Enter the satellite number to be excluded.

Figure 3-208

FDE EXCLUDE SATS 1/1

EXCLUDED SATS LIST

SAT #--

OK? ENTER

18. **ENTER** Key - DEPRESS. The satellite number is now displayed in the **EXCLUDED SATS LIST** field.

*NOTE: Entering a number already listed and pressing **ENTER** will remove the number from the list. Pressing the Line Select Key next to **CLEAR ALL** and pressing **ENTER** will remove all satellites from the exclusion list.*
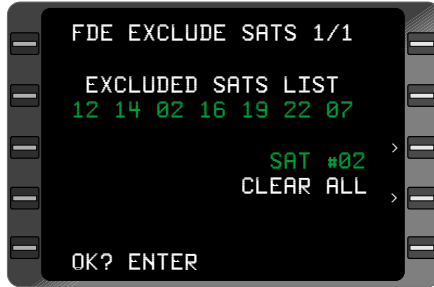
19. **ENTER** Key - DEPRESS when all desired satellites are entered. **PLAN 7/8 FDE** Page will again be displayed.

20. **START CALC? ENTER** is displayed at the bottom of the screen. See Figure 3-210

Figure 3-209

Figure 3-210

21. **ENTER** Key - DEPRESS. **PLAN 8/8 FDE COMPUTATION** Page is now displayed. **COMPUTING - STANDBY** will flash while FDE prediction is being calculated and the percentage completed will be shown. When the prediction calculation is complete, an **FDE** and **NAV AVAILABLE** or **UNAVAILABLE** message will be displayed as shown in Figures 3-212 and 3-213.


```
       PLAN  8/8
     FDE COMPUTATION


  COMPUTING - STANDBY

      51% COMPLETE

      CANCEL COMPUTE  ›
```

Figure 3-211


```
       PLAN  8/8
     FDE COMPUTATION

      FDE AVAILABLE
      NAV AVAILABLE

   GPS PRIMARY MEANS
      NAV OK
```

Figure 3-212


```
       PLAN  8/8
     FDE COMPUTATION

     FDE UNAVAILABLE
     NAV UNAVAILABLE

   GPS PRIMARY MEANS
     NAV NOT ALLOWED
```

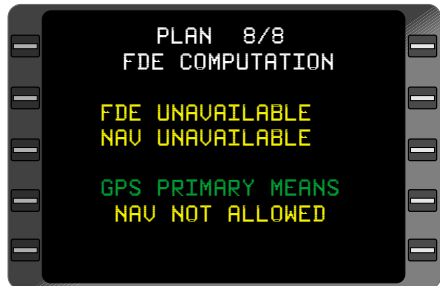*Figure 3-213*

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SEARCH AND RESCUE

Introduction

In addition to the standard GNS-XLS functions, the FMS may be configured for special mission capabilities. The following section describes those capabilities.

Search Patterns

The XLS-MSP generates and steers the aircraft through five search pattern types; Ladder, Expanding Square, Orbit, Sector Search, and Parallel Line. The operator is able to select the pattern and define the specific parameters appropriate to the mission. Search Patterns can be activated, cancelled, deleted, or interrupted at any time.

Break and Resume

The search pattern being flown can be interrupted, then resumed at the operator's convenience with the aircraft automatically returned to the point of interruption traveling in the proper direction. This allows the crew to maneuver the aircraft freely, while allowing resumption of the search pattern with no loss of coverage.

Enhanced Steering

During an active search, the XLS increases the steering gains to those used during an approach to ensure the aircraft accurately tracks the search pattern. Also during an active search, the scaling of the crosstrack distance indicators is increased to 1 nm full scale deflection (terminal mode scaling). Configuration for steeper bank angles is provided.

Target Waypoints

The XLS-MSP allows the flight crew to generate target waypoints by designating a position via a discrete switch (Mark-On-Target) or via digital interface such as a weather RADAR. Target waypoints are stored on a flight plan by the XLS for future use. In addition, direct navigation may be selected to one of the latest nine target waypoints from the Direct-To Target Waypoints page.

WGS-84 to Tokyo Datum Calculation

The XLS may be configured to provide a special PLAN page to convert a position fix between the WGS-84 and the Tokyo coordinate systems.

Accessing the Search Pattern Planning Pages

The GNS-XLS generates and steers the aircraft through five search pattern types: Ladder, Expanding Square, Orbit, Sector Search, and Parallel Line. To access the search pattern page, a waypoint identifier is entered on the ACTIVE flight plan that starts with an asterisk (e.g. ***ICT**). See Figure 3-214.

Figure 3-214

Each search type is selectable from the Search Parameter page. See Figure 3-215.

Once the search type is selected, parameters for the specific search may be entered.
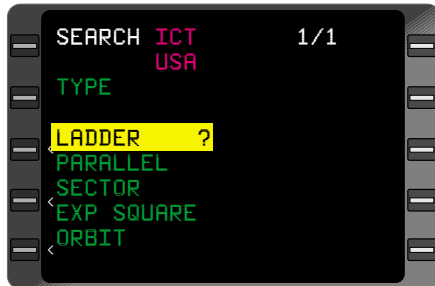
Figure 3-215

Search pattern waypoint naming

Search patterns are entered into the ACTIVE flight plan by insertion of search waypoints. Search waypoints have a naming design that includes the search pattern and waypoint number. An example of a LADDER search, with 5 waypoints, is as follows:

L00 01	Ladder search pattern 00, Waypoint 01
L00 02	Ladder search pattern 00, Waypoint 02
L00 03	|
L00 04	|
L00 05	Ladder search pattern 00, Waypoint 05

In this manner, search pattern waypoint naming uses the following characters for search pattern types:

L   Ladder

P   Parallel

S   Sector

E   Expanding Square

O   Orbit

Ladder Search Pattern

The Ladder search is a search comprised of a series of parallel legs with fly-by waypoints. The pattern begins at the Search Waypoint Identifier, proceeds outbound along the initial desired track for the specified leg length distance, and turns in the initial turn direction. The pattern then proceeds along a track 90 degrees to the initial desired track for the specified leg space distance, and turns again in the initial turn direction. The next leg track is 180 degrees to the initial desired track for the specified leg length distance and the turn is in the opposite direction for the initial turn direction. A space leg is then flown, ending in a turn again opposite to the direction of the initial turn. This pattern is then repeated for a maximum of 99 legs.

When the cursor on the Search Pattern Page is over the LADDER search pattern types and the **ENTER** key is pressed, the FMS shall display the **LADDER SEARCH** page. See Figure 3-216.

On the **LADDER SEARCH** page the search pattern parameters are entered:

```
    SEARCH ICT      1/1
           USA
 TYPE            LADDER
 
 INIT DTK         -----
 LEG LENGTH       -----
 LEG SPACE         ----
 INIT TURN        RIGHT
 LEGS                 3
```

Figure 3-216

Initial Desired Track (**INIT DTK**) – entered from 0 to 360 degrees

LEG LENGTH – entered in nautical miles from 0.5 to 999.9

LEG SPACE – entered in nautical miles from 0.5 to 99.9

Initial turn **(INIT TURN**) – Right or Left

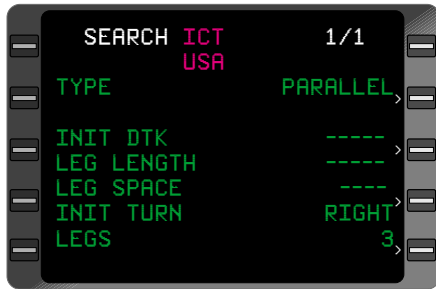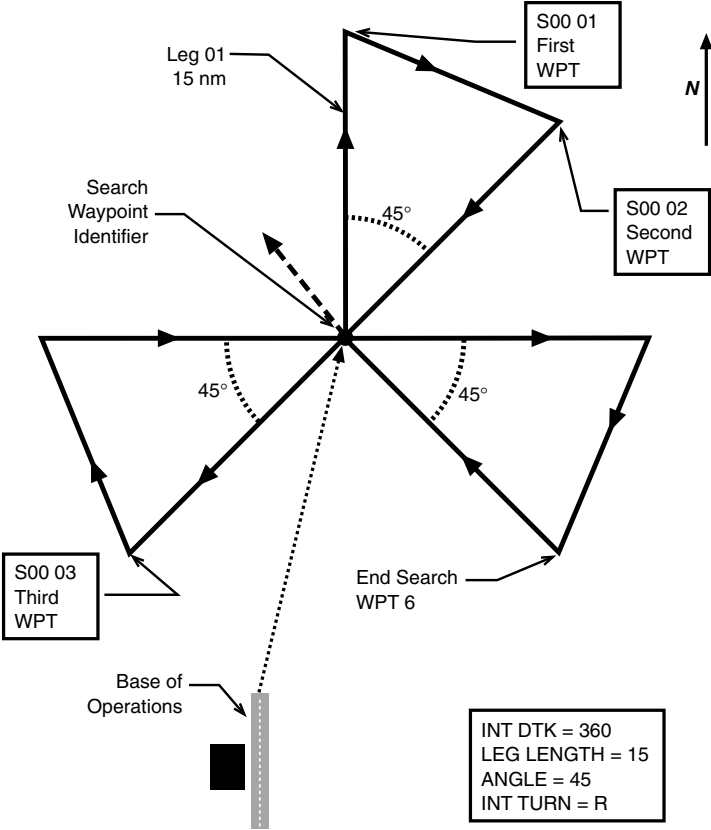Number of legs (**LEGS**) – Number of legs; total number of waypoints must remain below 100, minimum is 3 legs

Parallel Line Search Pattern

The Parallel Line Search is similar to the Ladder search except the parallel search is made of over-fly waypoints and uses special turn sequences designed to assure the aircraft is on track at the beginning of each new leg of the ladder. The pattern begins at the Search Waypoint Identifier, proceeds outbound along the initial desired track for the specified leg length distance, over flying the leg endpoint before turning in the initial turn direction. It then proceeds inbound on the leg track that is 180 degrees to the initial desired track for the specified leg length distance, ending again in turn opposite to the direction of the initial turn. This pattern is then repeated for a maximum of 99 legs.
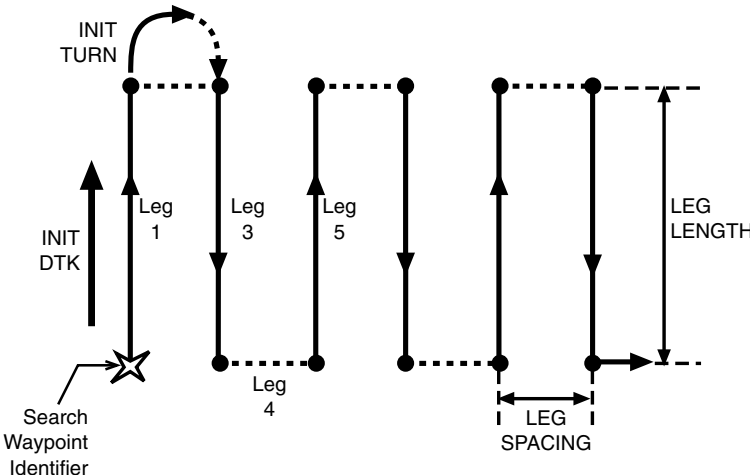
For Leg Spacing Less Than 2x the Minimum Turn Radius
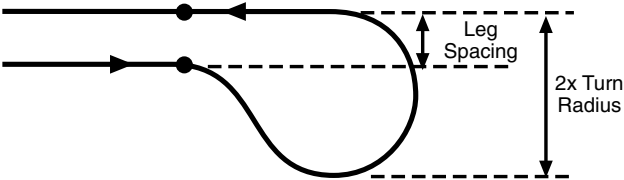
For Leg Spacing Greater Than 2x the Minimum Turn Radius
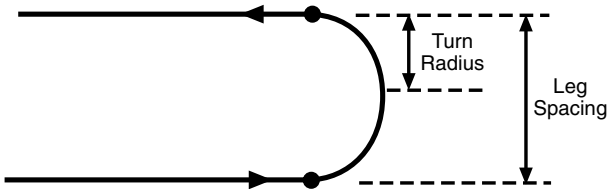
On the **PARALLEL SEARCH** pattern page the search pattern parameters are entered:

> Initial Desired Track (**INIT DTK**) – entered from 0 to 360 degrees
>
> **LEG LENGTH** – entered in nautical miles from 0.5 to 999.9

```
    SEARCH ICT        1/1
           USA
 TYPE          PARALLEL

 INIT DTK          -----
 LEG LENGTH        -----
 LEG SPACE          ----
 INIT TURN         RIGHT
 LEGS                  3
```

Figure 3-217

LEG SPACE – entered in nautical miles from 0.5 to 99.9

Initial turn **(INIT TURN)** – Right or Left

Number of legs (**LEGS**) – Number of legs; total number of way-points must remain below 100, minimum is 3 legs

GNS-XLS Enhanced Flight Management System

Sector Search Pattern

A Sector search starts at the Search Waypoint Identifier, proceeds outbound along the initial desired track for the leg length distance, and turns in the initial turn direction. The next leg is a segment that intercepts an inbound desired track that is equal to the reciprocal of the initial desired track plus or minus the specified angle, depending on the direction of turn, at a distance equal to the initial leg length. The search turns again in the same direction and proceeds inbound to the Search Waypoint Identifier. The next leg proceeds outbound along an extension of the previous leg, for a distance equal to the initial leg length and terminates with a turn in the same direction to intercept another inbound track. The inbound track is the reciprocal of the previous leg, plus or minus the specified angle, depending on the direction of the turn. The pattern repeats in a similar manner for a maximum of 99 legs.

On the **SECTOR SEARCH** pattern page the search pattern parameters are entered:

```
    SEARCH ICT        1/1
           USA
    TYPE           SECTOR

    INIT DTK         -----
    LEG LENGTH       -----
    INIT TURN        RIGHT
    LEGS                 3
    ANGLE            -----
```

Figure 3-218

    Initial Desired Track (**INIT DTK**) – entered from 0 to 360 degrees

    LEG LENGTH – entered in nautical miles from 0.5 to 999.9

    Initial turn **(INIT TURN)** – Right or Left

    Number of legs (**LEGS**) – Number of legs; total number of waypoints must remain below 100, minimum is 3 legs

    ANGLE – entered in degrees from 0.2 to 90.0

Expanding Square Search Pattern

The Expanding Square search begins at the Search Waypoint Identifier, proceeds outbound along the initial desired track for the specified initial leg length distance, and turns in the initial turn direction. It then proceeds along a track 90 degrees to the initial desired track direction for the specified initial leg length distance, and again turns in the initial turn direction. The next leg is 180 degrees to the initial desired track and the distance is increased by the amount of the initial leg length distance. The fourth leg is the reciprocal of the second leg. The turn at the end of this leg is again in the same direction, making the next leg parallel and in the same direction as the initial desired track. The distance is equal to the previous leg. The pattern continues in this manner with the turn always being in the same direction and the distance after each pair of legs increasing by the amount of the initial leg length distance, for a maximum of 99 legs.

S0 01
5 nm

Waypoint
S0 06

Search
Waypoint
Identifier

Leg 05
Radius 5 nm

End Search
WPT-x

N

DIRECT TO Base

Base of
Operations

INT DTK = 360
INT LEG LENGTH = 5
INT TURN = R
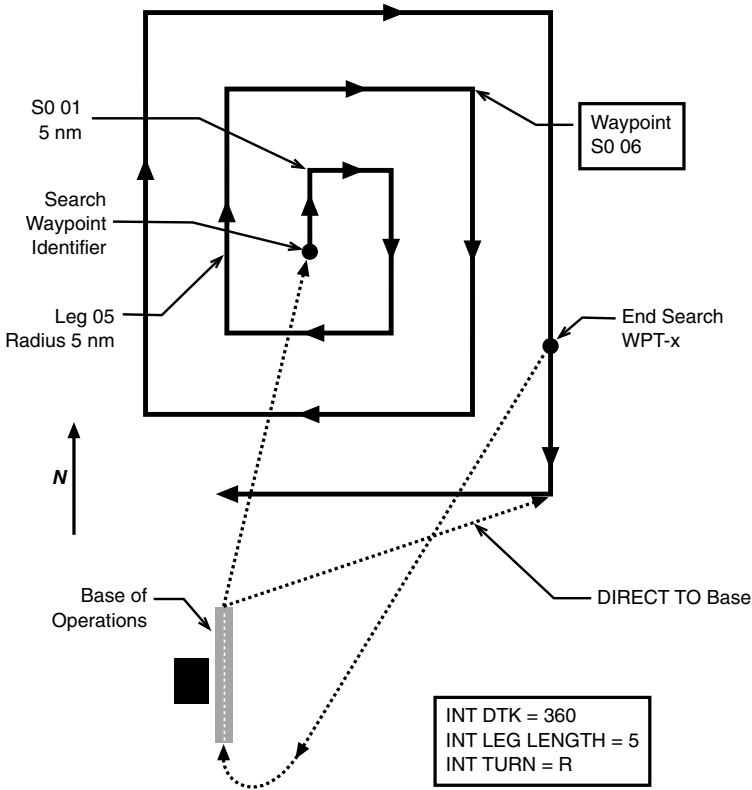
On the **EXPANDING SQUARE SEARCH** pattern page the search pattern parameters are entered:

Initial Desired Track (**INIT DTK**) – entered from 0 to 360 degrees

LEG LENGTH – entered in nautical miles from 0.5 to 999.9

Initial turn **(INIT TURN)** – Right or Left

Figure 3-219

Number of legs (**LEGS**) – Number of legs; total number of waypoints must remain below 100

Orbit Search Pattern

An Orbit search starts at the Search Waypoint Identifier and proceeds outbound along the initial desired track. The airplane turns in the initial turn direction to intercept a circular orbit about the Search Waypoint with the specified radius.

See Figure 3-220 for the page to define the ORBIT search parameters.

Data entered for the orbit search pattern is:

INIT DTK   Initial Desired Track to enter the orbit.
                          0 to 360 degrees.

RADIUS   Radius in nautical miles of the orbit pattern from
                          1.0 to 999.9.

INIT TURN   Whether the orbit is flown as a clockwise (CW) or
                          counter-clockwise (CCW) rotation. To change direc-
                          tion, cursor to the field and press the **BACK** key.

LEGS   Number of straight line legs in the orbit pattern.
                          Maximum is 99 waypoints. Minimum is 4 waypoints.

ORBITS   Number of times the orbit pattern repeats itself.

The orbit search pattern defaults to an initial desired track of 000 degrees with a radius of 10.0 nm. The turn direction is set for clockwise with 36 legs to the orbit. One orbit pattern is the default condition.

```
   SEARCH PAGE      1/1
 ‹
 FR *SLI
         ORBIT           ›

 INIT DTK           000›
 RADIUS            10.0
 TURN                CW›
 LEGS                36›
 ORBITS               1›
```
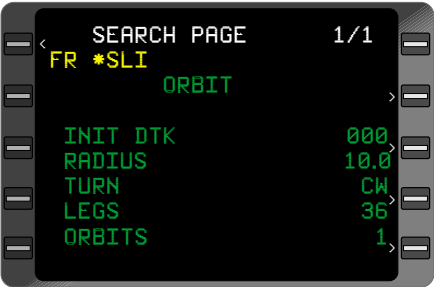
Figure 3-220

At any time the FMS is executing a SEARCH pattern, the FMS will default to TER-
MINAL scaling cross track deviation. The roll steering commanded to the autopilot will have increased gains. The gain changes are to keep the aircraft as close to the search pattern legs as possible.

Leg 04
Radius 5 nm

Search
Waypoint
Identifier

N

End Search
WPT-x

DIRECT TO Leg xx

Base of
Operations

INT DTK = 360
RADIUS = 5
INT TURN = R
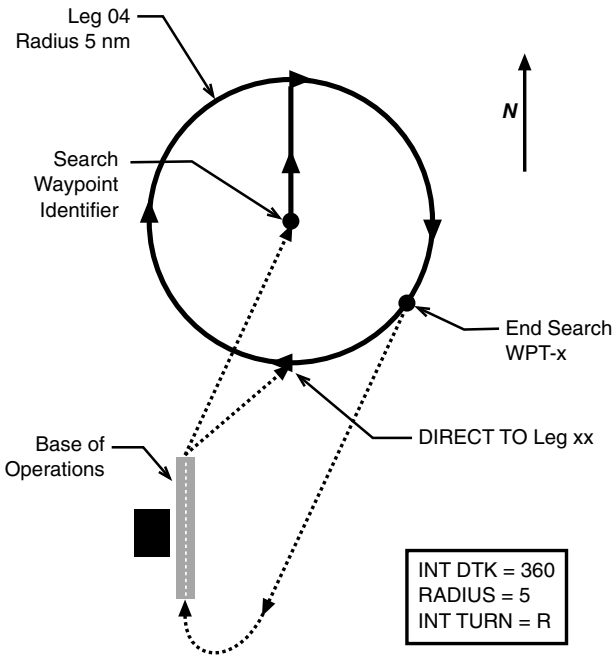
Search Pattern Break and Resume

The FMS provides the capability for the aircraft to break from a search pattern, in order that the aircraft be flown manually to view a possible target. At the crews discretion, the search pattern may be resumed at the point of departure.

When the FMS is on a search pattern, the BREAK option may be selected by changing **AUTO** leg change mode to **BREAK** on the bottom of **NAV** page 1. See Figure 3-221.

When **BREAK** mode is selected, the following will occur:

```
     NAVIGATION 1/4
FR L00 03           12:09
TO #BREAK           12:10

DIS                    1.6
ETE               00:00.7
DTK                    074
GS                     160
WIND               204/  7
            BREAK
```

Figure 3-221

The leg change mode indicator/selector will indicate **BREAK** on the bottom of **NAV** page 1.

Leg sequencing shall not occur.

The **FR** (FROM) waypoint shall be the **FR** (FROM) waypoint prior to the Break.

The displayed **TO** waypoint on Nav Page 1, 2 and 3 shall be the Break Waypoint. The Break Waypoint does not need to be accessible to the operator including access from the Direct-To, FPL, PLAN, or waypoint pages.

The output to the EFIS should indicate the Break Waypoint is the **TO** waypoint. The Break Waypoint shall be at the location where search pattern was interrupted.

The guidance and position information displayed on the FMS or output from the FMS shall be relative to the leg between the **FR** (FROM) waypoint and the Break Waypoint.

Selection of the **RESUME?** option from the leg change mode indicator/selector causes the FMS to provide guidance to resume the execution of the search pattern at the point of the break. On re-entry into the search pattern, the aircraft shall be established on a track equivalent to the aircraft track when the break option was selected. See Figure 3-222. While the FMS is in Search Pattern Resume mode:

The leg change mode indicator/selector on NAV page 1 indicates **RESUME**.

The cursor may be placed on the **RESUME** or **CANCEL?** option to select it. **CANCEL?** returns the FMS to Break mode.

Leg sequencing shall not occur.

The **FR** (FROM) way-point shall be the **FR** (FROM) waypoint prior to the Break.

```
       NAVIGATION 1/4
FR L00 03            12:09
TO #BREAK            12:10

DIS                    1.6
ETE                00:00.7
DTK                    074
GS                     160
WIND               204/  7
          RESUME
```

Figure 3-222

The displayed **TO** waypoint on Nav Page 1,2 and 3 shall be the Break Waypoint.

The guidance and position information displayed on the FMS or output from the FMS shall be relative to the leg between the **FR** (FROM) waypoint and the Break Waypoint.

The Direct or Teardrop holding pattern entry guidance shall be used to establish the aircraft on a track equivalent to the aircraft track prior to the break. The holding pattern entry will return the aircraft on the same portion of the SEARCH pattern before the BREAK was executed.

Once the SEARCH mode has been resumed and the BREAK waypoint captured, the FMS returns to SEARCH mode.

Target Waypoints

Target waypoints are waypoints selected by the search crew and stored in the FMS for later retrieval. Target waypoints may be input into the FMS by selection of targets from a radar display joystick. Target waypoints may also be selected by activation of a mark-on-target switch. The mark-on-target causes the present aircraft position to be set as a target waypoint.

Target waypoints are numbered sequentially as T000 to T999. The highest number associated with the target waypoint indicates the last target waypoint entered. The FMS will begin counting at the last number target waypoint found in memory.

The last nine target waypoints entered into the system may be selected on a **DIRECT-TO** page. Press the ■ Key three times (1 – for DIRECT TO flight plan list, 2 – for DIRECT TO closest airport, 3 –

for DIRECT TO target way-
points). The last nine target
waypoints, with bearing/dis-
tance to that waypoint, are
displayed and can be select-
ed for DIRECT-TO opera-
tion.

Target waypoints are stored
on stored flight plan 56 and
may be accessed via the
FLIGHT PLAN LIST page

Figure 3-223

where stored flight plans are accessed. A total of fifty target way-
points may be stored in the flight plan at any one time. Target way-
points latitude/longitude may be reviewed by accessing **FLIGHT
PLAN 56**, and then selecting the particular waypoint of interest. The
target waypoint latitude/longitude is displayed on the **PILOT
ENTERED** waypoint page.
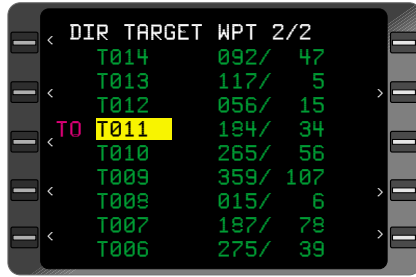
WGS-84 to Tokyo Datum Calculation

When configured, the FMS will have the capability to calculate lati-
tude/longitude positions from WGS-84 (the standard FMS coordinate
system) to TOKYO coordinate system. This calculation indicates the
same position between the
two coordinate systems.

The calculation page is on
PLAN 8/8 page. When the
page is first accessed, the
present position of the air-
craft is displayed (WGS-84).
Latitudes and longitudes
may be entered in the WGS-
84 section, with the calculat-
ed TOKYO latitude and lon-
gitude displayed. Likewise,

Figure 3-224

data may be entered in the TOKYO section with the calculated
WGS-84 position displayed.

An example of the page is shown in Figure 3-224.

The FMS continues to use WGS-84 datum for all latitudes and longi-
tudes within the FMS. The TOKYO datum plan page is a calculator
page only.

SECTION 4

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS)

GNS-XLS TERRAIN OPERATION

Some GNS-XLS systems are configured to display terrain data from an enhanced ground proximity warning sensor. The terrain data is provided to enhance situational awareness of the crew to terrain around the aircraft and its path. Refer to the enhanced ground proximity system operator's manual for detailed information on the terrain display information.

To display terrain data on the GNS-XLS, press the **TERR** key. The terrain data will be displayed on the FMS screen.

*Note: If terrain data is not available from the enhanced ground proximity system, the message **TERRAIN DISPLAY NOT AVAILABLE** will be shown on the FMS screen.*

TERRAIN PROFILE DISPLAY

The terrain can be displayed in plan view only, or in plan and profile view (Figure 4-1). The plan only view looks like the upper 2/3 of Figure 4-1 expanded to fill the whole screen. The mode of the display can be changed between Plan, Profile and Center mode using LSK R3.

Figure 4-1

Reference the Terrain Profile View shown in Figure 4-1 for the following descriptions.

5000 MSL   Present aircraft altitude

RNG 80   Present range setting 80 nm to outer ring. Range scales are 5, 10, 20, 40, 80, 160, and 320 nm. Range can be scaled up by LSK R1 and down by LSK R2.

000   Present magnetic heading.

               True heading will be indicated with **T** when in true head-
               ing mode. Aircraft track will replace heading if heading is
               not available.

▲   Present aircraft position.

XXX   Present PEAKS mode altitudes:

               108 - Highest red is 10800 feet.
               030 - lowest green is 3000 feet.

MODE   Selects Terrain display mode.

The profile view of the ter-
rain displays a vertical
view of the aircraft looking
ahead at terrain. The ver-
tical 'slice' is looking for-
ward from the present air-
craft heading. The present

Figure 4-2

aircraft altitude is displayed. See Figure 4-2.
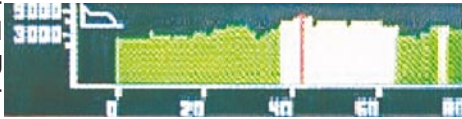
TERRAIN CENTER MODE DISPLAY

An aircraft center mode dis-
play is available. With this
display, the present position
of the aircraft is depicted in
the center of the terrain data.
See Figure 4-3.

Figure 4-3

SECTION 5

DATABASE UPDATE

DATA BASE UPDATE PROCEDURES

1. Apply aircraft power.

2. Turn the screws located directly above both lower DZUS fasteners counter-clockwise. The screws will remain in the door. Carefully lift the door.

3. Insert current Data Base Update card firmly into the slot. The double row of holes on the forward edge of the card must be inserted first, with the write protect slot toward the left edge of the card. Insert the card at the same level as the eject button located at the left edge of the slot.

```
    DATA BASE UPDATE
TYPE:WW        CARD:1/1
REVISION:          3-95
EXPIRES:     13 MAR 95

ENTER CHOICE:
1  BEGIN UPDATE
<

2  RESTART NAV
<  (REMOVE CARD)
```
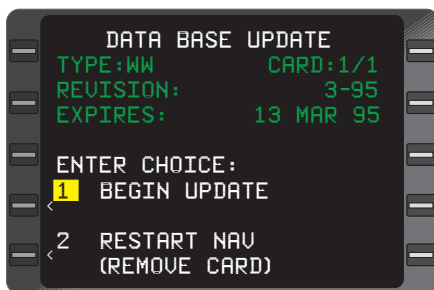
Figure 5-1

4. **ON** Key - DEPRESS to turn on system. Figure 5-1 appears.

TO UPDATE

CAUTION: IF AN INTERRUPTION OF THE UPDATE PROCESS IS DESIRED, REMOVE THE UPDATE DISK. DO NOT TURN OFF POWER TO STOP THE UPDATE.

5. Line Select or **1** Key - DEPRESS to select **BEGIN UPDATE**, if required. If update is not desired, depress the Line Select or **2** Key to select restart NAV.

```
    DATA BASE UPDATE
TYPE:WW        CARD:1/1
REVISION:          3-95
EXPIRES:     13 MAR 95




<

<        2% COMPLETE
```
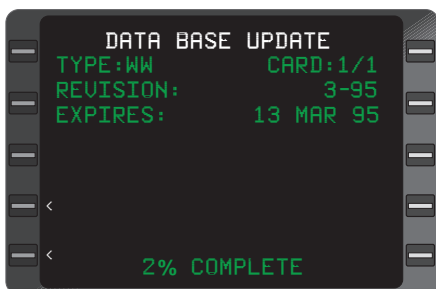
Figure 5-2

6. With cursor over option **1, ENTER** Key - DEPRESS. The Update - Data Base Page and, the message **"X" % "COMPLETE"** appear indicating the update is in progress. (Figure 5-2)

WHEN UPDATE IS COMPLETE

If the update is successful, Figure 5-3 is displayed.

8. Turn system OFF or DEPRESS **ENTER** Key to restart navigation.

IF UPDATE FAILS

If the database update fails, Figure 5-4 is displayed.

Depress the **1** Key then **ENTER** Key to retry the update or use the following procedure. Sometimes when a retry is initiated, a display such as that shown in Figure 5-5 may be seen momentarily.

1. Update Card - REMOVE.

2. Turn system OFF.

3. Update Card - RE-INSERT into CDU.

4. Turn system ON and retry Update using UPDATE PROCEDURE, Steps 1-7.
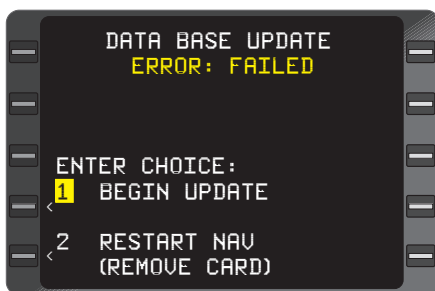
Figure 5-3
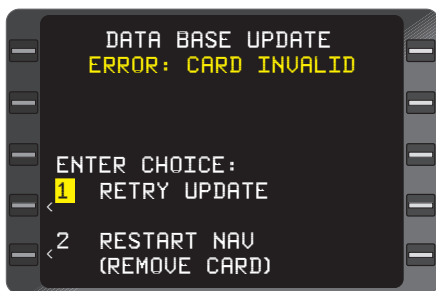
Figure 5-4

Figure 5-5

SECTION 6

LIST OF ABBREVIATIONS AND DEFINITIONS

DEFINITION

A	AT or ABOVE (Ref. to VNAV Altitude Constraint)
ADC	Air Data Computer
ADF	Automatic Direction Finder
AFIS	Airborne Flight Information System
AFM	Aircraft Flight Manual
AHRS	Attitude Heading Reference System
ALT	Altitude
APRCH	Approach
AR	DME Arc
ARINC	Aeronautical Radio, Inc.
ARP	Airport Reference Point
ASU	Antenna Switching Unit
ATC	Air Traffic Control
AUTO	Automatic
AZ	Satelite Azmiuth Relative to Aircraft Position
B	AT or BELOW (Ref. VNAV Altitude Constraint)
Baro	Barometric Altitude
BASIC OP WT	Basic Operating Weight
BRG	Bearing to Waypoint
BRT	Bright

	DEFINITION
CDI	Course Deviation Indicator
CDU	Control Display Unit
CH	Channel
CLIMB GRAD	Current Aircraft Climb Performance in feet per Nautical Mile
CRUISE ALT	Cruise Altitude
ꝺ➔	Direct To (Laterally)
DB	Database
DEF	Default
DIF	Difference
DIR	Direct
DIS	Distance
DME	Distance Measuring Equipment
DN	Down
DTK	Desired Track
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground ProximityWarning System
EL	Satelite Elevation Above the Horizon
ELEV	Elevation
ENRTE	Enroute
EST CROSSING	Estimated Crossing Altitude
ETA	Estimated Time of Arrival
ETA @	Estimated Time of Arrival at Destination
ETE	Estimated Time Enroute
EXP	Expires

DEFINITION

FCF	Final Course (Alignment) Fix.
FL	Flight Level
FAF	Final Approach Fix
FDE	Fault Detection and Exclusion. Detection meaning the capability of the system to detect a satellite failure that will affect navigation. Exclusion meaning the capability of the system to exclude one or more failed satellites from the prediction solution, thus, preventing a satellite failure from affecting navigation. Available only in -0102 units.
FMS	Flight Management System - includes CDU and optional RPU
FPA	Flight Path Angle
FPL	Flight Plan
FPM	Feet per minute
FR	From Waypoint
FREQ	Frequency
FT	feet
G	Glide path (Ref. to VNAV Altitude Constraint)
GMT	Greenwich Mean Time
GPS	Global Positioning System
GS	Groundspeed
HDG	Heading
HDOP	Horizontal Dilution of Precision
HLTH	Satelite Health (Good or Bad)
HP	Holding Pattern

	DEFINITION
HPE	Horizontal Position Error (A Quality Factor for the GPS.)
HSI	Horizontal Situation Indicator
IAF	Initial Approach Fix
ICAO	International Civil Aviation Organization
IDENT	Identifier
ILS	Instrument Landing System
INBOUND CRS	Inbound Holding or Procedure Turn course
INS	Inertial Navigation System
IRS	Inertial Reference System
Jeppesen	Name of Navigation Database Source
KEY	CDU Keyboard Entry
KG	Kilogram/Kilograms
kHz	Kilohertz
LAT	Latitude
LB	Pound/Pounds
LEG DIST	Leg Distance
LON	Longitude
MAG	Magnetic
MAG VAR	Magnetic Variation
MAN	Manual Entry
MAN ALT	Manual Altitude

	DEFINITION
MAP	Missed Approach Point
MHz	Megahertz
MSG	Message
NAV	Navigation
NAVAID	Navigation Aid (Typically a Radio Station Providing VOR and/or DME Position Data)
NDB	NAV Database or Non-Directional Beacon
NM	Nautical Miles
NOTAM	Notice to Airman
NX	Next Waypoint
NXT	Next
OM	Outer Marker
POS	Position (Present or Waypoint)
PRESEL ALT	Preselect Altitude
#PRESL	Preselected Altitude Profile Point
PREV or PRV	Previous
PRN	Pseudo Random Noise (GPS Satelite Number)
PT	Procedure Turn
RAD	Radial
RAIM	Receiver Autonomous Integrity Monitoring
REM	Remaining
REQ FPM	Required Feet Per Minute

DEFINITION

RCVD	Received
RMI	Radio Magnetic Indicator
RNAV	Area Navigation or type of Non Presision Approach
RNG	Range
RW	Runway
SAT	Satelite (PRN) Number
SID	Standard Instrument Departure
SM	Software MOD Level
SNR	Signal to Noise Ratio
STAR	Standard Terminal Arrival
SXTK	Selected Crosstrack
T	True (Heading or Track) or whether a Satelite is being trached or not.
TACAN	TACtical Air Navigation
TAS	True Airspeed
TK	Track Angle
TKE	Track Error
#TOC	Top of Climb Profile Point
#TOD	Top of Descent Profile Point
TRANS LEVEL	Transition Level (The Altitude at which Altitudes Become Flight Levels)

<u>DEFINITION</u>

TRCK	Track (Satellite Status)
TRMNL	Terminal
VAR	Magnetic Variation
VERT DEV	Vertical Deviation
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	VHF Omnirange
VORTAC	VHF Omnidirectional Range TACAN
VPU	VORTAC Position Unit
Waypoint	A Point Defined in Space Used in Navigation
WPT	Waypoint
WW	NDB Worldwide Coverage
XPDR	Transponder
XTK	Crosstrack

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SECTION 7

AFIS

AIRBORNE FLIGHT INFORMATION SYSTEM

AND

SATELLITE DATA COMMUNICATIONS SYSTEM

This section applies only to aircraft equipped with an AFIS system.

The purpose of this section is to acquaint users of AFIS Flight Plan and Weather Advisory Services with the equipment, its capabilities, and its operation. AFIS services are ADVISORY only, as they contain elements provided by the National Weather Service and information supplied by the pilot. Therefore, it is the responsibility of the pilot in command to exercise reasonable and prudent judgment in the use of these ADVISORY services.

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DESCRIPTION

AFIS is an Airborne Flight Information System that provides integrated flight planning and performance management interfaces to the GNS-X<small>LS</small> Nav Management System.

NOTE: The displays in this section apply to installations with MOD 11 or later DMU.

These interfaces consist of three major capabilities:

1. Access to ground based Global Data Center computers from a Personal Computer for the purpose of generating or retrieving performance optimized flight plans and current aviation weather;

2. Digital transfer of AFIS Flight Plan and weather data into the Nav Management System for display and performance monitoring on the GNS-X<small>LS</small> Color CDU; and

3. Air/ground computer link interfacing the GNS-X<small>LS</small> Nav Management System to the ground based Global Data Center computers for the purpose of providing enroute flight plan, weather, performance updates, requesting pre-departure clearance, and sending or receiving messages.

AFIS interfaces with ARINC, SITA and AVICOM VHF networks and the Inmarsat satellite network to provide a communication link between the aircraft and the Global Data Center. ARINC provides coverage within the continental United States, Hawaii, Alaska, the Aleutians, Guam, Saipan, Mexico, Puerto Rico, and parts of Canada; SITA covers Europe, the South Pacific, Southeast Asia, the Caribbean, and South and Central America; and AVICOM covers Japan. In most areas while using the VHF networks, data link coverage is excellent above Flight Level 200, but deteriorates below this flight level. Satellite data link coverage is excellent both on the ground and in-flight between 70° North and 70° South.

Many variables, including the amount of processing time and the length of the message, effect the turnaround time for information. Depending on the nature of the update request, the pilot should expect a turnaround time of approximately five minutes when using the VHF network and twelve minutes when using the satellite network.

AFIS consists of the following components: Global Data Center (GDC), Data Transfer Unit (DTU), Data Management Unit (DMU), and Antenna Switching Unit (ASU).

GLOBAL DATA CENTER (GDC)

The Global Data Center (GDC) is a ground based computer facility built and operated by Honeywel for the purpose of providing flight planning, aviation weather, and message forwarding services to AFIS operators on a subscription basis. The GDC communicates with the operator via data quality telephone lines to a Personal Computer as well as through the ACARS and satellite networks directly to the aircraft in flight.

DATA TRANSFER UNIT (DTU)

The Data Transfer Unit (DTU) is a 3.5 inch micro floppy disk drive mounted in the cockpit. Once the GNS-X$_{LS}$ is switched on and the disk inserted in the DTU, the AFIS Flight Plan and weather data are transferred to and stored in the Data Management Unit.

DATA MANAGEMENT UNIT (DMU)

The Data Management Unit (DMU) computer formats the disk information and presents it to the GNS-X$_{LS}$ for display on the CDU.

The DMU also incorporates a data quality VHF transceiver. This radio is tuned automatically by the DMU computer to the appropriate ground station for the purpose of transmitting data to and receiving data from the Global Data Center while in flight.

ANTENNA SWITCHING UNIT (ASU)

The Antenna Switching Unit (ASU) is required for those installations where the DMU transceiver shares an existing VHF communications antenna. The ASU switches the transmit side of the antenna between the DMU data transmitter and the VHF voice transmitter.

During power up, the ASU defaults to the voice transmitter, if AFIS is configured for a shared antenna. Selecting the AFIS annunciator on the instrument panel switches the transmit side of the antenna to the DMU data transmitter. Selecting the annunciator again, or pressing the "push to talk" button on the VHF communications radio switches the transmit side of the antenna back to the voice transmitter.

If AFIS is configured for non-shared antenna or there is no configuration module, during power up the system will assume an antenna is dedicated to AFIS.

The Satellite Data Communications System consists of the following components: Satellite Communications Unit (SCU), High Power Amplifier/ Low Noise Amplifier (HPA/LNA) and Satellite Antenna.

SATELLITE COMMUNICATIONS UNIT (SCU)

The Satellite Communications Unit (SCU) incorporates the satellite transceiver and instruction for transmitting to and receiving data from the satellite network. The SCU also contains information to allow it to tune the appropriate satellite operating region automatically and to the appropriate ground stations.

HIGH POWER AMPLIFIER/ LOW NOISE AMPLIFIER (HPA/LNA)

The High Power Amplifier/ Low Noise Amplifier (HPA/LNA) amplifies transmitted and received information while minimizing noise.

SATELLITE ANTENNA

The antenna is designed to meet the Inmarsat system specification.

REMOTE PROCESSING UNIT (RPU)

The Remote Processing Unit (RPU) supplies AFIS™ weather Graphical Data to the GNS-XLS.

PAGE DISPLAY DEFINITIONS

AFIS FLIGHT PLAN LIST PAGE

If the GNS-XLS is configured for AFIS, this page appears directly after the Initialization Page. The DTU reads the inserted disk and displays one of the following messages:

NO AFIS FLT PLANS ON DISK: There are no AFIS Flight Plans stored on the disk. (Figure 7-1)

NO DISK: Either no disk was inserted into the DTU prior to power up or the DTU cannot read the disk.

READING DISK: The DTU is transferring data from the disk to the DMU.


```
          AFIS
   FLIGHT PLAN LIST 1/4



      NO AFIS FLT PLANS
          ON DISK
```

Figure 7-1

AIRCRAFT TYPE: The Global designated aircraft type as transferred from the disk or obtained by an Update or Recall procedure.

*NOTE: Once the system is initialized, the page appears between the Active Flight Plan Page and the first GNS-XLS **FLIGHT PLAN LIST** Page.*

AFIS FLT PLAN LIST: A list of AFIS generated Flight Plan origin/destination identifiers with date of issue. (Figure 7-2)

*NOTE: Additional pages can be accessed when more than 6 Flight Plans are listed by DEPRESSING the **FPL** Key to access page.*

```
          AFIS
   FLIGHT PLAN LIST 1/4

   KABE-KVNY      04JAN90
   KAPA-KTEB      04JAN90
   KBUR-KLGA      04JAN90
   KBZN-KLAN      04JAN90
   KDAL-KDEN      04JAN90
   KDAL-KJFK      04JAN90
```

Figure 7-2

LOADING FLIGHT PLAN: The system is loading a selected AFIS Flight Plan.

REPLACE ACTIVE FPL?: Allows a selected AFIS Flight Plan to replace an existing Active Flight Plan.

UPDA-XXXX: (Where XXXX is an ident) Indicates a Flight Plan Update for an active Flight Plan has occurred.

FLIGHT PLAN PROGRESS (NAVIGATION PAGE 5)

HEC:KVNY: Current FROM and TO waypoints. (Figure 7-3) The FROM waypoint can be replaced by **DIR TO** for DIRECT TO.

FL: AFIS planned flight level for leg being flown.

NOTE: Field is dashes when aircraft is projected to be climbing or descending.

```
     NAVIGATION 5/5

  HEC:KVNY            FL390
            PLAN       ACT
  F REM     2150      3380
  FF P/E     625         0
  ETA      00:06     18:52
  TAS        460       460
  GS         448       460
  WIND  330/ 40   360/  0
```

Figure 7-3

PLAN: Planned

This column is AFIS planned data either transferred from the disk or received via the data link.
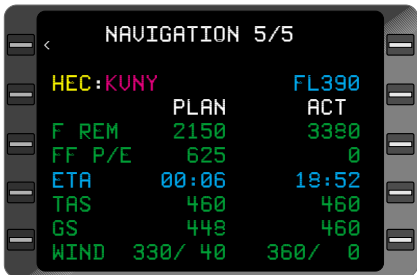
NOTE: Planned fields become dashes when no planned data is available for the current leg.

(Figure 7-4).

ACT: Actual

This column is GNS-XLS data.
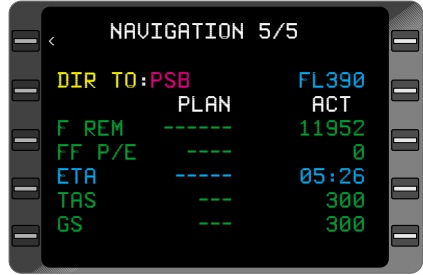
NOTE: Actual fields become dashes when cursor is positioned over the leg identifiers.

(Figure 7-5).

F REM: Fuel Remaining

Planned: AFIS planned fuel remaining at aircraft present position based on DMU interpolated values.

Actual: The total fuel on board as calculated by the GNS-XLS.
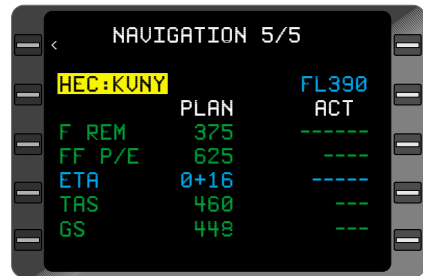
*NOTE: Field changes to **F REQ** when cursor is positioned over the leg identifiers*

Figure 7-4

Figure 7-5

F REQ: Fuel Required

Planned: The AFIS planned fuel required to fly the leg displayed.

FF P/E: Fuel Flow per Engine

Planned: AFIS planned fuel flow per engine for leg displayed.

Actual: Total actual fuel flow divided by the number of engines. This is an averaged quantity.

ETA: Estimated Time of Arrival

Planned: The sum of the AFIS planned time enroute for the leg displayed and the actual time of arrival over the previous waypoint.

Actual: The estimated time of arrival over TO waypoint based on current groundspeed.

*NOTE: Field changes to **ETE** when cursor is positioned over the leg identifiers. (Figure 7-6)*

ETE: Estimated Time Enroute

Planned: The AFIS planned time enroute for leg displayed.

TAS: True Airspeed

Planned: AFIS planned true airspeed for leg displayed.

Figure 7-6

Actual: Actual true airspeed of aircraft. The **TAS** value shown is the same as on **NAVIGATION** Page 3.

GS: Groundspeed

Planned: AFIS planned groundspeed for leg displayed.

Actual: Actual groundspeed of the aircraft as calculated by the GNS-XLS. The **GS** value shown is the same as on **NAVIGATION** Page 1.

WIND:

Planned: AFIS forecast wind for leg displayed. Direction is displayed relative to True North with velocity in knots.

Actual: Actual wind for leg as computed by the system. Direction is displayed relative to True North with velocity in knots.
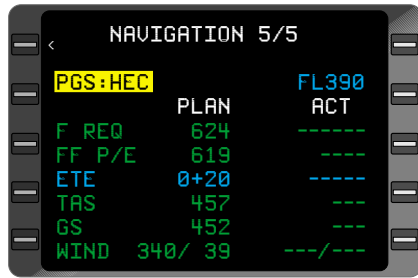
AFIS MENU PAGE

AFIS FLT PLAN: Review of the AFIS Flight Plan displaying:

- Fuel and time requirements

- Weights, flight level, and route

- Operator inputs used in generating Flight Plan

- Performance bias entered by operator

Figure 7-7

SIGMETS: Review of all SIGMETS(SIGnificant METeorology) transferred via the disk and/or received via the data link.

TERMINAL WX: Review of all Terminal Weather transferred via the disk and/or received via the data link. Additional requests can be entered.

WINDS ALOFT: Review of all Winds Aloft identifiers transferred via the disk and/or received via the data link. Additional requests can be entered.

RECALL AFIS FPL: Allows operator to recall a previously accessed flight plan and associated weather from the Global Data Center via the data link.

SEND AFIS MSG: Allows operator to send non-flight related text messages via the satellite data link and flight related text messages via the satellite or VHF data link.

DISPL AFIS MSG: Allows operator to display flight related messages received via the data link.

OPERATING MODES: Allows operator to select operating mode for:

• AUTO REPORT

• AUTO WX UPDT

• VHF NETWORK (ARINC, SITA/AVICOM) and if applicable,

• SAT (satellite) NETWORK.

Note: If Weather Graphics is configured, the AFIS MENU page is as shown in the AFIS Weather Graphics section.

AFIS FLT PLAN PAGES

The AFIS Flight Plan Pages are accessed by selecting **AFIS FLT PLAN** on the **AFIS MENU** Page.

AFIS FLT PLAN PAGE 1

FUEL AND TIME REQUIRE-MENTS

FR: The origin airport identifier. (Figure 7-8) When there is an enroute update to the flight plan, the identifier will change to


```
      AFIS FLT PLAN 1/4
                 FUEL      TIME
 FR KSNA
 TO KJFK      8806       4+30
 HOLDING      -----      -----
 TO ----      -----      -----
 RESERVE      2000       1+03

 TOTALS      10806       5+33
```

Figure 7-8

UPDATE. UPDATE refers to the Lat/Lon position of aircraft at time of last update request. (Figure 7-9).

TO: The TO waypoint identifier.

TO/FUEL: Projected fuel required from FROM waypoint to TO waypoint as transferred from disk or updated enroute via the data link.


```
    AFIS FLT PLAN 1/4
               FUEL      TIME
FR UPDA
TO KJFK    6400      4+04
HOLDING    -----     -----
TO ---     -----     -----
RESERVE    5563      2+32

TOTALS     11963     6+36
```

Figure 7-9

TO/TIME: The estimated time enroute in hours and minutes from the FROM waypoint to the TO waypoint as transferred from the disk or updated through the data link.

HOLDING/FUEL: Projected fuel required for Holding Time as transferred from disk or received via the data link.

HOLDING/TIME: The holding time in hours and minutes as transferred from disk or received via the data link.

TO/FUEL: Projected fuel required from TO waypoint to alternate airport as transferred from disk or received via the data link.

TO/TIME: The estimated time enroute in hours and minutes from TO waypoint to alternate airport as transferred from disk or received via the data link.

RESERVE FUEL: Projected reserve fuel at TO waypoint as transferred from the disk or received via the data link.

RESERVE TIME: Projected flight time remaining at TO waypoint to consume the displayed **RESERVE FUEL**.

TOTALS: Sum of planned enroute and reserve fuel and sum of planned enroute and reserve time.

AFIS FLT PLAN PAGE 2

WEIGHTS, FLIGHT LEVEL AND ROUTE

RAMP WT: Planned ramp weight in lbs prior to starting engines as transferred from disk or received via the data link. (Figure 7-10)
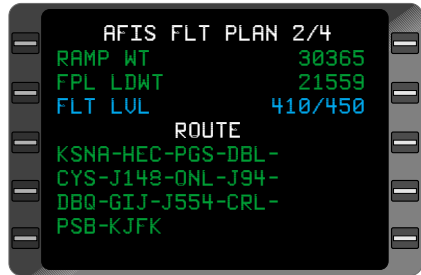
GROSS WT: Sum of basic operating weight, payload, and fuel remaining as calculated by GNS-XLS. (Figure 7-11)

*NOTE: **RAMP WT** changes to **GROSS WT** if there is an automatic **FUEL FLOW** input, FUEL REMAINING quantity, and input for basic operating weight and **PAYLOAD** input.*

FPL LDWT: Flight planned landing weight of aircraft at destination as transferred from disk or received via the data link.

Figure 7-10

Figure 7-11

FLT LVL: Planned flight level(s) as transferred from disk or received via the data link.

ROUTE: Planned route of flight as computed by Global Data Center and transferred from disk or received via the data link.

*NOTE: Pressing the **AFIS** or **NXT** Key displays the remainder of the route (up to 50 waypoints).*

UPDATE: Waypoint identifier defining position of aircraft at time of last update request.

AFIS FLT PLAN PAGE 3

OPERATOR INPUTS

FROM: Origin airport identifier as transferred from disk or received via the data link, or UPDATE waypoint defining position of aircraft at time of last update request. (Figure 7-12)

```
     AFIS FLT PLAN 3/4
FROM              KSNA
TO                KJFK
DEP TIME         22:00
BASIC OP WT      18959
PAYLOAD            600
RAMP FUEL        10806
RESERVE FUEL      2000
PERF OPTION M80    / F
```

Figure 7-12

TO: Destination waypoint transferred from disk or received via the data link.

DEP TIME: Estimated time of departure in GMT. This field changes to **UPDATE TIME** when a flight plan is updated and indicates time of issued update. (Figure 7-13)

BASIC OP WT: AFIS planned basic operating weight as transferred from disk or received via the data link.

```
     AFIS FLT PLAN 3/4
FROM              UPDA
TO                KJFK
UPDATE TIME      22:03
BASIC OP WT      18959
PAYLOAD           1200
RAMP FUEL        11963
RESERVE FUEL      5563
PERF OPTION        M80
```

Figure 7-13

PAYLOAD: AFIS planned payload weight as transferred from disk or received via data link.

RAMP FUEL: AFIS planned total trip fuel as transferred from disk or received via data link. This field changes to **UPDATE FUEL** when a flight plan is updated and refers to the actual fuel remaining at time of last update request.

FPL RES FUEL: AFIS planned reserve fuel remaining at destination as transferred from disk or received via the data link. This field changes to **RESERVE FUEL** when a flight plan is updated and refers to the updated estimate of fuel remaining at destination.

PERF OPTION: AFIS planned cruise mode as transferred from disk or received via the data link. Alternate cruise mode options may be requested and updated via the data link.
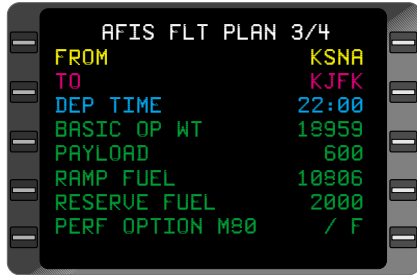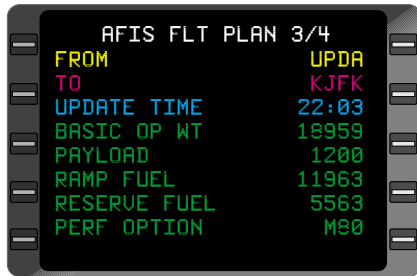
AFIS FLT PLAN PAGE 4

PERFORMANCE BIAS

This page allows a review of the operator entered performance bias data transferred from disk or received via the data link. (Figure 7-14)
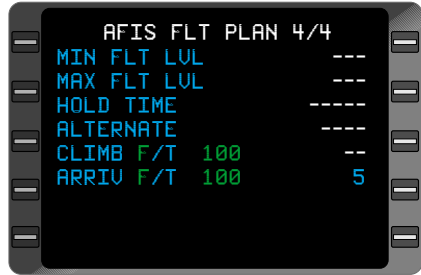
SIGMETS PAGES

AFIS SIGMETS pages are accessed by selecting **SIG-METS** on the **AFIS MENU** Page.

This page allows a review of all SIGMETS transferred from disk or received via the airborne data link. SIGMETS may consist of one or more pages of text and display their FAA code names followed by text.
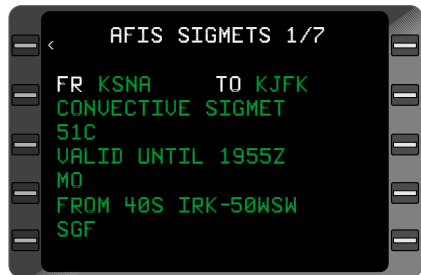
DATE: Issue date of SIGMET. This field may be blank if transferred from disk.

NOTE: Date field will remain blank if no date is supplied on disk or by UPDATE.

FR: Desired start VOR, airport, waypoint, Lat/Lon, VORTAC ident, or NAT (North Atlantic Tracks). (Figure 7-15 or 7-16)
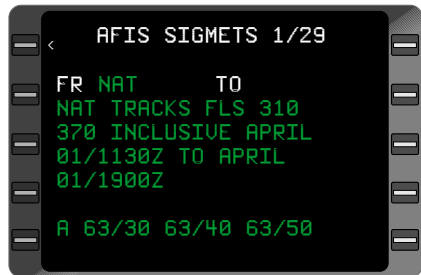
NOTE: Parentheses remain until a SIGMET update is received via the data link.

TO: Desired end VOR, airport, waypoint, Lat/Lon or VORTAC ident. No entry is required if **FR** is **NAT**.

```
     AFIS FLT PLAN 4/4
MIN FLT LVL          ---
MAX FLT LVL          ---
HOLD TIME          -----
ALTERNATE           ----
CLIMB F/T  100        --
ARRIV F/T  100         5
```

Figure 7-14

```
<    AFIS SIGMETS 1/7

FR KSNA      TO KJFK
CONVECTIVE SIGMET
51C
VALID UNTIL 1955Z
MO
FROM 40S IRK-50WSW
SGF
```

Figure 7-15

```
<    AFIS SIGMETS 1/29

FR NAT       TO
NAT TRACKS FLS 310
370 INCLUSIVE APRIL
01/1130Z TO APRIL
01/1900Z

A 63/30 63/40 63/50
```

Figure 7-16

TRANSMIT REQUEST?: When cursor is on this field and **ENTER** is pressed, a SIGMET update request is sent to the Global Data Center via data link. **DATA LINK DISABLED** will appear if the data link is disabled and the request will not be transmitted.

NOTE: This field only appears when the FR or TO fields are in parentheses.

If no SIGMETS are on disk, the message **NO SIGMETS ON DISK** appears. If there are no SIGMETS via a Flight Plan update the message reads **NO SIGMETS**.

(Figure 7-17)

```
      AFIS SIGMETS 1/1

FR KSNA     TO KMIA
NO SIGMETS ON DISK
```
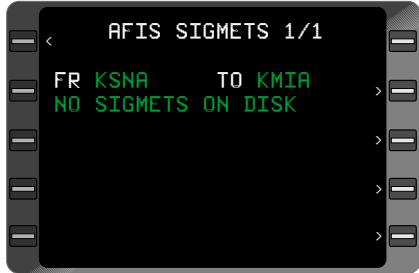
Figure 7-17

TERMINAL WEATHER PAGES

The **TERMINAL WEATHER** Menu Page is accessed by selecting **TERMINAL WX** on the **AFIS MENU** Page.

Terminal identifiers for which associated weather data is available to review are listed. The identifiers in parentheses represent pilot entered requests for additional weather not stored in the DMU. The parentheses disappear when weather updates have been received via the data link.

TRANSMIT REQUEST?: When cursor is on this field and **ENTER** is pressed, a weather update request is sent to the Global Data Center via data link. (Figure 7-18)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.

```
     AFIS TERMINAL WX


  (KSNA)      (KENO)

  (KSTL)      (KDQO)

  (KMKC)

     TRANSMIT REQUEST?
```

Figure 7-18

TERMINAL WX DATA PAGES

These pages are accessed by selecting a terminal weather identifier on the **TERMINAL WEATHER** Menu Page.

They allow review of Terminal Weather by identifier as transferred from disk or received by the Global Data Center via the data link.
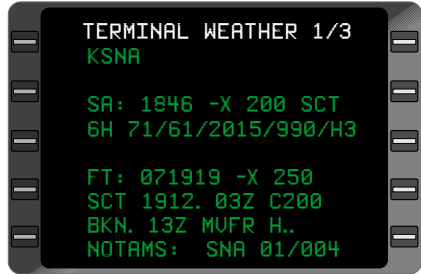
DATE: Issue date of actual weather. This field may be blank if transferred from disk.

```
TERMINAL WEATHER 1/3
KSNA

SA: 1846 -X 200 SCT
6H 71/61/2015/990/H3

FT: 071919 -X 250
SCT 1912. 03Z C200
BKN. 13Z MVFR H..
NOTAMS:  SNA 01/004
```

Figure 7-19

Weather available for review includes:

- **SA** (Sequence Reports)

- **FT** (Terminal Forecasts)

- **NOTAMS** (Notices to Airmen)

- **PIREPS** (Pilot Reports)

WINDS ALOFT PAGES

The **AFIS WINDS ALOFT** Menu Page is accessed by selecting **WINDS ALOFT** on the AFIS MENU Page.

The WIND identifiers represent VOR, airport, waypoint, Lat/Lon or VORTAC locations, for which associated weather data is available.

```
    AFIS WINDS ALOFT

‹  (SNA )      (ENO )    ›

‹  (STL )      (DQO )    ›

‹  (MKC )                ›

   TRANSMIT REQUEST?     ›
```

Figure 7-20

WINDS ALOFT DATA PAGES

These pages are accessed by selecting a wind identifier on the **WINDS ALOFT MENU** page.
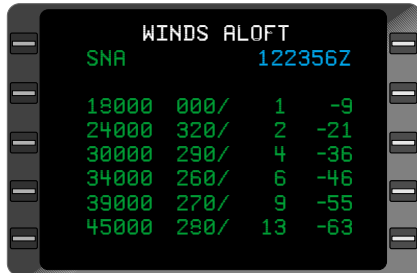
They allow review of Winds Aloft data by VOR, airport, waypoint, Lat/Lon or VORTAC identifier as transferred from disk or received via the data link.

DATE/TIME: Actual day and time of the issue of the wind informa-tion. This field may be blank if transferred from disk. The number is read 12th day 2356 ZULU. (Figure 7-21)

Wind data available to review includes:

- Flight Level

- Wind Direction (True North)

- Wind Velocity (Knots)

- Temperature (Degrees Celsius)


```
        WINDS ALOFT
  SNA              122356Z

  18000  000/    1    -9
  24000  320/    2   -21
  30000  290/    4   -36
  34000  260/    6   -46
  39000  270/    9   -55
  45000  290/   13   -63
```

Figure 7-21

RECALL AFIS FPL PAGE

This page is accessed by selecting **RECALL AFIS FPL** on the **AFIS MENU** Page.

This page allows the pilot to recall previously computed AFIS Flight Plan and Weather requests from the Global Data Center via the data link.

FPL-#: A Global Data Center generated Flight Plan number. Entered as an alpha character followed by four numeric digits. If **FPL#** is entered, other entries are not required. (Figure 7-22)


```
      RECALL AFIS FPL

<  FPL-# D8751
   DATE
   ETD
   FR
   TO


   TRANSMIT REQUEST?
```

Figure 7-22

DATE: Issue date of recalled AFIS Flight Plan.

ETD: Estimated time of depar-ture in GMT of recalled AFIS Flight Plan .

FR: Origin of recalled AFIS Flight Plan.

TO: Destination of recalled AFIS Flight Plan. (Figure 7-23)


```
      RECALL AFIS FPL

<  FPL-#
   DATE 29MAY91
   ETD    12:00
   FR     KSNA
   TO     KLAX
```

Figure 7-23

TRANSMIT REQUEST?: When cursor is on this field and **ENTER** is pressed, the recall request is sent to the Global Data Center via data link. (Figure 7-22)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit, must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.

SEND AFIS MESSAGE PAGE

This page is accessed by selecting **SEND AFIS MSG** on the **AFIS MENU** Page.

↑ ↓ indicate that pressing the Line Select Key adjacent the arrow will move the cursor in the direction of the arrow.

PPM: Preprogrammed messages that can be stored in non-volatile memory, selected and sent without being re-entered.

TO: Receiver of message.

FROM: Sender's identification (name or tail number).

#: Receiver's address. See Table A-1 for possible address variations and the method in which the Global Data Center processes the message.

MESSAGE TEXT: Fifteen lines of text entry available. Text must be flight related when using the VHF network operating mode.

SEND MESSAGE: When cursor is over this field and **ENTER** is pressed the message is sent via the data link. (Figure 7-24)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit, must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.

Figure 7-24

Phone number   #206 869 6450
- GDC will deliver message verbally to given number.

AFIS-equipped aircraft   #N4322B
- GDC will deliver message to aircraft specified.

"A" followed by phone number   #A206 869 6458
- GDC will deliver message to PC at given number.

"AI" followed by Country Code, City Code, and phone number   #AI4118106530
- GDC will deliver message to PC located outside the
  US or Canada.

"F" followed by phone number   #F206 869 6464
- GDC will deliver message to FAX machine at given number

"FI" followed by Country Code, City Code and phone number   #FI4118108708
- GDC will deliver message FAX machine located
  outside the US or Canada.

"A" followed by ARINC or SITA address   #AHDQGLXH
- GDC will deliver message to ARINC or SITA address given.

Auto Forward Code   #GWSOPS
- GDC will deliver message to PC, FAX, or ARINC/SITA
  as defined in GDC database.

GDC Code   #GWSPJC
- GDC will search database for phone number and special
  contact name or message associated with code and
  deliver message verbally.

ADCUS XXX   #ADCUS TEB
- GDC will search database for customs phone number
  at specified airport and deliver message verbally.

PDC XXX   #PDC LAX
- GDC will search database for pre-departure clearance
  and forward to aircraft if found.

Global Defined Codes

- BASEOPS International   #BASEOPS or
                                                              #BOPS
- Air Routing International   #ARC
- Universal Weather   #UNIVERSAL or
                                                              #UV or #UVAIR
- Jeppesen Data Plan   #JETPLAN or
                                                              #DATAPLAN
                                                              or #JEPPESEN
- Medlink   #MEDLINK

GDC   #GDC
- Message will be printed at GDC further action.

AFIS Addresses
Table 1

PPM MENU PAGE (PREPROGRAMMED MESSAGES)

This page is accessed from the **SEND MESSAGE** Page by selecting **PPM** in the upper right hand corner.

PPM can only be selected when an entry has been made in the **TO** or **#** fields on the **SEND MESSAGE** Page. The **TO**, **FROM**, and **#** data are used when sending a preprogrammed message.
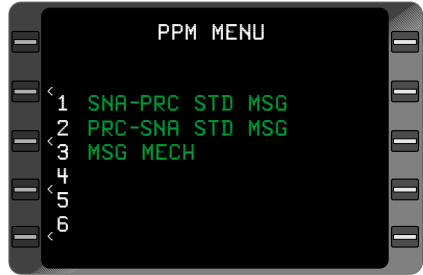
Titles for up to six preprogrammed messages can be listed for selection to review, change, and send.

Figure 7-25

PREPROGRAMMED MESSAGE PAGES

These pages display the message text for each preprogrammed message title selected from the **PPM MENU** Page. Up to seven lines of text may be entered. Preprogrammed Messages will remain in nonvolatile memory and can be removed by editing the title on the **PREPROGRAMMED MSG** Menu Page.

Figure 7-26

DISPLAY AFIS MSG PAGE

The message page is displayed by selecting **DISPLAY AFIS MSG** on the **AFIS MENU** Page.

All text messages sent to the tail number of the aircraft being flown appear in this section. Up to 15 pages of text can be stored according to time received, with the newest message appearing first. Messages can originate from:

```
 ┌─────────────────────────────┐
 │  DISPLAY AFIS MSG 3/7       │
 │                             │
 │   7-JUN-90 20:00Z           │
 │  FR:OFFICE                  │
 │  TO:CAPTAIN                 │
 │  PLEASE CALL HOME           │
 │  ASAP.                      │
 │   7-JUN-90 20:04Z           │
 │  FR:222                     │
 │  TO:111                     │
 └─────────────────────────────┘
```

Figure 7-27

• Another AFIS equipped aircraft,

• third party, or

• Global Data Center.

OPERATING MODES PAGE (FOR AFIS USERS EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

Operating modes information is accessed by selecting **OPERATING MODES** on the **AFIS MENU** Page.

AUTO REPORT:

ON: The aircraft will automatically report position and station ID for weather updates to the Global Data Center via the data link on a timed basis.

OFF: The automatic reporting capability has been manually inhibited by the pilot.

```
 ┌─────────────────────────────┐
 │  AFIS OPERATING MODES       │
 │                             │
 │  AUTO REPORT     OFF    >   │
 │  AUTO WX UPDT    ON         │
 │  VHF NETWORK     ON     >   │
 │  SAT NETWORK     ON     >   │
 │                             │
 │  ACTIVE LINK: ARINC         │
 └─────────────────────────────┘
```
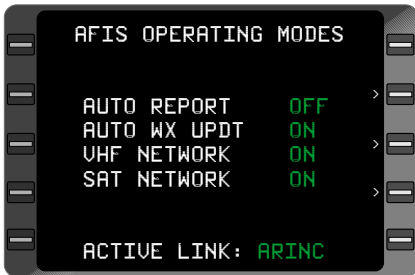
Figure 7-28

AUTO WX UPDT (WEATHER UPDATE):

ON: The Global Data Center will automatically send weather/wind updates for the displayed idents when new information is issued.

OFF: The auto weather update function is not enabled.

VHF NETWORK: Ground networks that AFIS interfaces with to establish a data link with the Global Data Center.

ON: The appropriate VHF network will automatically be selected whenever the aircraft present position is within the specified boundaries. (Figure 7-28)

OFF: Network is not enabled.

SAT NETWORK: Satellite network that AFIS interfaces with to establish a data link with the Global Data Center.

ON: The appropriate satellite region will automatically be selected whenever the aircraft present position is within the specified boundaries.

OFF: Network is not enabled.

ACTIVE LINK: Indicates the network in service, i.e. **ARINC**, **SITA**, or **SATCOM**. (Figure 7-29)

*NONE: All networks are turned **OFF** or current position does not correspond with the manually selected boundaries.*

*NOTE: The VHF network has precedence over the satellite network in areas of shared coverage and must be turned **OFF** in order for **SATCOM** to be the Active Link. **AUTO REPORT**, **AUTO WX UPDT** and **OPERATING MODE** selection status are stored in non-volatile memory. If the operator turns to **OFF** the operator must reselect to turn **ON***


```
  AFIS OPERATING MODES


  AUTO REPORT    OFF
  AUTO WX UPDT   ON
  VHF NETWORK    OFF
  SAT NETWORK    ON


  ACTIVE LINK: SATCOM
```
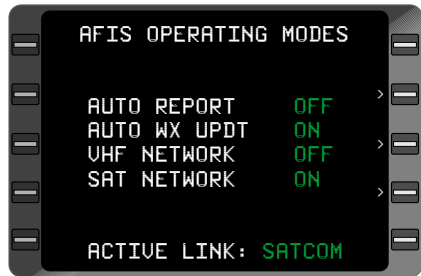
Figure 7-29

VHF LINK CONTROL PAGE

This page is accessed when the VHF Network is turned **ON**.

ARINC, SITA/AVICOM: Ground networks that AFIS interfaces with to establish a data link with the Global Data Center.

AUTO: The VHF network will automatically be selected whenever the aircraft present position is within the appropriate boundaries. (Figure 7-30)
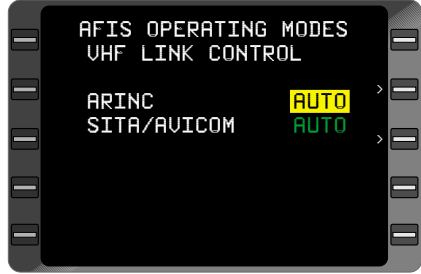
Figure 7-30

MAN (manual): The desired network will be maintained independent of the present position. In manual, the system will only allow transmission when present position is within the appropriate boundaries. All other networks will be turned **OFF** if one is in **MAN**.

OFF: Network is not enabled.

SAT LINK CONTROL PAGE

This page is accessed when the SAT Network is turned **ON**.

SAT COMM:

AUTO: The satellite network will automatically be selected whenever the aircraft present position is within the appropriate boundaries and VHF Network is turned **OFF** or is not in VHF coverage.

MAN (manual): The desired region will be maintained independent of the present position. In manual, the system will only allow transmission when present position is within the appropriate boundaries and VHF network is turned **OFF** or is not in VHF coverage.

OFF: Network is not enabled.

REGION: The four satellite regions, West Atlantic, East Atlantic, Pacific Ocean and Indian Ocean, that AFIS interfaces with to establish a data link with the Global Data Center. (Figure 7-31)

LINK:

OPERATIONAL: Message indicating the SAT COMM link is enabled.

Figure 7-31

NONE: Current position does not correspond with the manually selected boundaries or satellite link is not operational.

ACTIVATE?: Use to enable satellite network in **AUTO** or **MAN**. (Figure 7-32)

Figure 7-32

OPERATING MODES PAGE (FOR AFIS USERS NOT EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

Operating Modes information is accessed by selecting **OPERATING MODES** on the **AFIS MENU** Page.

AUTO REPORT:

ON: The aircraft will automatically report position and station ID for weather updates to the Global Data Center via the data link on a timed basis.

OFF: The automatic reporting capability has been manually inhibited by the pilot.

AUTO WX UPDT (WEATHER UPDATE):

ON: The Global Data Center will automatically send weather/wind updates for the displayed idents when new information is issued.

OFF: The auto weather update function is not enabled.

ARINC, SITA, AVICOM: Ground networks that AFIS interfaces with to establish a data link with the Global Data Center.
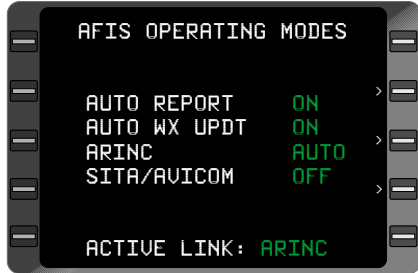
Figure 7-33

AUTO: The desired network will automatically be selected whenever the aircraft present position is within the appropriate boundaries.

MAN (manual): The desired network will be maintained independent of the present position. In manual, the system will only allow transmission when present position is within the appropriate boundaries.

OFF: Network is not enabled.

NOTE: If a ground network is placed in manual mode, all others will go to OFF.

ACTIVE LINK: Indicates the network in service, i.e. **ARINC**, **SITA** or **AVICOM**.
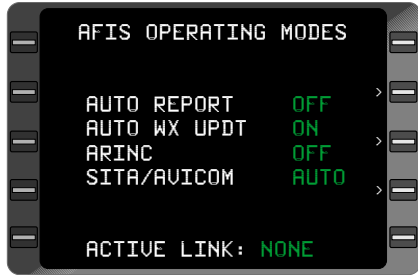
Figure 7-34

NONE: All networks are turned **OFF** or current position does not correspond with the selected mode.

*NOTE: **AUTO REPORT, AUTO WX UPDT** and **OPERATING MODE** selection status are stored in non-volatile memory. If the operator turns to **OFF** or **MAN**, the operator must reselect to turn **ON**.*

ACTIVE FLIGHT PLAN PAGE (FOR AFIS FLIGHT PLAN UPDATING)

AFIS UPDATE: Allows pilot to:

• Amend an existing AFIS Flight Plan

• Update SIGMETS

• Request a new AFIS Flight Plan

AFIS UPDATE VERIFICATION PAGE

ACTUAL FL: Actual flight level of aircraft rounded to nearest 100 ft. as entered by the pilot.

ASSIGNED FL: Current Flight Level assigned by ATC as verified or amended by the pilot.

PAYLOAD: Current aircraft payload verified or amended by the pilot.

FUEL REM: Actual fuel remaining as calculated by the GNS-XLS or amended by the pilot.

CRUISE MODE: Current aircraft Cruise Mode as verified or amended by the pilot.

TRANSMIT REQUEST: When cursor is over this field and **ENTER** is pressed, the update request is sent via the data link. (Figure 7-36)

DATA LINK DISABLED: Aircraft equipped with the Antenna Switching Unit, must DEPRESS momentary AFIS annunciator to enable the air to ground data link. VHF or satellite network must also be enabled.
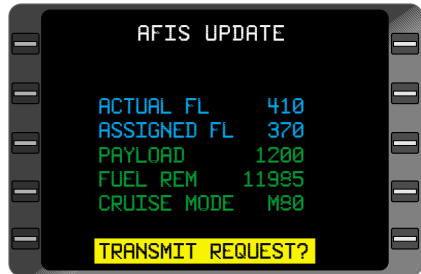
Figure 7-35
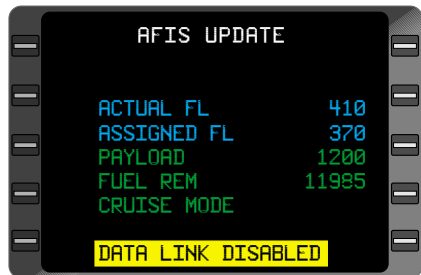
Figure 7-36

Figure 7-37

SYSTEM MESSAGES PAGE

AFIS related messages appear on the **SYSTEM MESSAGES** Page (see Section 2 of the Operators Manual). When new messages are added, the **MSG** Key will flash and a flashing asterisk will appear next to the new message.

```
SYSTEM MESSAGES 1/1
*SEE AFIS MSG
*WX UPDATED
DATA CENTER AK
NDB- WW EXP 31MAY
```
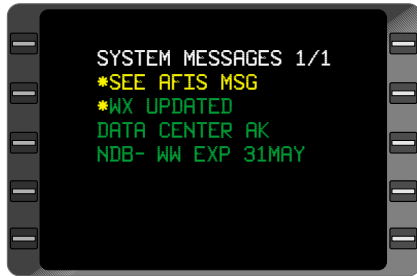
Figure 7-38

SYSTEM MESSAGES

ADVISORY:

The following are the advisory messages which pertain to AFIS and may appear on the GNS-XLS **SYSTEM MESSAGES** Page.

SYSTEM MESSAGE EXPLANATION

WX UPDATED The DMU has received an AFIS terminal weather update from the Global Data Center.

WINDS UPDATED The DMU has received an AFIS Winds Aloft update from the Global Data Center.

SIGMETS UPDATED The DMU has received an AFIS SIGMETS update from the Global Data Center.

FPL UPDATED The DMU has received an AFIS Flight Plan update from the Global Data Center.

1 **NO COMM** AFIS update request initiated by the pilot has not been acknowledged by the ground communications network.

DOWNLINK FAIL The last AFIS downlink request contained an invalid character and was not transmitted to the ground network.

UPLINK FAIL The last AFIS uplink attempt by the ground network was not accepted by the DMU.

FPL RECALLED The DMU has received a previously accessed AFIS Flight Plan from the Global Data Center.

DATA CENTER AK Global Data Center has acknowledged a downlink request.

AFIS CONFIG CHG. Configuration information in the DMU has been changed to agree with interfaced configuration module

AFIS CONFIG FAIL   Configuration module has failed. DMU non-volatile memory configuration information will be used.

AFIS CONFIG LOST   DMU non-volatile memory has lost its con-figuration information and the configuration module has failed.

NOTE: Message may not cause MSG Annunciator to flash.

ACTION REQUIRED:

The following are the action required messages which pertain to AFIS and may appear on the GNS-XLS **SYSTEM MESSAGES** Page.

SEE AFIS MSG There is a text message on the **AFIS MESSAGES** page which requires acknowledgement and possibly pilot action.

SYSTEM OPERATION

PRE-DEPARTURE

AFIS FLIGHT PLAN SELECTION

The **AFIS FLIGHT PLAN LIST** Page appears after the Initialization Page. The page also appears between the Active Flight Plan Page and the first GNS-XLS **FLIGHT PLAN LIST** Page.

NOTE: For aircraft equipped with the Antenna Switching Unit, DEPRESS momentary AFIS annunciator to enable the air to ground data link.

TO ENTER AN AFIS FLIGHT PLAN

1. Preprogrammed AFIS Disk - INSERT disk into DTU.

2. Select **AFIS FLIGHT PLAN LIST** Page using either (a) or (b).

    a. Initialization Page - Enter Date, GMT, and Initial Position. **AFIS FLIGHT PLAN LIST** Page appears.

Figure 7-39

    b. **FPL** Key - DEPRESS until desired **AFIS FLIGHT PLAN LIST** Page appears. (Figure 7-39)

NOTE: Desired flight plan may be found on a subsequent page if more than six flight plans have been either transferred from the disk or received via the data link. If there is more than one Flight Plan with the same Departure/ Destination pair a random letter will be displayed between the Depart?Dest pair and the date. This letter and the date distinguish one FPL from the other.

3. Line Select Key - DEPRESS to place cursor over desired Flight Plan. (Figure 7-40)
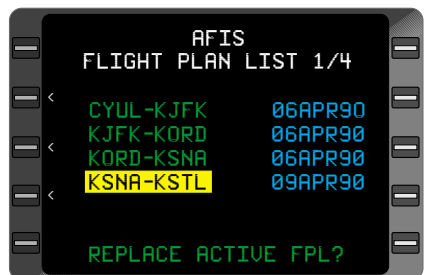
Figure 7-40

4. FPL Date - VERIFY.

5. **ENTER** Key - DEPRESS.

*NOTE: If an Active Flight Plan exists, the message **REPLACE ACTIVE FPL?** appears. DEPRESS **ENTER** to replace the Active Flight Plan with the AFIS Flight Plan.*

6. ACTIVE FPL - CONFIRM. AFIS Flight Plan becomes the Active Flight Plan. The initial leg must be established on the NAV Page so the system can navigate normally.

ENROUTE

REVIEWING FLIGHT PLAN PROGRESS

1. **NAV** Key - DEPRESS until **NAVIGATION** Page 5, Flight Plan Progress Page appears. (Figure 7-41)

2. Current Leg Data - CONFIRM. Observe AFIS Planned data vs. Actual GNS-X_{LS} calculated data.

REVIEWING AFIS PLANNED LEG DATA

3. Line Select Key - DEPRESS to position cursor over Leg Identifiers. (Figure 7-42)

*NOTE: ACTUAL data fields become dashes, **F REM** field becomes **F REQ** and **ETA** field becomes **ETE**.*

4. **ENTER** Key - DEPRESS to review Planned data for future legs of the Active AFIS Flight Plan.

```
      NAVIGATION 5/5
‹ PRC: GUP            FL410
              PLAN      ACT
  F REM      9642      9685
  FF P/E     1932      1800
  ETA       02:09     02:08
  TAS         488       485
  GS          507       519
  WIND   300/ 26   310/ 38
```
Figure 7-41

```
      NAVIGATION 5/5
‹
  PRC: GUP            FL410
              PLAN      ACT
  F REQ      1330     ------
  FF P/E     1932       ----
  ETE        0+22      -----
  TAS         488        ---
  GS          507        ---
  WIND   300/ 26    ---/---
```
Figure 7-42

```
      NAVIGATION 5/5
‹
  DIR TO ICT           FL---
              PLAN      ACT
  F REQ     ------      9475
  FF P/E      ----      1800
  ETA        -----     03:17
  TAS          ---       485
  GS           ---       491
  WIND   ---/---    310/ 38
```
Figure 7-43

5. **BACK** or **PRV** Key - DEPRESS to review Planned data for previous legs of the AFIS Flight Plan.

6. Line Select Key - DEPRESS to remove cursor from page and return to Current Leg Progress.

NOTE: If the current leg displayed does not agree with a planned AFIS leg, the PLAN fields display dashes. (Figure 7-43) If AFIS Flight Plan is updated via the data link, new values will appear. Refer to Updating AFIS Flight Plan for update procedure.

REVIEWING AFIS FLIGHT PLAN DATA

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - Place cursor over **AFIS FLT PLAN**. (Figure 7-44)

3. **ENTER** Key - DEPRESS.

```
         AFIS MENU
  1 AFIS FLT PLAN
  2 SIGMETS
  3 TERMINAL WX
  4 WINDS ALOFT
  5 RECALL AFIS FPL
  6 SEND AFIS MSG
  7 DISPL AFIS MSG
  8 OPERATING MODES
```

Figure 7-44

AFIS FLIGHT PLAN PAGE 1

4. REVIEW fuel and time data. (Figure 7-45) If the Flight Plan has been updated, the **FROM** identifier (origin airport) will be changed to **UPDATE**. (Figure 7-46)

Fuel and time data change as a result of the updated information. The **TOTALS** reflect the changes in the **TO** and **RESERVE** fields.

```
      AFIS FLT PLAN 1/4
             FUEL      TIME
  FR KSNA
  TO KSTL  10859      2+51
  HOLDING  -----      -----
  TO ----  -----      -----
  RESERVE   2500      0+45

  TOTALS   13359      3+36
```

Figure 7-45

```
      AFIS FLT PLAN 1/4
             FUEL      TIME
  FR UPDATE
  TO KSTL   9285      1+58
  HOLDING  -----      -----
  TO ----  -----      -----
  RESERVE   2700      0+49

  TOTALS   11985      2+47
```
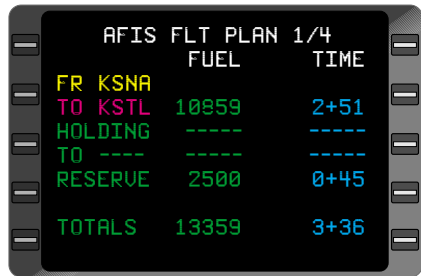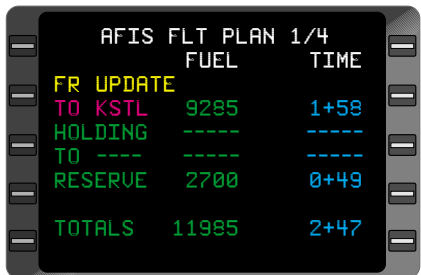
Figure 7-46

5. **AFIS** or **NXT** Key - DEPRESS to display AFIS Flight Plan Page 2.

*NOTE: Pressing the **PRV** or **BACK** Key will re-display the **AFIS MENU** Page with the cursor positioned over **AFIS FLT PLN**.*

AFIS FLIGHT PLAN PAGE 2

6. WEIGHTS, FLIGHT LEVEL and ROUTE - REVIEW (Figure 7-47). If the Flight Plan has been updated, the first route identifier will be **UPDATE**, followed by the updated route to destination. **FPL LDWT** and **FLT LVL** values may change as data is updated.

*NOTE: If Automatic Fuel Flow is interfaced to the GNS-XLS, **RAMP WT** changes to **GROSS WT** after the engines are started and the **GROSS WT** value field decreases on a periodic basis as the GNS-XLS recalculates. (Figure 7-48)*
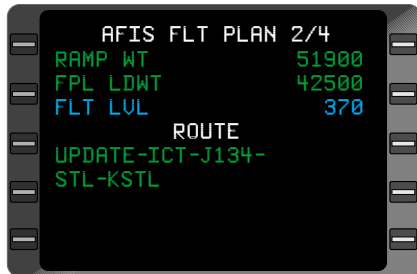
Figure 7-47

Figure 7-48

7. **AFIS** or **NXT** Key - DEPRESS. Subsequent pages of the Route will appear as needed (up to 50 waypoints) or **AFIS FLT PLAN** Page 3 appears.

*NOTE: DEPRESSING **PRV** or **BACK** Key will display **AFIS FLT PLAN** Page 1.*

AFIS FLIGHT PLAN PAGE 3

8. Pilot Inputs - REVIEW. (Figure 7-49)

*NOTE: If there has been an update to the flight plan: **FROM** identifier (origin airport) changes to **UPDATE**; **DEP TIME** changes to **UPDATE TIME**; **RAMP FUEL** changes to **UPDATE FUEL**; **FPL RES FUEL** changes to **RESERVE FUEL**; and the values in the respective fields change to reflect the updated information. (Figure 7-50)*
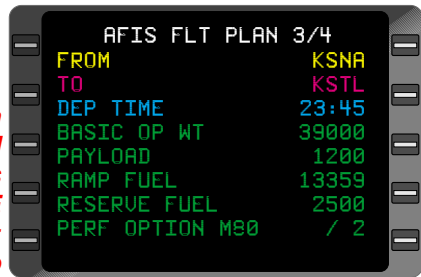
9. **AFIS** or **NXT** Key - DEPRESS to display **AFIS FLT PLAN** Page 4.

*NOTE: DEPRESSING **PRV** or **BACK** Key will display **AFIS FLT PLAN** Page 3.*
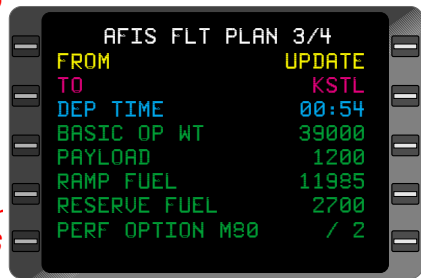
AFIS FLIGHT PLAN PAGE 4

10. Performance Bias Data - REVIEW. (Figure 7-51)

11. **AFIS** or **NXT** Key - DEPRESS to return to **AFIS MENU** Page, where the cursor will be positioned over **AFIS FLT PLN**.

*NOTE: Pressing the **BACK** or **PRV** Key throughout the Flight Plan Pages will cause the previous Flight Plan Page to appear.*

Figure 7-49
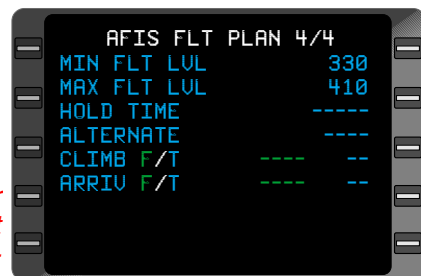
Figure 7-50

Figure 7-51

SIGMETS REVIEW/UPDATE

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **SIGMETS**.

3. **ENTER** Key - DEPRESS to display first **SIGMETS** Page. (Figure 7-52 or 7-53)

```
     AFIS SIGMETS 1/2
                 9APR95
FR KLAS        TO KLAX

SIGMET ECHO 7 VALID
UNTIL 222205
CA
FROM RNO TO EED TO
```

Figure 7-52

*NOTE: If no SIGMETS have been recorded on the disk, a page appears displaying the message **NO SIGMETS ON DISK**. If there are no SIGMETS via a Flight Plan update the message reads **NO SIGMETS**. Depress **AFIS, PRV,** or **BACK** Key to return to **AFIS MENU** Page.*

4. Select Key - DEPRESS TO POSITION cursor over **FROM** field

5. FROM Identifier - VERIFY or INSERT.

6. **ENTER** Key - DEPRESS. The cursor will automatically move to the TO Identifier field.

```
     AFIS SIGMETS 1/26
                 20OCT95
FR NAT       TO
NAT TRACKS FLS 310
370 INCLUSIVE OCT
20/11 30Z TO OCT 20
190002

A 53/15 52/20 50/30
```

Figure 7-53

7. TO Identifier- VERIFY or INSERT.

8. ENTER Key - DEPRESS. The cursor will automatically move to **TRANSMIT REQUEST?** (Figure 7-54)

9. **ENTER** Key - DEPRESS. The request is downlinked and the system will display the **AFIS MENU** Page with the cursor over **TERMINAL WX**.

```
     AFIS SIGMETS
<
FR (KSNA)     TO (KMIA)

      NO SIGMETS


TRANSMIT REQUEST?
```

Figure 7-54

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests. A ( ) around the FR and TO waypoints indiates that the updated information has not yet been received.*

10. **AFIS** or **NXT** Key - DEPRESS. Subsequent **SIGMETS** Pages will appear or **AFIS MENU** Page returns with cursor positioned over **TERMINAL WX**.

TERMINAL WEATHER MENU - DATA UPDATE AND REVIEW

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **TERMINAL WX**. (Figure 7-55)

3. **ENTER** Key - DEPRESS to display **TERMINAL WX** Menu Page. (Figure 7-56)

```
        AFIS MENU

  1  AFIS FLT PLAN
  2  SIGMETS
  3  TERMINAL WX
  4  WINDS ALOFT
  5  RECALL AFIS FPL
  6  SEND AFIS MSG
  7  DISPL AFIS MSG
  8  OPERATING MODES
```

Figure 7-55

4. Line Select Key - DEPRESS to position cursor over the desired Terminal Wx airport identifier.

5. **ENTER** Key - DEPRESS.

If the desired identifier is enclosed in parentheses, pressing the **ENTER** Key will cause it to blink, indicating no weather information is available for that identifier.

If no identifiers are displayed, they may be inserted by pressing the Line Select Key, which will create a cursor over the first blank identifier position. INSERT an airport identifier.

```
       TERMINAL WX

  KSNA      (ENO)

  KSTL      (DQO)

  (KMKC)

  TRANSMIT REQUEST?
```

Figure 7-56

6. **ENTER** Key - DEPRESS

7. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST?**

8. **ENTER** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

9. If there are identifiers: Placing the cursor over the selected identifier on the terminal weather and pressing **ENTER** will display the weather information for the airport. (Figure 7-57)

```
   TERMINAL WEATHER 1/5
 KSTL            09APR90

 SA: 1547 50 SCT E90
 BKN 120 BKN 10 156
 82 /70 /1912G18 /001
 CB NW-NE
 MOVG NE
```

Figure 7-57

10. Weather information - REVIEW.

TO INSERT A NEW IDENTIFIER:

11. Line Select - DEPRESS to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENTER** Key - DEPRESS. The **TERMINAL WX** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for this new identifier, it will appear in parentheses.

TO DELETE TEXT WHEN THERE IS NO DATA ENTRY IN PROGRESS:

14. Place cursor over airport identifier on **TERMINAL WX** page.

15. Depress **BACK** key. **DELETE?** will appear.

16. **ENTER** Key- Depress to delete the airport identifier.

WINDS ALOFT MENU - DATA UPDATE AND REVIEW

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over **WINDS ALOFT**. (Figure 7-59)

```
          AFIS MENU

 1  AFIS FLT PLAN
 2  SIGMETS
 3  TERMINAL WX
 4  WINDS ALOFT
 5  RECALL AFIS FPL
 6  SEND AFIS MSG
 7  DISPL AFIS MSG
 8  OPERATING MODES
```
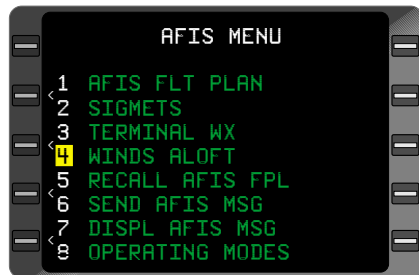
Figure 7-59

3. **ENTER** Key - DEPRESS to display **WINDS ALOFT** Menu Page. (Figure 7-60)

4. Line Select Key - DEPRESS to position cursor over the desired Wind identifier.

5. **ENTER** Key - DEPRESS.

If the desired identifier is enclosed in parentheses, pressing the **ENTER** Key will cause it to blink, indicating no weather information is available for that identifier.

```
       AFIS WINDS ALOFT

   KSNA        (ENO)

   KSTL        (DQO)

   (MKC)

   TRANSMIT REQUEST?
```

Figure 7-60

If no identifiers are displayed, they may be inserted by pressing the Line Select Key, which will create a cursor over the first blank identifier position. INSERT an identifier. (Usually a VOR or intersection)

6. **ENTER** Key - DEPRESS

7. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST?**

8. **ENTER** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*
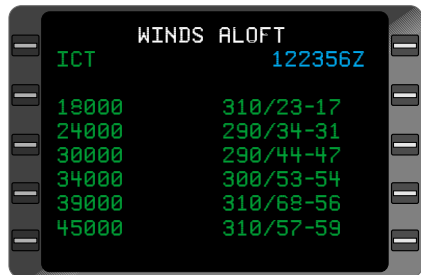
9. If there are identifiers, upon depressing the **ENTER** Key, the **WINDS ALOFT** Data Pages pertaining to the selected identifier appear. (Figure 7-61)

```
        WINDS ALOFT
   ICT             122356Z

   18000        310/23-17
   24000        290/34-31
   30000        290/44-47
   34000        300/53-54
   39000        310/68-56
   45000        310/57-59
```

Figure 7-61

10. Wind information - REVIEW.

TO INSERT A NEW IDENTIFIER:

11. Press Line Select Key to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENTER** Key - DEPRESS. The **WINDS ALOFT** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for the new identifier, it will appear in parentheses.

TO DELETE TEXT WHEN THERE IS NO DATA ENTRY IN PROGRESS:

14. Place cursor over identifier on **AFIS WINDS ALOFT** page.

15. Depress **BACK** key the the **ENTER** Key.

RECALLING AFIS FLIGHT PLAN

This procedure allows a previously accessed AFIS Flight Plan and associated weather to be recalled from the Global Data Center.

RECALL OPTION 1:

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **RECALL AFIS FPL**. (Figure 7-63)

3. **ENTER** Key - DEPRESS. **RECALL AFIS FPL** Page appears.

4. Line Select Key - DEPRESS to position cursor next to **FPL #** field.

5. **FPL #** - INSERT desired AFIS Flight Plan number. (Figure 7-64)

Figure 7-63

```
           AFIS MENU

  1  AFIS FLT PLAN
  2  SIGMETS
  3  TERMINAL WX
  4  WINDS ALOFT
  5  RECALL AFIS FPL
  6  SEND AFIS MSG
  7  DISPL AFIS MSG
  8  OPERATING MODES
```


Figure 7-64

```
        RECALL AFIS FPL

    FPL-#  A1234
    DATE
    ETD
    FR
    TO
```
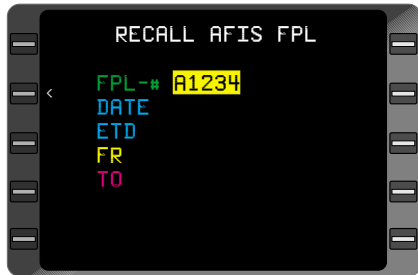
6. **ENTER** Key - DEPRESS. Cursor is positioned over **TRANSMIT REQUEST?** (Figure 7-65)

7. **ENTER** Key - DEPRESS to initiate recalling of AFIS Flight Plan from Global Data Center.

*NOTE: For aircraft equipped with the Antenna Switching Unit, if **DATA LINK DISABLED** message appears DEPRESS momentary AFIS annunciator to enable the air to ground data link. Also enable VHF or satellite network.*

Figure 7-65

Wait for **DATA CENTER AK** message if sending multiple requests.

RECALL OPTION 2:

If Flight Plan Number field is blank:

1. **ENTER** Key - DEPRESS. Cursor will position itself over date field. (Figure 7-66)

Figure 7-66

2. DATE - INSERT issue date (day, month, year, digits only) of AFIS Flight Plan being recalled.

3. **ENTER** Key - DEPRESS.

4. **ETD** - INSERT estimated time of departure in GMT of AFIS Flight Plan being recalled.

5. **ENTER** Key - DEPRESS.

6. **FR** field - INSERT origin ICAO Identifier.

7. **ENTER** Key - DEPRESS.

8. **TO** field - INSERT destination ICAO Identifier.
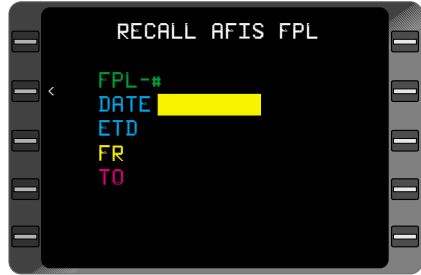
9. **ENTER** Key - DEPRESS. Cursor is positioned over **TRANSMIT REQUEST?** (Figure 7-67)
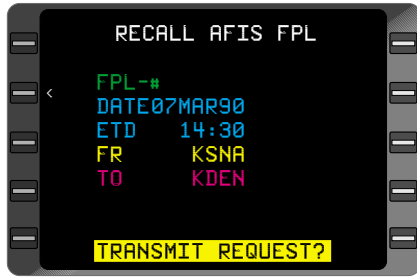
10. **ENTER** Key - DEPRESS to initiate recalling of AFIS Flight Plan from Global Data Center. **AFIS MENU** Page will appear with cursor positioned over **SEND AFIS MSG**.

```
         RECALL AFIS FPL

     FPL-#
  <  DATE07MAR90
     ETD   14:30
     FR    KSNA
     TO    KDEN


     TRANSMIT REQUEST?
```

Figure 7-67

*NOTE: SIGMETS ,Winds and Term Wx are automatically updated once the **FPL** is recalled.*

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

SENDING A TEXT MESSAGE OR PDC

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over **SEND AFIS MSG**. (Figure 7-68)

3. **ENTER** Key - DEPRESS. SEND AFIS MESSAGE Page appears. (Figure 7-69) If not requesting PDC proceed to step 7

4. Line Selct Key - Depress to position cursor over #: field.

5. INSERT - **PDCXXX** (XXX is departure airport identifier).

6. **ENTER** Key - Depress twice to transmit request.

7. **TO** - INSERT receiver of message.

```
            AFIS MENU

    1  AFIS FLT PLAN
    2  SIGMETS
  < 3  TERMINAL WX
  < 4  WINDS ALOFT
    5  RECALL AFIS FPL
  < 6  SEND AFIS MSG
  < 7  DISPL AFIS MSG
  < 8  OPERATING MODES
```

Figure 7-68

```
  ↑      SEND AFIS MSG
         MESSAGE        PPM
  ↓   TO:
      FR:
      #:



  <    SEND MESSAGE?     >
```

Figure 7-69

8. **ENTER** Key - DEPRESS.

9. **FR** - INSERT sender's iden-
   tification (name or tail num-
   ber).

10. **ENTER** Key - DEPRESS.

11. **#** - INSERT receiver's
    address. See Table 1 for
    possible addresses.

12. **ENTER** Key - DEPRESS.

13. Message - INSERT text
    message using the ENTER
    Key to access each succes-
    sive line. (Figure 7-70)

Figure 7-70

NOTE: The cursor remains fixed and the page display moves up or down one line at a time through the cursor. Fifteen lines of text can be entered. (Figure 7-71)

The following guidelines are used for entering and editing text:

Figure 7-71

   a. Entering a character
      causes the character at
      the cursor position and
      all the characters to the
      right to be shifted one
      position.

   b. The **BACK** Key may be used to delete characters one at a
      time from right to left.

   c. The **SP** Key may be used as a spacer to separate words.

   d. The **PRV** Key may be used to move the cursor one space to
      the left.

   e. The **NXT** Key may be used to move the cursor one space to
      the right.

f.   The Line Select Key moves cursor to **SEND MESSAGE?** field if a **TO** or **#** entry field has been inserted.

g.   Top two left Line Select keys move cursor up and down page.

11. Line Select Key - DEPRESS to position over **SEND MESSAGE?** It will be necessary to press the **ENTER** Key after 15 lines of text, or if there are two succeeding blank lines, in order for the cursor to appear over **SEND MESSAGE**? field. (Figure 7-72)


```
   ↑    SEND AFIS MSG      ›

   ↓  DELAYED DUE TO WX
      NEW ETA IS 1430Z
      PLS ARR GND TRANS
      ALSO PLS HAV MECH
      AVAIL TO DISCUSS POS
      MAINT PROB

   ‹  SEND MESSAGE?        ›
```

Figure 7-72

12. **ENTER** Key - DEPRESS. The message is sent to the Global Data Center via the data link.

*NOTE: Wait for **DATA CENTER AK** message if sending multiple requests.*

TO RETURN TO THE AFIS MENU PAGE

13. Press **AFIS** or **NXT** Key with the cursor off the page.

SENDING/BUILDING A PREPROGRAMMED MESSAGE

The PREPROGRAMMED MESSAGES MENU Page is accessed from the **SEND AFIS MSG** Page. (Figure 7-73) An entry in the TO or # field must be made before access to PPM is available.

```
↑      SEND AFIS MSG
    MESSAGE         PPM
↓   TO: DISPATCH
    FR:  N2175C
    #: SNABCDE

    DELAYED DUE TO WX
    NEW ETA IS 1430Z

<   SEND MESSAGE?        >
```

Figure 7-73

1. Line Select Key - DEPRESS to position cursor over the PPM field.

2. **ENTER** Key - DEPRESS. Up to six messages can be listed on the **PPM MENU** Page which appears.

3. Line Select Key - DEPRESS to position cursor over desired message title or blank title field. (Figure 7-74)

4. MESSAGE TITLE - VERIFY or ENTER. A new title may be entered with a maximum of 18 characters.

   To change an existing title, type characters over the old Title. The **BACK** Key can be used to delete characters one at a time.

```
        PPM MENU

< 1 ETA CHANGE
< 2 FILE FLT PLAN REQ
< 3 HOTEL RESERVATIONS
  4
< 5
  6
<
```

Figure 7-74

NOTE: Whenever a title is changed or erased, the preprogrammed message associated with the title will be erased also.

5. **ENTER** Key - DEPRESS. The preprogrammed message associated with that title will appear. If no message has been programmed the display will be blank. Insert message as requied up to 7 lines of text.

EDITING/ENTERING A PREPROGRAMMED MESSAGE

6. TEXT - EDIT or ENTER using the following guidelines.

    a. Entering a character causes the character at the cursor position and all the characters to the right to be shifted one position.

    b. The **BACK** Key may be used to delete characters one at a time from right to left.

    c. The **SP** Key may be used as a spacer to separate words.

    d. The **PRV** Key may be used to move the cursor one space to the left.

    e. The **NXT** Key may be used to move the cursor one space to the right.

Figure 7-75

CONTINUE SENDING MESSAGE

7. **NXT** Key - DEPRESS to position cursor over the **SEND MESSAGE?** field. It will be necessary to press the **ENTER** Key after seven lines of text in order for the **SEND MESSAGE?** field to appear. (Figure 7-76)

8. **ENTER** Key - DEPRESS. The message will be downlinked and the **AFIS MENU** Page will appear. **TO**, **FROM** and **#** field information of **SEND MESSAGE** Page will be used in downlink message.

Figure 7-76

*NOTE: **DATA LINK DISABLED** will appear in the **SEND MESSAGE?** field if the downlink is disabled.*

Wait for **DATA CENTER AK** message if sending multiple requests.

AFIS MESSAGES REVIEW
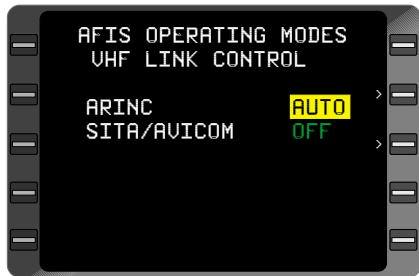
1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **DISPL AFIS MSG**. (Figure 7-77)

3. **ENTER** Key - DEPRESS. **DISPLAY AFIS MSG** Page appears.

4. MESSAGE - REVIEW. (Figure 7-78)

5. **AFIS**, **NXT**, **PRV** or **BACK** Key - DEPRESS. Subsequent message pages appear or old **AFIS MENU** Page returns with cursor positioned over **OPERATING MODES**.

NOTE: Messages will remain in the system until the system is powered off.

```
          AFIS MENU
 1  AFIS FLT PLAN
 2  SIGMETS
 3  TERMINAL WX
 4  WINDS ALOFT
 5  RECALL AFIS FPL
 6  SEND AFIS MSG
 7  DISPL AFIS MSG
 8  OPERATING MODES
```

Figure 7-77

```
     DISPLAY AFIS MSG 1/1

    DISPATCH:
    MESSAGE RECEIVED.
    NEW ETA IS 1430Z.
    TRANSPORTATION
    ARRANGED.
```

Figure 7-78

SELECTING OPERATING MODES (FOR AFIS USERS EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

AUTO REPORTING

When the system is initialized, the Automatic Reporting and Auto Wx update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.

TURNING AUTO REPORT / AUTO WX UPDATE OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

```
        AFIS MENU

  1 AFIS FLT PLAN
  2 SIGMETS
  3 TERMINAL WX
  4 WINDS ALOFT
  5 RECALL AFIS FPL
  6 SEND AFIS MSG
  7 DISPL AFIS MSG
  8 OPERATING MODES
```

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-79)

3. **ENTER** Key - DEPRESS.

Figure 7-79

4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO REPORT** or **AUTO WX UPDATE** field. (Figure 7-80)
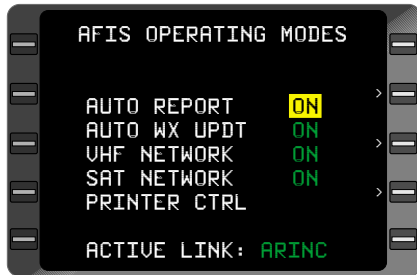
```
   AFIS OPERATING MODES

  AUTO REPORT     ON
  AUTO WX UPDT    ON
  VHF NETWORK     ON
  SAT NETWORK     ON
  PRINTER CTRL

  ACTIVE LINK: ARINC
```

5. **BACK** Key - DEPRESS. OFF appears in the cursor. (Figure 7-81)

Figure 7-80

6. **ENTER** Key - DEPRESS to turn **OFF** the **AUTO REPORT** or **AUTO WX UPDATE** function.

```
   AFIS OPERATING MODES

  AUTO REPORT     OFF
  AUTO WX UPDT    ON
  VHF NETWORK     ON
  SAT NETWORK     ON
  PRINTER CTRL

  ACTIVE LINK: ARINC
```
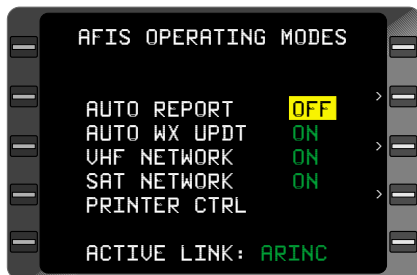
*NOTE: If all networks are **OFF**, then **AUTO REPORT** and **AUTO WX UPDATE** will be **OFF**.*

Figure 7-81

RETURNING TO AUTO REPORT/AUTO WX UPDATE

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERAT-ING MODES**. (Figure 7-82)

3. **ENTER** Key - DEPRESS.

```
            AFIS MENU

  1  AFIS FLT PLAN
  2  SIGMETS
  3  TERMINAL WX
  4  WINDS ALOFT
  5  RECALL AFIS FPL
  6  SEND AFIS MSG
  7  DISPL AFIS MSG
  8  OPERATING MODES
```

Figure 7-82

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO REPORT** or **AUTO WX UPDATE** field. (Figure 7-83)

```
   AFIS OPERATING MODES


   AUTO REPORT     OFF
   AUTO WX UPDT    ON
   VHF NETWORK     ON
   SAT NETWORK     ON


   ACTIVE LINK: ARINC
```
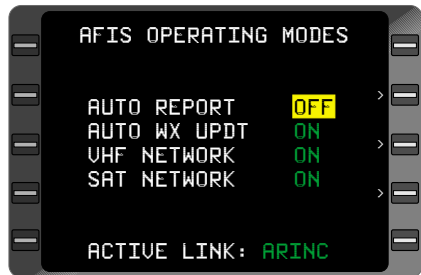
Figure 7-83

5. **BACK** Key - DEPRESS. **ON** appears in the cursor. (Figure 7-84)

6. **ENTER** Key - DEPRESS to turn **ON** the **AUTO REPORT** or **AUTO WX UPDATE** function.

*NOTE: If all networks are **OFF**, then **AUTO REPORT** and **AUTO WX UPDATE** will be **OFF**.*

```
   AFIS OPERATING MODES


   AUTO REPORT     ON
   AUTO WX UPDT    ON
   VHF NETWORK     ON
   SAT NETWORK     ON


   ACTIVE LINK: ARINC
```
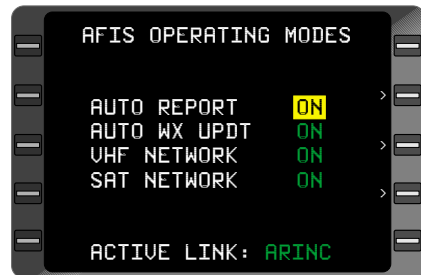
Figure 7-84

AUTO WEATHER UPDATE

When the system is initialized, the Automatic Weather Update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.

TURNING AUTO WX UPDT OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-85)

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO WX UPDT** field. (Figure 7-86)

5. **BACK** Key - DEPRESS. **OFF** appears in the cursor. (Figure 7-87)

6. **ENTER** Key - DEPRESS to turn **OFF** the **AUTO WX UPDT** function.

*NOTE: A Weather Update Request must be performed to notify the GDC of the change in status of **AUTO WX UPDT**.*

Figure 7-85
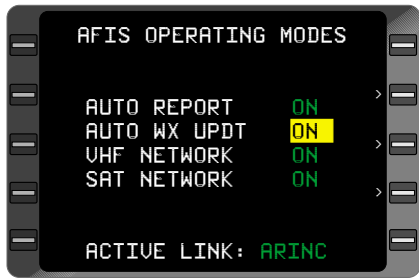
Figure 7-86
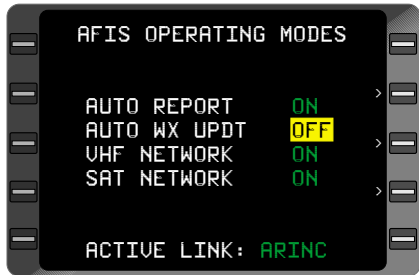
Figure 7-87

RETURNING TO AUTO WX UPDT

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

```
          AFIS MENU

       1  AFIS FLT PLAN
       2  SIGMETS
       3  TERMINAL WX
       4  WINDS ALOFT
       5  RECALL AFIS FPL
       6  SEND AFIS MSG
       7  DISPL AFIS MSG
       8  OPERATING MODES
```

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-88)

3. **ENTER** Key - DEPRESS.

Figure 7-88

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO WX UPDT** field. (Figure 7-89)
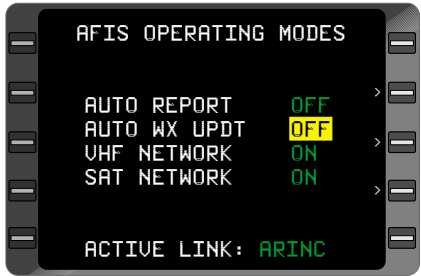
```
      AFIS OPERATING MODES


      AUTO REPORT      OFF
      AUTO WX UPDT     OFF
      VHF NETWORK      ON
      SAT NETWORK      ON


      ACTIVE LINK: ARINC
```

5. **BACK** Key - DEPRESS. **ON** appears in the cursor. (Figure 7-90)

Figure 7-89

6. **ENTER** Key - DEPRESS to turn **ON** the **AUTO WX UPDT** function.

*NOTE: A Weather Update Request must be performed to notify the GDC of the change in status of **AUTO WX UPDT**.*

```
      AFIS OPERATING MODES


      AUTO REPORT      OFF
      AUTO WX UPDT     ON
      VHF NETWORK      ON
      SAT NETWORK      ON


      ACTIVE LINK: ARINC
```
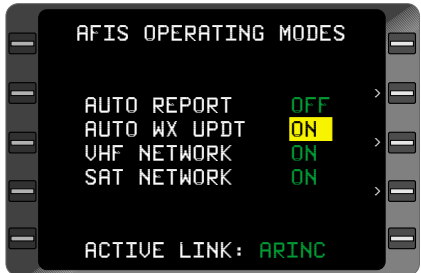
Figure 7-90

VHF AND SATELLITE NETWORK OPERATING MODES

The status of each network is held in non-volatile memory. When the system is initialized, all networks will prefill with the status at system shut-down. The following procedures allow the VHF and satellite networks to be manually operated, turned **OFF**, or returned to **AUTO**.

```
      AFIS MENU

 1  AFIS FLT PLAN
 2  SIGMETS
 3  TERMINAL WX
 4  WINDS ALOFT
 5  RECALL AFIS FPL
 6  SEND AFIS MSG
 7  DISPL AFIS MSG
 8  OPERATING MODES
```

Figure 7-91

TURNING VHF NETWORK OFF

The VHF network has precedence over the satellite network in areas of shared coverage and must be turned **OFF** in order for **SATCOM** to be the Active Link.

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-91)

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **ON** option of **VHF NETWORK** field. (Figure 7-92)

5. **BACK** Key - DEPRESS. **OFF**? appears in the cursor. (Figure 7-93)

6. **ENTER** Key - DEPRESS to turn the VHF network **OFF**.

```
  AFIS OPERATING MODES

  AUTO REPORT      ON
  AUTO WX UPDT     ON
  VHF NETWORK      ON
  SAT NETWORK      ON

  ACTIVE LINK: ARINC
```

Figure 7-92

```
  AFIS OPERATING MODES

  AUTO REPORT      ON
  AUTO WX UPDT     ON
  VHF NETWORK      OFF?
  SAT NETWORK      ON

  ACTIVE LINK: SATCOM
```

Figure 7-93

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time. If all networks are turned **OFF** or none are operational, **NONE** will be displayed.*
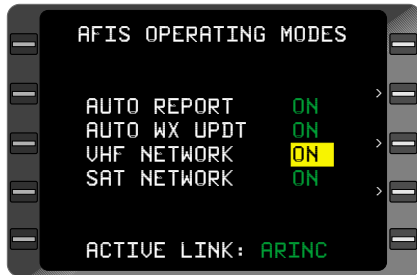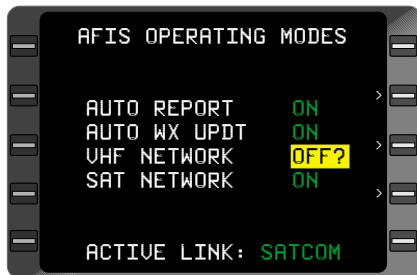
TURNING VHF NETWORK ON

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

```
       AFIS OPERATING MODES

    AUTO REPORT     ON      >
    AUTO WX UPDT    ON
    VHF NETWORK     OFF     >
    SAT NETWORK     ON
                            >

    ACTIVE LINK: SATCOM
```
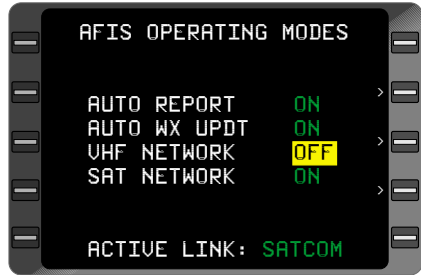
Figure 7-94

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **VHF NETWORK** field. (Figure 7-94)

```
       AFIS OPERATING MODES

    AUTO REPORT     ON      >
    AUTO WX UPDT    ON
    VHF NETWORK     ON ?    >
    SAT NETWORK     ON
                            >

    ACTIVE LINK: ARINC
```

Figure 7-95
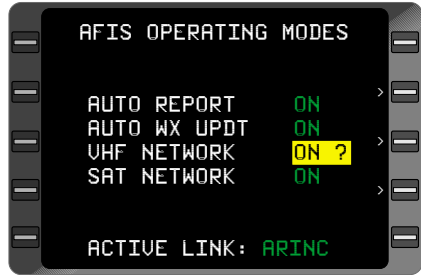
5. **BACK** Key - DEPRESS. **ON**? appears in the cursor. (Figure 7-95)

6. **ENTER** Key - DEPRESS to turn VHF network on. **VHF LINK CONTROL** Page appears. (Figure 7-96)

```
       AFIS OPERATING MODES
        VHF LINK CONTROL

    ARINC           AUTO    >
    SITA/AVICOM     AUTO
                            >


```

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time.*

Figure 7-96

7. Line Select Key - DEPRESS to position cursor over **AUTO** option of desired ground network.
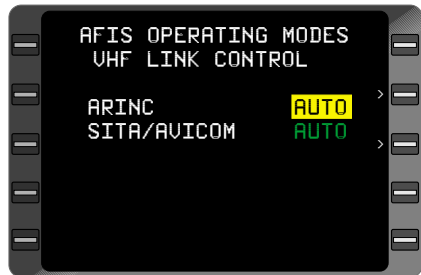
TURNING AUTO TO MAN OR OFF

NOTE: **SITA/AVICOM** *are two different ground networks covering different regions. The appropriate network is automatically selected for operation based on current Lat/Lon location of aircraft, if mode is set to AUTO.*

8. **BACK** Key - DEPRESS until **MAN** or **OFF** appears in the cursor.

9. **ENTER** Key - DEPRESS to select **MAN** or **OFF**.

*NOTE: If **MAN** is selected, all other networks will indicate OFF. (Figure 7-97)*
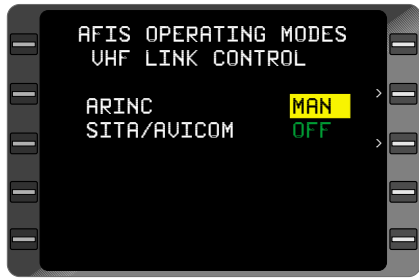
10. Repeat Steps 7 through 9 to turn **OFF** desired ground networks or DEPRESS **ENTER** Key to cursor through option fields and return to **AFIS OPERATING MODES** Page.

Figure 7-97

RETURNING TO AUTO

11. Line Select Key - DEPRESS to position cursor over **OFF** or **MAN** option of desired ground network.

12. **BACK** Key - DEPRESS until **AUTO** appears in cursor. (Figure 7-98)

13. **ENTER** Key - DEPRESS to select **AUTO** option.

14. Repeat Steps 11 through 13 to return desired ground networks to **AUTO** or DEPRESS **ENTER** Key to cursor through option fields and return to AFIS Operating Modes Page.

Figure 7-98

TURNING SATELLITE NETWORK OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

```
         AFIS MENU
  1  AFIS FLT PLAN
 ‹2  SIGMETS
  3  TERMINAL WX
 ‹4  WINDS ALOFT
  5  RECALL AFIS FPL
 ‹6  SEND AFIS MSG
  7  DISPL AFIS MSG
 ‹8  OPERATING MODES
```

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-99)

3. **ENTER** Key - DEPRESS.

Figure 7-99

4. Line Select Key - DEPRESS to position cursor over ON option of **SAT** (satellite) **NETWORK** field. (Figure 7-100)

```
   AFIS OPERATING MODES

  AUTO REPORT     ON
  AUTO WX UPDT    ON
  VHF NETWORK     OFF
  SAT NETWORK     ON

  ACTIVE LINK: SATCOM
```

5. **BACK** Key - DEPRESS. **OFF**? appears in the cursor.
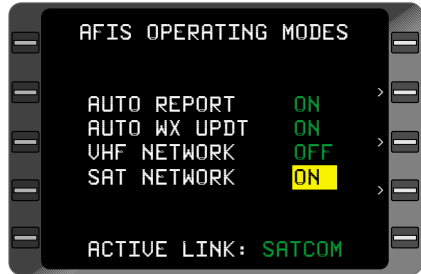
Figure 7-100

6. **ENTER** Key - DEPRESS to turn the satellite network **OFF**. (Figure 7-101)

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time. If all networks are turned **OFF** or none are operational, **NONE** will be displayed.*

```
   AFIS OPERATING MODES

  AUTO REPORT     ON
  AUTO WX UPDT    ON
  VHF NETWORK     OFF
  SAT NETWORK     OFF?

  ACTIVE LINK: NONE
```
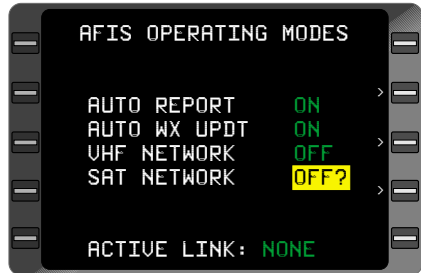
Figure 7-101

TURNING SATELLITE NETWORK ON

The satellite network must be turned **ON** to send non-flight related messages. Since the VHF network has precedence over the satellite network in areas of shared coverage, the **VHF NETWORK** must be turned OFF in order for SATCOM to be the Active Link. If the VHF network cannot be received and the SAT-COM mode is set to ON the system will automatically select the SATCOM mode for transmit and receive.
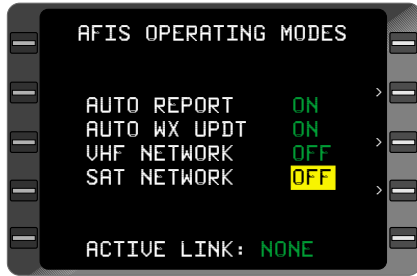
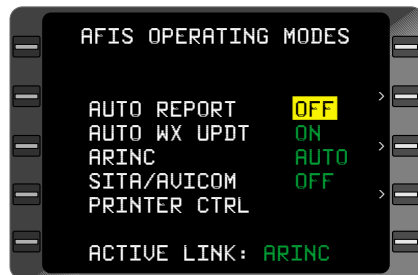*Figure 7-102*

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **SAT NETWORK** field. (Figure 7-102)

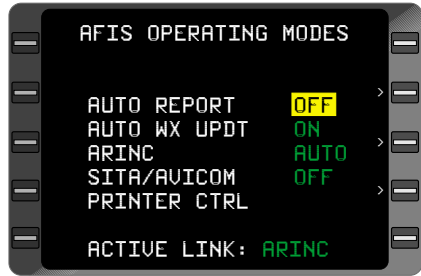5. **BACK** Key - DEPRESS. **ON**? appears in the cursor. (Figure 7-103)
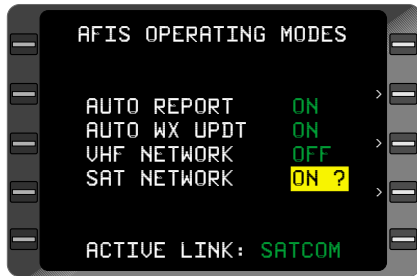
Figure 7-103

*NOTE: The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time.*

6. **ENTER** Key - DEPRESS to turn satellite network on. **SAT** (satellite) **LINK CONTROL** Page appears with cursor over **AUTO**. (Figure 7-104)

Figure 7-104

DEPRESS **ENTER** Key to cursor through option fields and return to **AFIS OPERATING MODES** Page or proceed to Step 7.

TURNING AUTO TO MAN

7. Line Select Key - DEPRESS until **MAN** appears in the cursor.

8. **ENTER** Key - DEPRESS. Cursor moves to **REGION** field.

9. **BACK** Key - DEPRESS until desired region appears in cursor, either **W. Atlantic**, **E. Atlantic**, **Pacific**, or **Indian**. (Figure 7-105)

```
   AFIS OPERATING MODES
 ↑ SAT LINK CONTROL
 ↓
   SAT COM: MAN

   REGION:  PACIFIC


   LINK:OPERATIONAL
```

Figure 7-105

10. **ENTER** Key - DEPRESS to select region. Cursor moves to **LINK** field. (Figure 7-106)

*NOTE: All other regions are now considered **OFF**.*

11. **ENTER** Key - DEPRESS to ACTIVATE the SAT network link as operational and return to **AFIS OPERATING MODES** Page.

```
   AFIS OPERATING MODES
 ↑ SAT LINK CONTROL
 ↓
   SAT COM: MAN

   REGION:  PACIFIC


   LINK:ACTIVATE?
```

Figure 7-106

*NOTE: When in **MAN** mode, the **ACTIVE LINK** will display **NONE** until the aircraft is within the boundaries of the selected region.*

RETURNING TO AUTO

12. Line Select Key - DEPRESS to position cursor over **MAN** field.

13. **BACK** Key - DEPRESS until **AUTO** appears in cursor.

14. **ENTER** Key - DEPRESS to select **AUTO** option. Cursor moves to the **LINK** field.

15. **ENTER** Key - DEPRESS to ACTIVATE the SAT network link as operational and return to **AFIS OPERATING MODES** Page.

PRINTER CTRL

The AFIS DMU has two RS-232 printer interfaces. Users may print messages or weather to either or both printer ports. Automatic printing is also available. Controls for these options, as well as Auto Form Feed control, are accessed on the **PRINTER CONTROL** page. Access the **PRINTER CONTROL** page by line selecting the **PRINTER CTRL** field on the **OPERATING MODES** page and pressing **ENTER**.

MESSAGE DEST

The Message Destination field is used to assign the printer port that will be used when messages are printed. Messages can be sent to printer port 1 (**PRT1**), printer port 2 (**PRT2**), or **BOTH**.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over the **PRINTER CTRL** field. **SEL** will appear in the field.

5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.

6. Line Select Key - DEPRESS to position cursor over **MESSAGE DEST**.

7. **BACK** Key - DEPRESS to cycle destination field between **PRT1**, **PRT2**, and **BOTH**.

8. **ENTER** Key - DEPRESS to set Message Destination field to its present value (**PRT1**, **PRT2**, or **BOTH**.)

WEATHER DEST

The Weather Destination field is used to assign the printer port that will be used when weather is printed. Weather can be sent to printer port 1 (**PRT1**), printer port 2 (**PRT2**), or **BOTH**.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.

5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.

6. Line Select Key - DEPRESS to position cursor over **WEATHER DEST**.

7. **BACK** Key - DEPRESS to cycle destination field between **PRT1**, **PRT2**, and **BOTH**.

8. **ENTER** Key - DEPRESS to set Message Destination field to its present value (**PRT1**, **PRT2**, or **BOTH**.)

AUTO FORM FEED

The Auto Form Feed option, when set to YES, will cause the printer to Form Feed, or eject the page, after each message or weather report is printed. Setting the Auto Form Feed option to NO will print messages and weather reports on the same page until the page is full, then eject the page.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.

5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.

6. Line Select Key - DEPRESS to position cursor over **AUTO FORM FEED**.

7. **BACK** Key - DEPRESS to toggle Auto Form Feed option between **YES** and **NO**.

8. **ENTER** Key - DEPRESS to set Auto Form Feed to its present value (**YES** or **NO**.)

AUTO PRINT MSG

The Auto Print Message field is used to select or deselect the automatic printing of messages. If **AUTO PRINT MSG** is set to **YES**, then messages will automatically be printed upon receipt. If **AUTO PRINT MSG** is set to **NO**, then messages will not be printed upon receipt.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.

5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.

6. Line Select Key - DEPRESS to position cursor over **AUTO PRINT MSG**.

7. **BACK** Key - DEPRESS to toggle Auto Print Message field between **YES** and **NO**.

8. **ENTER** Key - DEPRESS to set Auto Print Message field to its present value (**YES** or **NO**.)

AUTO PRINT WX

The Auto Print Weather field is used to select or deselect the automatic printing of weather. If **AUTO PRINT WX** is set to **YES**, then weather will automatically be printed upon receipt. If **AUTO PRINT WX** is set to **NO**, then weather will not be printed upon receipt.

1. **AFIS** key - DEPRESS to display **AFIS MENU** page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**.

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **SEL** option of **PRINTER CTRL** field.

5. **ENTER** Key - DEPRESS to access the **PRINTER CONTROL** page.

6. Line Select Key - DEPRESS to position cursor over **AUTO PRINT WX**.

7. **BACK** Key - DEPRESS to toggle Auto Print Weather field between **YES** and **NO**.

8. **ENTER** Key - DEPRESS to set Auto Print Weather field to its present value (**YES** or **NO**.)

PRINTING PROCEDURES

PRINTING FLIGHT PLANS

Following is a step by step procedure to print a flight plan in the air-craft:

Note: The aircraft must be specially REGISTERED with the Global Data Center (GDC) for this feature.

1. Enable **AUTO PRINT WX** from the printer control page of the **AFIS OPERATING MODES** page.

2. Select **SEND AFIS MSG** from the **AFIS MENU**.

3. Leave the **TO** and **FR** fields blank. At the address (#) field, type: **PRFPD1234**, where D1234 is the flight plan number.

4. Transmit the request to the GDC.

5. When uplinked, the flight plan will be treated like weather and will print automatically.

PRINTING MESSAGES

Messages may be printed automatically as the message is uplinked, and/or individually at any time.

To Automatically Print Messages Upon Receipt:

1. Select **AUTO PRINT MSG** from the AFIS OPERATING MODES, PRINTER CONTROL page, to **YES**. All uplinked messages will print automatically upon receipt.

To Manually Print a Message:

1. While reviewing the message, line select one of the white caret symbols at the bottom of the message page.

2. The **PRINT MESSAGE?** prompt will display. Press **ENTER** to send the message to the printer currently selected for messages.

To Manually Print All Messages:

1. From the **AFIS MENU**, select the **SEND AFIS MSG** page.

2. On the send message page, leave the **TO** and **FR** fields blank. At the address (#) field, type <u>ONE</u> of the following commands:

> **MSG 1**   Send messages to printer one.
>
> **MSG 2**   Send messages to printer two.
>
> **MSG 3**   Send messages to both printers.

3. Press **ENTER** until the **SEND MESSAGE?** prompt is displayed. Press **ENTER** again to initiate printing to the specified printer(s).

PRINTING WEATHER

SIGMETS, Winds Aloft, and Terminal Weather may be printed automatically or manually.

To Automatically Print SIGMETS, Winds Aloft, and Terminal Weather Upon Receipt:

1. Select **AUTO PRINT WX** from the AFIS OPERATING MODES, PRINTER CONTROL page. All SIGMETS, Winds Aloft, and Terminal Weather reports will print automatically as they are received.

To Manually Print All SIGMETS, Winds Aloft, or Terminal Weather:

1. From the **AFIS MENU**, select the **SEND AFIS MSG** page.

2. On the send message page, leave the **TO** and **FR** fields blank. At the address (#) field, type <u>ONE</u> of the following commands (note- there is a space between the command and the numeral, ex. SIG<space>1):

> **SIG 1**   Send SIGMETS to printer one.
>
> **SIG 2**   Send SIGMETS to printer two.
>
> **SIG 3**   Send SIGMETS to both printers.

> **WND 1**   Send Winds Aloft to printer one.
>
> **WND 2**   Send Winds Aloft to printer two.
>
> **WND 3**   Send Winds Aloft to both printers.

SELECTING OPERATING MODES (FOR AFIS USERS NOT EQUIPPED WITH SATELLITE DATA COMMUNICATIONS SYSTEM)

AUTO REPORTING

When the system is initialized, the Automatic Reporting and or Auto Wx update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.

TURNING AUTO REPORT OFF

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-107)

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO REPORT** field. (Figure 7-108)

5. **BACK** Key - DEPRESS. **OFF** appears in the cursor. (Figure 7-109)

6. **ENTER** Key - DEPRESS to turn **OFF** the **AUTO REPORT** function.
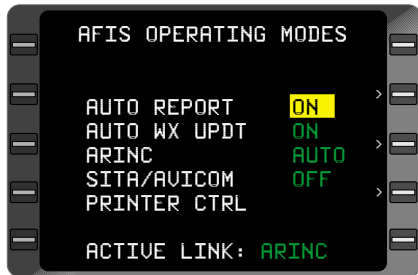
NOTE: If all ground networks are **OFF**, then **AUTO REPORT** will be **OFF**.

Figure 7-107

Figure 7-108

Figure 7-109

RETURNING TO AUTO REPORT

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

```
        AFIS MENU

  1 AFIS FLT PLAN
< 2 SIGMETS
< 3 TERMINAL WX
< 4 WINDS ALOFT
< 5 RECALL AFIS FPL
< 6 SEND AFIS MSG
< 7 DISPL AFIS MSG
  8 OPERATING MODES
```

Figure 7-110

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-110)

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO REPORT** field. (Figure 7-111)

```
    AFIS OPERATING MODES


   AUTO REPORT    OFF  >
   AUTO WX UPDT    ON
   ARINC         AUTO
   SITA/AVICOM    OFF  >
   PRINTER CTRL

   ACTIVE LINK: ARINC
```

Figure 7-111

5. **BACK** Key - DEPRESS. **ON** appears in the cursor.

6. **ENTER** Key - DEPRESS to turn **ON** the **AUTO REPORT** function. (Figure 7-112)

*NOTE: If all ground networks are **OFF**, then **AUTO REPORT** will be **OFF**.*

```
    AFIS OPERATING MODES


   AUTO REPORT     ON  >
   AUTO WX UPDT    ON
   ARINC         AUTO
   SITA/AVICOM    OFF  >
   PRINTER CTRL

   ACTIVE LINK: ARINC
```
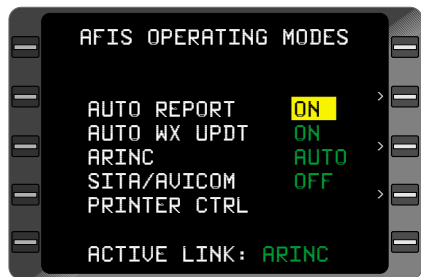
Figure 7-112

AUTO WEATHER UPDATE

When the system is initialized, the Automatic Weather Update function will retain the status at aircraft shutdown. The following procedures allow the function to be turned **OFF** and back **ON**.

TURNING AUTO WX UPDT OFF

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.


```
        AFIS MENU
1  AFIS FLT PLAN
2  SIGMETS
3  TERMINAL WX
4  WINDS ALOFT
5  RECALL AFIS FPL
6  SEND AFIS MSG
7  DISPL AFIS MSG
8  OPERATING MODES
```

Figure 7-113

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-113)
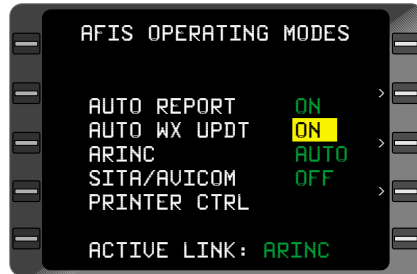
3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **ON** option of **AUTO WX UPDT** field. (Figure 7-114)


```
   AFIS OPERATING MODES

AUTO REPORT      ON
AUTO WX UPDT     ON
ARINC            AUTO
SITA/AVICOM      OFF
PRINTER CTRL

ACTIVE LINK: ARINC
```

Figure 7-114

5. **BACK** Key - DEPRESS. **OFF** appears in the cursor. (Figure 7-115)
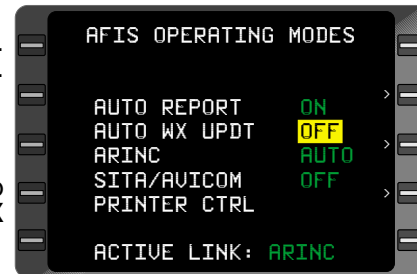
6. **ENTER** Key - DEPRESS to turn **OFF** the **AUTO WX UPDT** function.


```
   AFIS OPERATING MODES

AUTO REPORT      ON
AUTO WX UPDT     OFF
ARINC            AUTO
SITA/AVICOM      OFF
PRINTER CTRL

ACTIVE LINK: ARINC
```

Figure 7-115

RETURNING TO AUTO WX UPDT

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

```
        AFIS MENU

   1  AFIS FLT PLAN
 < 2  SIGMETS
 < 3  TERMINAL WX
 < 4  WINDS ALOFT
 < 5  RECALL AFIS FPL
 < 6  SEND AFIS MSG
 < 7  DISPL AFIS MSG
   8  OPERATING MODES
```

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-116)

3. **ENTER** Key - DEPRESS.

Figure 7-116

4. Line Select Key - DEPRESS to position cursor over **OFF** option of **AUTO WX UPDT** field. (Figure 7-117)
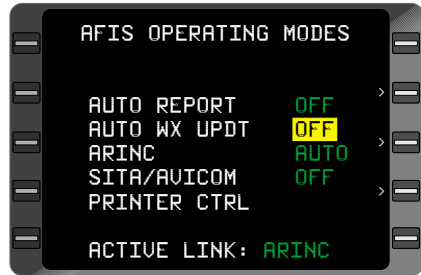
```
   AFIS OPERATING MODES

   AUTO REPORT    OFF   >
   AUTO WX UPDT   OFF
   ARINC          AUTO  >
   SITA/AVICOM    OFF
   PRINTER CTRL         >

   ACTIVE LINK: ARINC
```

5. **BACK** Key - DEPRESS. **ON** appears in the cursor. (Figure 7-118)

Figure 7-117

6. **ENTER** Key - DEPRESS to turn **ON** the **AUTO WX UPDT** function.

```
   AFIS OPERATING MODES

   AUTO REPORT    ON    >
   AUTO WX UPDT   ON
   ARINC          AUTO  >
   SITA/AVICOM    OFF
   PRINTER CTRL         >

   ACTIVE LINK: ARINC
```

*NOTE: A Weather Update Request must be performed to notify the GDC of the change in status of **AUTO WX UPDT**.*
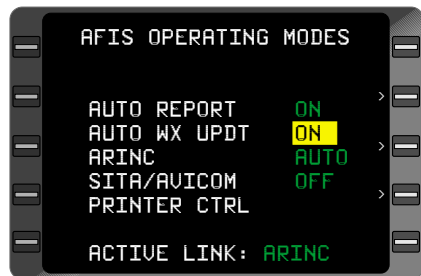
Figure 7-118

GROUND NETWORK OPERATING MODES

The status of each network is held in non-volatile memory. When the system is initialized, all networks will prefill with the status at system shut-down. The following procedures allow the ground networks to be manually operated, turned **OFF**, or returned to **AUTO**.

NOTE: **SITA/AVICOM** *are two different ground networks covering different regions. The appropriate network is selected for operation based on current Lat/Lon location of aircraft.*

AUTO TO MAN OR OFF MODE

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-119)

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **AUTO** option of desired ground network field. (Figure 7-120)

5. **BACK** Key - DEPRESS until **MAN** or **OFF** appears in the cursor.

6. **ENTER** Key - DEPRESS to select **MAN** or **OFF** mode. (Figure 7-121)
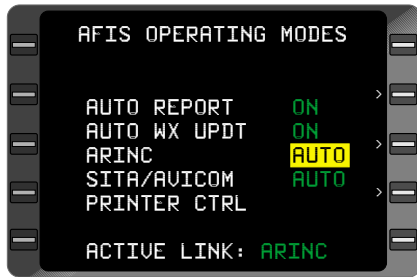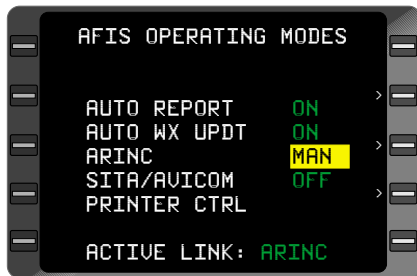
*NOTE: If **MAN** is selected, all other networks will indicate **OFF**.*

Figure 7-119

Figure 7-120

Figure 7-121

RETURNING TO AUTO

1. **AFIS** Key - DEPRESS to display **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position cursor over **OPERATING MODES**. (Figure 7-122)

3. **ENTER** Key - DEPRESS.

4. Line Select Key - DEPRESS to position cursor over **MAN** or **OFF** option of ground network field. (Figure 7-123)

5. **BACK** Key - DEPRESS until **AUTO** appears in the cursor. (Figure 7-124)

6. **ENTER** Key - DEPRESS to select **AUTO** mode.

*NOTE: **AUTO REPORT**, **AUTO WX UPDT**, and **OPERATING MODE** selection status are stored in non-volatile memory. If the operator turns to **OFF** or **MAN**, the operator must reselect to turn **ON**.*
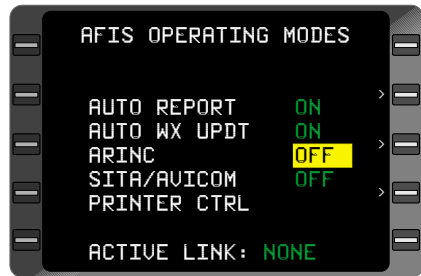
The **ACTIVE LINK** information at the bottom of the page indicates the network that is being serviced at that time. If the system is operating in automatic mode and the network selected by the present position information is turned **OFF** or none are operational, **NONE** will be displayed.

```
          AFIS MENU

  1 AFIS FLT PLAN
  2 SIGMETS
  3 TERMINAL WX
  4 WINDS ALOFT
  5 RECALL AFIS FPL
  6 SEND AFIS MSG
  7 DISPL AFIS MSG
  8 OPERATING MODES
```

Figure 7-122

```
   AFIS OPERATING MODES


  AUTO REPORT    ON
  AUTO WX UPDT   ON
  ARINC          OFF
  SITA/AVICOM    OFF
  PRINTER CTRL

  ACTIVE LINK: NONE
```

Figure 7-123

```
   AFIS OPERATING MODES


  AUTO REPORT    ON
  AUTO WX UPDT   ON
  ARINC          AUTO
  SITA/AVICOM    OFF
  PRINTER CTRL

  ACTIVE LINK: ARINC
```
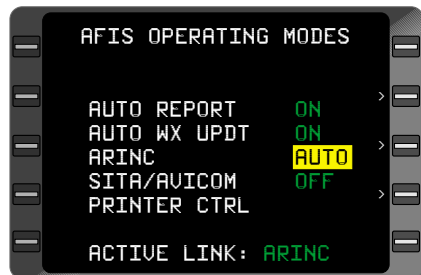
Figure 7-124

UPDATING AFIS FLIGHT PLAN AND WEATHER

UPDATING AFIS FLIGHT PLAN

1. **FPL** Key - DEPRESS to display Active Flight Plan Page.

2. Active Flight Plan - VERIFY the Active Flight Plan route or AMEND as necessary.

3. Line Select Key - DEPRESS until cursor is positioned over **AFIS UPDATE?** (Figure 7-125)

4. **ENTER** Key - DEPRESS. **AFIS FPL UPDATE** Page appears with cursor positioned over **ACTUAL FL** value field. (Figure 7-126)

NOTE: Values entered are checked against aircraft limitations stored in GDC computers. Invalid entries prevent cursor movement and cause the field to flash. Amend and re-enter to advance cursor.
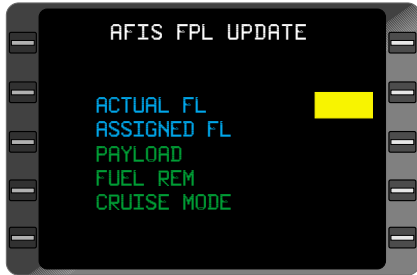
Figure 7-125

Figure 7-126

NOTE: SIGMETS Winds and Terminal Wx are automatically updated when a AFIS FPL update is received.

5. **ACTUAL FL** value - VERIFY or INSERT actual flight level.

6. **ENTER** Key - DEPRESS.

7. **ASSIGNED FL** value - VERIFY or INSERT new flight level assignment.

8. **ENTER** Key - DEPRESS.

9. **PAYLOAD** value - VERIFY or INSERT amended payload value.

10. **ENTER** Key - DEPRESS.

11. **FUEL REM** value - VERIFY or INSERT amended fuel remaining value.

12. **ENTER** Key - DEPRESS.

13. **CRUISE MODE** - VERIFY or INSERT an amended cruise mode.

14. **ENTER** Key - DEPRESS. The cursor positions over **TRANSMIT REQUEST**? field. (Figure 7-127)

15. **ENTER** Key - DEPRESS to initiate a Flight Plan Update. **ACTIVE FPL** Page will appear.

```
      AFIS FPL UPDATE

   ACTUAL FL          410
   ASSIGNED FL        370
   PAYLOAD           1200
   FUEL REM         11985
   CRUISE MODE        M90

   TRANSMIT REQUEST?
```
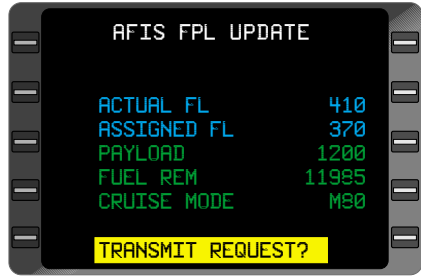
Figure 7-127

*NOTE: For aircraft equipped with the Antenna Switching Unit, if **DATA LINK DISABLED** message appears DEPRESS momentary AFIS annunciator to enable the air to ground data link. Also enable VHF or satellite network.*

Wait for **DATA CENTER** AK message if sending multiple requests.

SELECTING UPDATE AS ACTIVE FLIGHT PLAN

1. **FPL** Key - DEPRESS until AFIS FLIGHT PLAN LIST Page appears with Updated Flight Plan (UPDA - XXXX). (Figure 7-128)

2. Line Select Key - DEPRESS to position cursor over Updated Flight Plan.

3. **ENTER** Key - DEPRESS. Cursor positions itself over **REPLACE ACTIVE FPL?**

```
          AFIS
   FLIGHT PLAN LIST 1/4

 <   CYUL-KJFK      06APR90
 <   UPDA-KORD      16APR90


     REPLACE ACTIVE FPL?
```

Figure 7-128

4. **ENTER** Key - DEPRESS to replace Active Flight Plan with Updated Flight Plan. (Figure 7-129)

5. ACTIVE FPL - CONFIRM. Updated Flight Plan becomes the Active Flight Plan.

```
          AFIS
   FLIGHT PLAN LIST 1/4

 <   CYUL-KJFK      06APR90
 <   UPDA-KORD      16APR90


     REPLACE ACTIVE FPL?
```
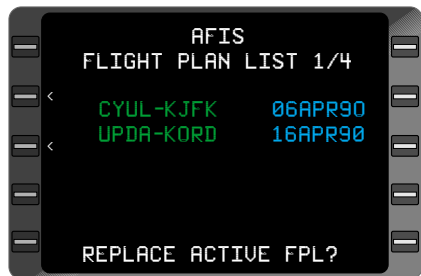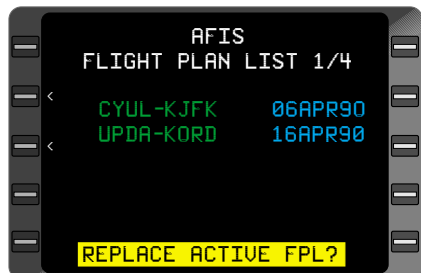
Figure 7-129

UPDATING SIGMETS

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over **SIGMETS**. (Figure 7-130)

```
      AFIS SIGMETS 1/2
<                   9APR90
FR (KSNA)     TO (KMIA)
ALPHA 2: SEV CAT
EXT FR SO CENT VA
THRU DE AT 14000 TO
24000 FT.


TRANSMIT REQUEST?
```

Figure 7-130

3. **ENTER** Key - DEPRESS to display first **SIGMETS** Page.

4. Line Select Key - DEPRESS to position cursor over **FROM** field.

5. Desired Identifier - INSERT.

6. **ENTER** Key - DEPRESS.

NOTE: Parentheses appear indicating a request has not yet been sent or received.

7. Line Select Key - DEPRESS to position cursor over **TO** field.

8. Desired Identifier - INSERT.

9. **ENTER** Key - DEPRESS.

```
      AFIS SIGMETS 1/2
<                   9APR90
FR KSNA       TO  KMIA
SIGMET ECHO 7 VALID
UNTIL 222205 CA
FROM RNO TO EED TO
```

Figure 7-131

10. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST**? (Figure 7-131)

11. **ENTER** Key - DEPRESS to initiate a SIGMET update.

*NOTE: When an updated SIGMET is received it replaces all previous SIGMETS. If **NAT** is entered as **FR** option, a North Atlantic Tracks update is sent. (Figure 7-132)*
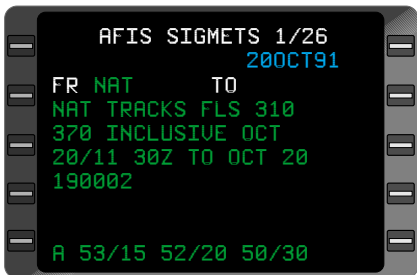
Wait for **DATA CENTER AK** if sending multiple requests.

```
      AFIS SIGMETS 1/26
                  20OCT91
FR NAT        TO
NAT TRACKS FLS 310
370 INCLUSIVE OCT
20/11 30Z TO OCT 20
190002

A 53/15 52/20 50/30
```

Figure 7-132

UPDATING WEATHER

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over **TERMINAL WX**. (Figure 7-133)

3. **ENTER** Key - DEPRESS to display **TERMINAL WX** Menu Page.

4. Line Select Key - DEPRESS to position cursor in next available field. (Figure 7-134)

NOTE: If desired, when no field is available, place cursor over an existing identifier.

Figure 7-133

5. Terminal ICAO Identifier - INSERT.

6. **ENTER** Key - DEPRESS. The newly entered ID appears in parentheses on the Menu.

7. Repeat Steps (5) and (6) to enter additional requests.

8. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST**?

Figure 7-134

9. **ENTER** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** if sending multiple requests.*

TO UPDATE TERMINAL WEATHER DATA PAGES

10. Access the **TERMINAL WEATHER** Data Page (Figure 7-135) by selecting an Identifier on the **TERMINAL WX MENU** Page.
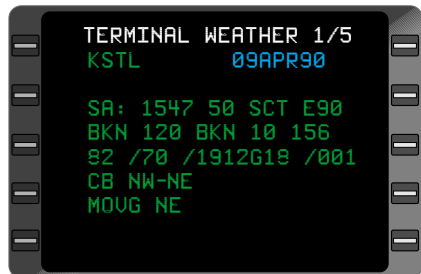
Figure 7-135

TO INSERT A NEW IDENTIFIER

11. Line Select Key - DEPRESS to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENTER** Key - DEPRESS. The **TERMINAL WEATHER** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for the new identifier, it will appear in parentheses.

UPDATING WINDS ALOFT

1. **AFIS** Key - DEPRESS to display AFIS MENU Page.

2. Line Select Key - DEPRESS to position cursor over **WINDS ALOFT**. (Figure 7-137)

3. **ENTER** Key - DEPRESS to display **WINDS ALOFT** Menu Page.

```
              AFIS MENU

     1  AFIS FLT PLAN
     2  SIGMETS
     3  TERMINAL WX
     4  WINDS ALOFT
     5  RECALL AFIS FPL
     6  SEND AFIS MSG
     7  DISPL AFIS MSG
     8  OPERATING MODES
```

Figure 7-137

4. Line Select Key - DEPRESS to position cursor in next available field. (Figure 7-138)

NOTE: If desired, when no field is available, place cursor over existing identifier.

5. Desired Identifier - INSERT.

NOTE: Identifier can be VOR, airport, waypoint, Lat/Lon or VORTAC ident.

```
             TERMINAL WX

    <   KSNA      (ENO)   >

    <   KSTL      (DQO)   >

    <   (MKC)              >

    <   TRANSMIT REQUEST?
```

Figure 7-138

6. **ENTER** Key - DEPRESS. The newly entered ID appears in parentheses on the Menu.

7. Repeat Steps (5) and (6) to enter additional requests.

8. Line Select Key - DEPRESS to position cursor over **TRANSMIT REQUEST**?

9. **ENTER** Key - DEPRESS. Identifiers listed on this page will be transmitted to the ground via the data link.

*NOTE: Wait for **DATA CENTER AK** if sending multiple requests.*

TO UPDATE THE WINDS ALOFT DATA PAGES

10. Access the **WINDS ALOFT** Data Pages (Figure 7-139) by selecting an identifier on the **WINDS ALOFT** menu Page.


```
        WINDS ALOFT
ICT          122356Z

18000 310/23-17
24000 290/34-31
30000 290/44-47
34000 300/53-54
39000 310/68-56
45000 310/57-59
```
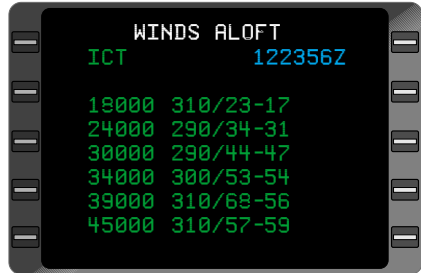
Figure 7-139

TO INSERT A NEW IDENTIFIER

11. Line Select Key - DEPRESS to position the cursor over the identifier field.

12. IDENTIFIER - INSERT. The data text fields will go blank.

13. **ENTER** Key - DEPRESS. The **WINDS ALOFT** Menu Page appears with the new identifier in place of the original identifier, and the cursor positioned at the location of the original identifier selected. If there is no data available for the new identifier, it will appear in parentheses.

AFIS GRAPHICAL WEATHER OPERATIONS

The AFIS functions described in this section are available only on an AFIS Data Management Unit (DMU) equipped to process graphical weather. If your AFIS DMU has not been equipped to process graphical weather the WX Graphics option will not be listed on the AFIS Main Menu. Contact your nearest Honeywell dealer or the Global Data Center for AFIS DMU upgrade information.

INTRODUCTION

AFIS provides timely aviation oriented graphical weather products, which supplement the variety of AFIS textual weather. Like other AFIS messages, Weather Graphics are transmitted via VHF or satellite data transceivers. In order to provide an additional level of situational awareness, own-ship position and flight plan are overlaid on the graphical weather products. The GNS-XLS and AFIS DMU must be configured to receive and display Weather AFIS Graphical Weather. AFIS Graphical Weather hardware also includes a separate Remote Processing Unit (RPU) and installation kit. The RPU uses an updateable PCMCIA Data Card, which contains the application software, base maps, and an aeronautical database. The Data Card must remain in the RPU during use. Ask your Honeywell dealer for subscription information to ensure your unit is using the most current RPU software.

An optional SRAM PCMCIA card is available for storage of uplinked weather products during power interrupts. Uplinked AFIS Graphical Weather products that are older than 6 hours will delete automatically to prevent unintended use. It is possible to display AFIS Graphical Weather on up to two GNS-XLS units with a single AFIS DMU, however each FMS must be configured with a separate RPU. Contact your Honeywell dealer for details on dual RPU installations.

Available Graphical Information Includes:

Moving map with special use airspace, geographic reference information display.

Airport and FBO directory information.

NEXRAD weather with historical replay and convective 1 hour forecast information.

CATMET/METAR weather.

Winds Aloft.

Significant Weather.

NOTE: *Individual Graphical Weather products may contain upwards of 11,000 characters. In some areas normal per character fees apply when requesting Graphical Weather products through the Satellite network. Refer to your chosen pricing plan for more details.*

WX GRAPHIC IMAGERY

OVERVIEW

Four types of weather graphic maps are available from the AFIS® Weather Graphics interface: US National Next Generation Radar (NEXRAD) coverage; worldwide representation of aviation weather reports Categorical METARs (CATMET); Winds aloft reports; and Significant Weather reports (selectable options are TURB, NCWF, ICE, MISC). All of the weather graphics are viewed from the **MAP** page, one at a time.

AFIS weather graphics are displayed in the **NORTH UP** display for all regional views. NEXRAD and CATMET may also be viewed in 100 NM and 200 NM scales. The weather graphic display scales are selected from the **WX DISPLAY OPTS** page (press the blue caret line select key (LSK 3L)), or by using the "**+**" and "**-**" options from the **MAP** view.

NEXRAD

The NEXRAD weather graphic displays weather conditions as shaded blocks representing the intensity of the radar returns for the selected region. See Figure 7-140. The NEXRAD is depicted with blocks that are 8km² (approximately 4.3nm). The USA National (USANATL) and US Regional weather graphic is displayed with 64 km² (approximately 35nm) blocks. Each

Figure 7-140

block is color-coded to represent the precipitation level. The absence of color-coded blocks indicates clear to very light mist. The other colors are coded as follows:
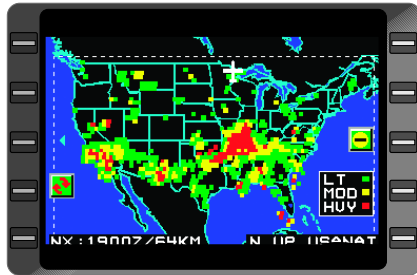
Color	Precipitation	Comments
None	None to light mist	None
Green	Light rain	None
Yellow	Moderate rain	Moderate thunderstorm activity
Red	Heavy to severe rain	Heavy to severe thunder storm activity

NOTE: Missing NEXRAD information is indicated by a white line across the region on the display where the NEXRAD information is missing. Subsequent NEXRAD maps with a complete transmission will overwrite the white line with the correct NEXRAD information. A dashed white line denotes the effective boundary of the NEXRAD data. Diagonal dotted blue lines will be displayed when viewing NEXRAD information on a 100nm or 200nm scale in a region where weather has not yet been received. Until a regional (8Km) NEXRAD product has been received, it is not possible to view the NEXRAD at either the 100nm or 200nm NEXRAD scale. Similarly, until the national (64Km) NEXRAD product has been received, it is not possible to view the NEXRAD at the national scale.

CATMET

Categorical METARs (**CATMETs**) are graphical maps of ceiling, visibility and other surface weather information based on indivual METAR reports supplied by the National Weather Service. The coverage area includes airports worldwide. It is possible to slew to a CATMET airport across the display using the crosshair feature. If the aircraft position is within the selected region, the aircraft and route of flight are displayed as well.

CATMETs are graphically displayed as a two-box station-reporting square to the left of the airport identifier at 100 and 200 nautical mile ranges. Each station reporting square is divided into a two-box upper **ceiling** category and lower **visibility** category. On Regional and National scales, the CATMET icon is a one-box consolidation of the most severe level of ceiling **OR** visibility, graphically represented by the lowest level of the ceiling or visibility category. The pilot can tell at a glance airports that are at or below minimums. When selected for display, the ceiling and visibility information from the CATMET reports form a Station Reporting Square, which is placed on the left side of the airport identifier. If no CATMET information is available, no station square will be displayed. A hollow station square means no significant weather is reported at that location.

At Regional or National scale, the CATMET icon may have a small yellow box in its center. At the 100nm or 200nmscale, the CATMET reporting squares may have a red line to the left of the boxes. See Figures 7-141 and 7-142. If this box or line appears, it represents one or more of the following conditions:

  Surface Winds are greater than 19 kts.

  Surface Winds are greater than 10 kts. with gusts.

  Ground Temperature is within +/- 5 degrees of freezing.

  Temperature / Dew point spread is within 4 degrees.

Each station square is coded in the following manner:

Station Square Color	Sky Conditions	Ceiling (ft)	Visibility (nm)
None	VFR	> 3,000	> 5nm
Green	Marginal VFR (MVFR)	1,000 – 3,000	3nm – 5nm
Yellow	IFR	500 – 1,000	1nm – 3nm
Red	Low IFR (LIFR)	< 500	< 1nm

Figure 7-141
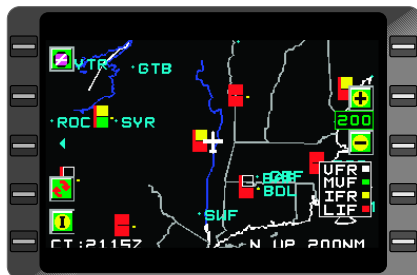
Figure 7-142

Surface categorical winds are divided into eight magnetic directions and eight wind velocity indications. If winds are "light and variable", the CATMET wind indicator will show "N<10 KNOTS".

Wind Indicator	Magnetic Direction	Velocity Indicator
N=North	338 < D < 022	V < 10 kts
NE=Northeast	023 < D < 067	10 < V < 15 kts
E=East	068 < D < 112	15 < V < 20 kts
SE=Southeast	113 < D < 157	20 < V < 25 kts
S=South	158 < D < 202	25 < V < 30 kts
SW=Southwest	203 < D < 247	30 < V < 35 kts
W=West	248 < D < 292	35 < V < 40 kts
NW=Northwest	293 < D < 337	V > 40 kts

The Freezing danger indicator is based on the reported ground temperature and is coded as follows:

LOW = surface temperature is not within 5 degrees C of freezing
HIGH = surface temperature is within ±5 degrees C of freezing

The TEMP/DEW SPREAD display options ar "LESS THAN 4C" or "GREATER THAN 4C", and provides the pilot with an indication of the surface temperature and dewpoint spread. See Figure 7-143.

Figure 7-143

SIG WX

The SIG WX weather graphic displays areas of forecast meteorological phenomena such as turbulence, National Convective Weather Forecasts, icing, and miscellaneous (low and high pressure centers, warm and cold fronts, and jet stream location). See Figures 7-144 through 7-147. The **SIG WX** map may be viewed at 100 NM scales or higher in the affected regions. Each SIG WX product must be viewed one at a time. If the aircraft and/or route of flight is located within the specified region, they too will appear.
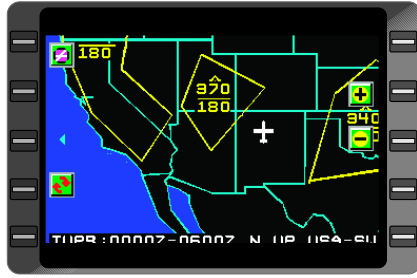
Figure 7-144

Figure 7-145

Figure 7-146

Figure 7-147

WINDS

The WINDS weather graphic provides worldwide wind information, and displays forecast wind direction and speed in a color coded format at the following flight levels and altitudes:

Altitude / Flight Level	Pressure Level
Surface*	1000 Mb
10,000 msl	700 Mb
18,000 msl	500 Mb
FL 240	400 Mb
FL 300	300 Mb
FL 340	250 Mb
FL 390	200 Mb
FL 450	150 Mb
FL 510	100 Mb

NOTE: Surface Winds are part of the CATMET and will not be displayed unless that product has been received.

Wind speed is coded in the following manner for all but surface winds:

Color	Wind Speed
Green	0 - 30 kts
Yellow	30 - 60 kts
Red	> 61 kts

For surface winds, wind speed is coded in the following manner:

Color Wind	Speed
Green	0 - 10 kts
Yellow	10 - 20 kys
Red	> 20 kts

NOTE: Although WIND data is available worldwide, occasionally WIND data is not available at all the listed altitudes in every region of the world due to a lack of source data. When WIND data is not available for a particular altitude or flight level, that map will display the geographic image without the WIND overlay.

AFIS Operation

CONFIGURATION SELECTION FOR WX GRAPHICS

```
AFIS MAIN MENU
      │
      ▼
  MAP PAGE ───────▶ MAIN MENU ───────▶ DEMO OFF?    ──No──▶ DEMO
           ◀───────              YES/NO?                   INITIALIZATION
                              Yes
      │                           │
      ▼                           ▼
  WAYPOINT INFO               WAYPOINT INFO
      │                           │
      ▼                           ▼
  WX DISPLAY OPTS             DISPLAY MENU
      │                           │
      ▼                           ▼
  SLEW                        SLEW
      │                           │
      ▼                           ▼
  RECENTER                    RECENTER
      │
      ▼
  SCALE ADJUST
      │
      ▼
  DISPLAY MENU
```
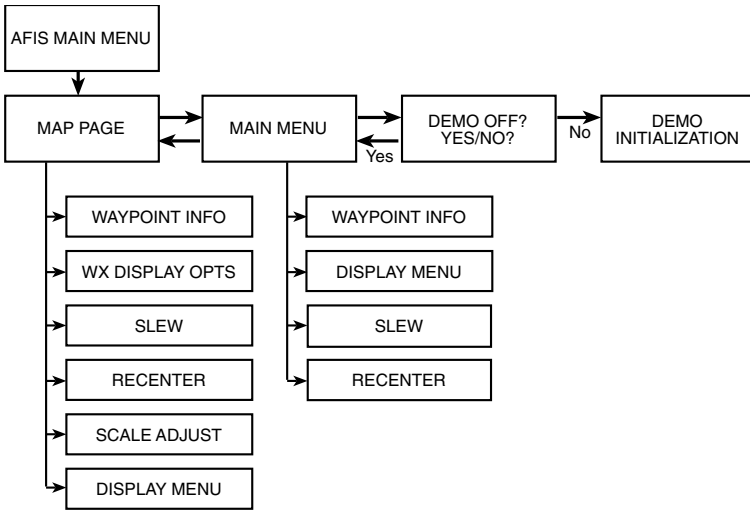
GENERAL PAGE SELECTION OVERVIEW FOR WX GRAPHICS

```
CHART SCALE        WEATHER          DISPLAY MENU      WEATHER
                   DISPLAY OPTS                       REQUEST MENU

 5 NM MAP          METAR            SPECIAL USE       NEXRAD
                                    AIRSPACE          (SUBMENU)
                                    (SUA)

 10 NM MAP         REGIONAL         NORTH UP &        CATMET
                   DISPLAY          TRACK UP
                   (SUBMENU)

 15 NM MAP         LIST METAR       A/C EDGE &        SIG WX
                                    A/C CENTER        (SUBMENU)

 25 NM MAP         WEATHER          GEOGRAPHY         WINDS
                   REQUEST          (GEOG)            (SUBMENU)

 50 NM MAP         SIGNIFICANT      RPU SOFTWARE
                   WEATHER          VERSION
                                    NUMBER
                                    (BOTTOM LINE)

 100 NM MAP        WINDS

 200 NM MAP        NEXRAD

 REGIONAL
 MAP
 (SUBMENU)
```

GETTING STARTED

FROM THE AFIS MENU

Access the **WX GRAPHICS** functions by selecting option 1 (LSK 1L) from the **AFIS MENU**. See Figure 7-148. For all other AFIS functions, select options 2 through 9 from the **AFIS MENU**. If **WX GRAPHICS** is not configured or installed, the **AFIS MENU** will not list **WX GRAPHICS** as an option.

Figure 7-148

NORMAL OPERATIONS

1. For normal operation, access the WX GRAPHICS functions by selecting option 1 (LSK 1L) from the AFIS MENU. The first time AFIS Graphical Weather is accessed after powering the system on, the 50 NM Moving Map page will appear with your position centered on the map. See Figure 7-149. If you exit and return to the AFIS Graphical Weather functions, the system will return to the last WX Graphics page accessed.

Figure 7-149

2. From the 50 NM Moving Map page, select LSK 3L (Blue caret) to access **WX DISPLAY OPTS** page. Select **WX REQT** (LSK 4R) to request AFIS Graphical Weather products. Read on for more detailed procedures on requesting or using AFIS Graphical Weather.

GRAPHICAL WEATHER DEMO MODE

OVERVIEW

For safety reasons, operation of AFIS Graphical Weather should be learned on the ground. To facilitate learning, AFIS Graphical Weather may be configured in a demonstration mode as described in this section. The **DEMO** mode does not transmit, but still provides all button

functionality using stored graphical weather examples from the RPU. Entering the demo mode will not affect other AFIS functions.

At power-up the RPU system will default to the normal Weather Graphics operating mode. There is also a Weather Graphics Demonstration mode. Access to the **DEMO** mode is available by selecting LSK 1R from the Weather Graphics **MAIN MENU**.

*WARNING: In **DEMO MODE** the graphical weather is **NOT CURRENT WEATHER** and should only be used for training or demonstration purposes. Be careful not to leave the weather graphics configuration in a demo mode during flight.*

FOR DEMO MODE

You may place the RPU in a demonstration mode by first accessing the AFIS Wx Graphics function, and then select LSK 1R from the Weather Graphics **MAIN MENU**. The demo mode is used for crew training or demonstration purposes. In demo mode the RPU uses pre-stored (canned) weather images for practice or training.

1. Access the demo function by first selecting **WX GRAPHICS** (LSK 1L) from the **AFIS MENU**.

2. Go to **MAIN MENU** page by selecting the LSK 1R (unmarked).

3. From the **MAIN MENU**, press LSK 1R (unmarked) to access the **DEMO** initialization page. See Figure 7-150.

Figure 7-150

4. Select **YES** using LSK 3L (green arrow) to highlight your choice, and then select **ACK** (LSK 5L) to acknowledge entering the demo mode.
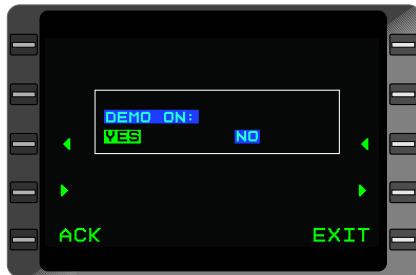
5. At the **WEATHER GRAPHICS DEMONSTRATION** page press any LSK key or the **ENTER** key to initialize the demo mode. See Figure 7-151.

Figure 7-151

6. All demo functions are accessed identically to normal operations from this point (see the normal operation procedures).

*NOTE: When in the **DEMO** mode, access the normal mode of operation by pressing LSK 1R from the **MAIN MENU** page to access the **DEMO** initiation page. Once prompted, choose **DEMO "OFF"** to access the normal mode again.*

MAP PAGE

OVERVIEW

Using position information gained from the FMS, AFIS Graphical Weather automatically tracks your flight plan and displays own-ship position and graphical weather around the aircraft position on a **MAP** page. See Figure 7-152. To access the **MAP** page, select **RETURN** (LSK 5R) from other weather graphics menu pages. You may need to press this key several times depending on which menu level you are on.

Figure 7-152

In addition to displaying Graphical Weather, the AFIS Graphical Weather system enables an auxiliary **Moving Map** function which plots and updates own-ship position and displays SUA geometry. The Moving Map feature is available when no graphical weather is displayed on the map. The **MAP** page automatically reverts to the Moving Map mode when no weather is displayed. The Moving Map is available on all scales, although track up is only available at scales of 200 NM and below.

AFIS Graphical Weather provides a variety of different map views including the 5 NM, 10 NM, 15 NM, 25 NM, 50 NM, 100 NM, 200 NM, Regional US, National US, and International views. Some features are not available on all map scales, see table 7-1 following.

Map features available on each map scale.

	CATMET DATA	NEXRAD DATA	SIGNIFICANT WX DATA	WIND DATA	TRACK A/C FPL & POS	SLEW TO RESIZE MAP ON AN AIRPORT	SLEW & DISPLAY AIRPORT FACILITY INFO
NATIONAL US	★	★	★	★	★		
REGIONAL US	★	★	★	★	★		
100-200 NM	★	★	★	★	★	★	★
5-50 NM					★	★	★

Table 7-1

WAYPOINT INFO FEATURE (LSK 1L)

When viewing the **MAP** page, access **WAYPOINT INFO** page by pressing the icon (LSK 1L).

ACCESS WX DISPLAY OPTION PAGE (LSK 3L)

When viewing any **MAP** page, access the **WX DISPLAY OPTS** page by selecting the blue caret (LSK 3L) on the left side. See Figure 7-153. Once graphical weather has been uplinked to the aircraft, you may select the desired graphical product on the **WX DISPLAY OPTS** page. Only one product may be displayed at a time.
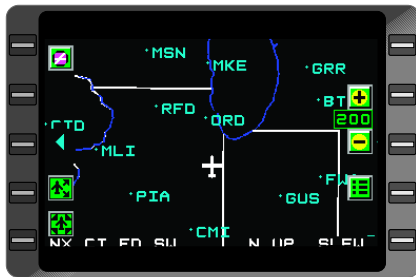
Figure 7-153

SLEW (LSK 4L)

With the map scale set to 200 NM or less, access the SLEW function by selecting the slew icon (LSK 4L) from the **MAP** page. The slew function is used to re-center the map on an airport.

SCROLL FEATURE (LSK 4L)

With any graphical weather selected and the map scale set to 100 NM or greater, press the **Scroll** icon (LSK 4L) on the **MAP** page to scroll through all available weather graphic maps. To ascertain the timeliness of the graphical weather, check the effectivity times at the bottom of each individual product. Uplinked AFIS Graphical Weather products that are older than 6 hours will be deleted automatically to prevent unintended use.

RE-CENTER MAP (LSK 5L)

With the map scale set to 200 NM or less, re-center the map by selecting the **RE-CENTER** icon (LSK 5L) from the **MAP** page. The re-center icon only appears when the map is not already centered about own-ship position.

ACCESS MAIN MENU (LSK 1R)

When viewing the **MAP** page, access the **MAIN MENU** page by pressing LSK 1R (unmarked).

MAP SCALE INDICATOR AND SELECTION KEYS (LSK 2R AND LSK 3R)

Map Scale is indicated on the right side of the **MAP** page between the "+" and "-" line select keys. When available, the "+" option (LSK 2R) will cause the map page to redraw with increased map scale, and the "-" option (LSK 3R) will cause the map to redraw to a smaller scale.

ACCESS DISPLAY MENU (LSK 4R)

When viewing the **MAP** page, access the **DISPLAY MENU** page by pressing the **MENU** icon (LSK 4R).

MAIN MENU

OVERVIEW

To access the **MAIN MENU** from any **MAP** Page, select LSK 1R (unmarked), or the **MENU** icon (LSK 4R) from the **MAP** page. See Figure 7-154. Once on the **MAIN MENU**, select the corresponding line select key to choose a desired function, or select **RETURN** to return to the **MAP** page. See Figure 7-155. The **MAIN MENU** provides access to frequently used functions such as **WAYPT INFO**

(used to move the map to a selected airport, or display airport facility information), **SLEW** (used to search for identifiers or redirect the screen), and **RECENTER** (used to redraw the map centered on the aircraft icon), and **DISPLAY MENU** (used to change map display settings). Also from the **MAIN MENU**, press LSK 1R (unmarked) to access the **DEMO** initialization page.

Figure 7-154

NOTE: The available LSK functions on the MAIN MENU will vary depending on the map scale and your selected graphical weather options, as illustrated in Figures 7-154 and 7-155.

WAYPT INFO (LSK 1L)

OVERVIEW

Figure 7-155

The WAYPT INFO function is accessed from the **MAIN MENU** when no weather graphics products are selected, or by selecting the Waypoint icon (LSK 1L) from the **MAP** page. The waypoint information function is used to locate airport information for specified airports.

When accessing Waypoint Information from the **MAP** page, you may either use line select keys to scroll through the list of airports, or you may use the FMS alphanumeric keypad to enter the desired airport identifier. Select **NXT** to search alphabetically up the list of airports, or select **PREV** to search alphabetically down the list of airports. When typing in an airport identifier, press **BACK** to move the cursor left one space, or press **SEL** to move the cursor right one space. When the desired identifier is shown on the bottom of the page, press **ACK** to view the airport facility information for that airport.

Airport Facility Information is available for public airports with hard surfaced runways of at least 3000 feet in length. Additionally, AFIS Graphical Weather provides FBO information for many frequented airports. Airport Facility information may include airport name, identifier, location, elevation, traffic pattern altitude, common frequencies, FBO contact numbers, and runway information.

1. Select **WAYPT INFO** (LSK 1L) from the **MAIN MENU**, or select the Waypoint Information icon from the **MAP** page. See Figure 7-156.

2. Type the airport identifier, then press **ACK** (LSK 5L) to view the airport facility information for a specific airport. See Figure 7-157.

3. Press the **NXT** key to go to the next page of airport information, or press the **PRV** key to return to the previous page. See Figure 7-158 and 7-159.

4. Press the **NXT** key again to return to the **MAP** page.

The **WAYPT INFO** page also provides a movable **Crosshair Tool** to select areas of the map while seeking airport facility information. The crosshairs on the **WAYPT INFO** page may be repositioned according to the associated green direction indicators with corresponding line select keys.
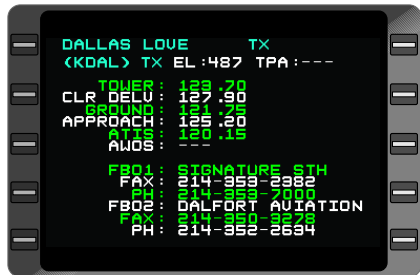
1. Select **WAYPT INFO** (LSK 1L) from the **MAIN MENU**, or select the Waypoint Information icon from the **MAP** page.

2. Use line select keys to position the crosshair near the desired airport on the map, select **ACK** (LSK 5L) to display a list of airports near that location on the map, or **EXIT** (LSK 5R) to exit the function.

Figure 7-156

Figure 7-157

Figure 7-158

Figure 7-159

3. Select the desired airport from the list with the associated left line select key, then press **ENTER** to display the first page of Airport Facility information for that airport. Select the **NXT** key to go to the next page or the **PRV** key to return to the previous page.

4. Select **RETURN** from the airport list page to return to the **MAP** page.

MAP SCALE

OVERVIEW

Change the MAP SCALE directly from the **MAP** page, or through the **WX DISPLAY OPTS** page. Map scales are defined as areas, or listed in nautical miles that refer to the approximate distance from top to bottom of the map window. With no graphical weather products selected, control the map scale with "**+**" and "**-**" (LSK 2R and 3R). When any graphical weather product is selected, control the map scale from the **WX DISPLAY OPTS** page as follows:

1. From the **MAP** page, select the blue caret (LSK 3L) to access the **WX DISPLAY OPTS** page. See Figure 7-160.

2. The current scale is shown at the LSK 2R position. To change the map scale, press LSK 2R to cycle through the choices. The choices are USANATL, 100 NM, 200 NM, and regional map scales. Cycling through the map scales will also display the **LOAD**
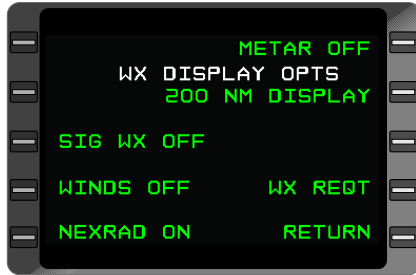
Figure 7-160

Figure 7-161

Figure 7-162

DISPLAY MENU (LSK 4R)

MAP FEATURES

GEOGRAPHY

Geographical reference features available include country and state lines, major lakes and rivers, coastlines, and large islands. To display Geographical reference information, select "**GEOG ON**" from the **DISPLAY MENU**.

SPECIAL USE AIRSPACE (SUA)

Class B, Class C, Alert, Prohibited, and Restricted areas are included in the Special Use Airspace option. Class D airspace will not display because many class D areas are temporary. The **SUA** setting is located on the **DISPLAY MENU**. See Figure 7-163.

Figure 7-163

TRACK UP

The GNS-XLS FMS may be configured to display the map either with a **TRACK UP** depiction or a **NORTH UP** depiction. In **TRACK UP** mode the aircraft icon is centered on the map or is centered at the bottom of the map. When the FMS is tracking an active flight plan, in the **TRACK UP** mode the aircraft icon remains stationary relative to the display, while the map

Figure 7-164

moves relative to the aircraft icon. In both **TRACK UP** and **NORTH UP** modes, you may select to view the aircraft icon in either the Center or Edge position. The **TRACK UP** setting is located on the **DISPLAY MENU**. See Figure 7-164.

*NOTE: **TRACK UP** mode is only available on maps of 5 NM to 200 NM scale.*

NORTH UP

In **NORTH UP** mode the aircraft icon moves across the display and the map image stays relatively fixed. As the aircraft icon nears the map edge, the map will redraw with the aircraft icon at either the opposite map edge or in the map center position. In both **TRACK UP** and **NORTH UP** modes, you may select to view the aircraft icon in either the center or edge position.

Figure 7-165

Choosing **A/C EDGE** in the **NORTH UP** mode will give the longest period of time before the map redraws. The **NORTH UP** setting is located on the **DISPLAY MENU**. See Figure 7-165.

NOTE: When displaying Graphical Weather imagery, only the NORTH UP mode is available for viewing.

A/C EDGE/CENTER

The **A/C EDGE** or **CENTER** option lets you display the aircraft on the bottom edge, or in the center of the screen.

In the **A/C EDGE** mode, the aircraft icon is at the edge of the map page, thus allowing a majority of the screen to be used to display information in front of the aircraft. See Figure 7-166. If the system is set to **CENTER** mode, the aircraft icon will be in the center of the map page. See Figure 7-167.

In the **TRACK UP** display, **A/C EDGE** mode will place the aircraft on the bottom edge of the screen. In the **NORTH UP** display, **A/C EDGE** mode will display the aircraft on the edge of

Figure 7-166

Figure 7-167

the screen based on the aircraft's current true course. Both these settings are located on the **DISPLAY MENU**.

SLEW (LSK 4L)

The **SLEW** function provides means to re-center the map on a specific airport by typing in an airport identifier. Access **SLEW** from the **MAIN MENU** (LSK 3L) while displaying graphical weather with the map scale set at 200 NM or less. With no graphical weather selected (map scale 200 NM or less), access **SLEW** by pressing the **SLEW** icon (LSK 4L) on the **MAP** page. When entering an identifier during functions such as slewing, the GNS-XLS FMS utilizes a feature called "ID Completion". As you enter the desired identifier, the system displays the first match for the entered characters.

PREV and **NEXT** line select buttons are used to scroll forward and backward through characters. **SEL** is used to select a character or to move the cursor forward. **BACK** is used to backspace a single character on a line. **ACK** is used to acknowledge the entire entry. Once you **ACK** an entry it will automatically return to the map window.

IDENTIFIER PROCEDURE

1. With the map scale set to 200 NM or less while displaying graphical weather, select **SLEW** (LSK 4L) from the **MAIN MENU**. See Figure 7-168. The **SELECT POSITION** page will display. See Figure 7-169.

Figure 7-168

2. On the **SELECT POSITION** page type the desired airport identifier then press **ENTER** to re-center the map on that airport.

3. Or, use the **NEXT** or **PREV** keys to scroll to the first character of the airport identifier, and then press **SEL** to accept the character. Do not press **ACK** until the desired airport identifier is showing. Pressing **SEL** will also move the cursor one space to the right in preparation for

Figure 7-169

selection of the next character. A solid line cursor appears under-neath the character to be entered or changed in the **WPT IDENT** area. Select **NEXT** to scroll to the next character. For example, if '**A**' is displayed, selecting **NEXT** scrolls to '**B**'. Selecting **PREV** will return to the previous character.

4. Repeat step 3 above for each character of the airport identifica-tion. Select **BACK** to edit any previously accepted character.

5. If the aircraft icon is not visible on the map after redrawing the map to different position, the map will display "**OFF MAP**" to indi-cate that the map does not represent your current position. The **RE-CENTER** icon will re-center the map to own-ship position.

CROSSHAIR PROCEDURE

The Crosshair provides a means to re-center the map on an area of the existing map view with a crosshair pointer.

1. With the map scale set to 200 NM or less, select **SLEW** (LSK 3L) from the **MAIN MENU**, or press the **SLEW** icon from the **MAP** page.

2. The **MAP** page will display again with the crosshair tool visible on the page. See Figure 7-170. Use the asso-ciated line select keys fol-lowing the arrows to reposi-tion the crosshair tool to the desired point on the map.

3. Select **ACK** when the crosshair is at the correct position on the map. The map page will re-center on the chosen point of the map.
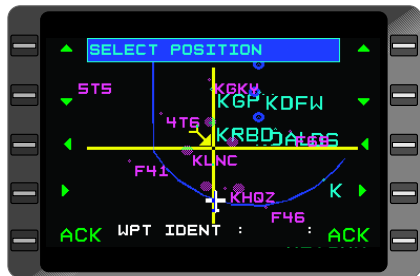
Figure 7-170

4. If the aircraft icon is not visible on the map after redrawing the map to different position, the map will display "**OFF MAP**" to indi-cate that the map does not represent your current position. The **RE-CENTER** icon will re-center the map to own-ship position.

RECENTER (LSK 5L)

With the map scale set to 200 NM or less, access **RECENTER** centers the map on the aircraft's position.

RE-CENTER PROCEDURE

1. With the map scale set to 200NM or less (while graphical weather is selected), select **RECENTER** (LSK 5L) from the **MAIN MENU**. See Figure 7-171. Or, when no graphical weather is selected, press the **RE-CENTER** icon from the **MAP** page.

2. The **MAP** page will redraw with the aircraft icon centered on the map.

Figure 7-171

WX REQUEST PAGE

OVERVIEW

Access the **WX REQUEST** page from the **WX DISPLAY OPTS** page. This page is used to request real-time **NEXRAD**, **CATMET**, forecast **SIG WX** and forecast **WINDS** aloft weather graphics.

The weather graphic request is transmitted from the aircraft through VHF or SATCOM networks worldwide to the Global Data Center (GDC). The GDC receives the request and verifies that an updated version of the requested weather product is available. If an updated product exists, it is transmitted to the aircraft. If an update is not available an AFIS message indicating that the aircraft already has the most current map is transmitted to the aircraft.

When a weather graphic product has been received, there will be a "**Y**" next to that product on the appropriate **WX REQUEST** page indicating it is available for viewing. If the requested product is not available, the GDC will issue an AFIS message to the aircraft indicating that the requested AFIS Wx graphics product is not currently supported and the letter "**X**" will appear on the appropriate **WX REQUEST** page next to the requested product. Example: **CATMET: X**

PROCEDURE OVERVIEW

To request weather graphics, from the **WX REQUEST** page, press the desired weather graphic product line select key i.e., **NEXRAD**, **CATMET**, **SIG WX**, or **WINDS**. See Figure 7-172. One or all available WX GRAPHICS products may be requested at the same time. After selecting the desired weather graphic product for example, **NEXRAD**, a page may appear displaying available WX GRAPHICS regions. See Figure 7-173. Press the desired region line select key. The selected region is indicated with a reverse video display highlighted. Press the **RETURN** line select key to return to the **WX REQUEST** page. Next, back on the **WX REQUEST** page press the **SEND WX REQT** line select key to transmit request to the GDC for processing.

Figure 7-172

Figure 7-173

NOTE: Be sure to check for currency for each chart after displaying the new or updated chart to ensure you are viewing the most current weather information. The available weather graphic codes on the bottom of the **WX DISPLAY OPTS** *page indicate which products have been uplinked and are available for viewing. Multiple products may be requested simultaneously. Users are advised to be judicious about the number of weather products requested when awaiting other AFIS messages, such as a PDC or flight plan recall.*

REQUEST NEXRAD WEATHER GRAPHIC

Although NEXRAD is currently available only for the continental U.S., border areas of Canada and Mexico, and limited areas in the Caribbean, NEXRAD maps come in National and Regional (64km^2 and 8km^2) display options. Any region may be selected, however areas not supported will display map information.

1. From the **MAP** Page, access the **WX DISPLAY OPTS** page by selecting the **Blue Caret** (LSK 3L) on the left of the screen. See Figure 7-174.

2. Press **WX REQT** (LSK 4R) on the **WX DISPLAY OPTS** page to display the **WX REQUEST** page. See Figure 7-175.
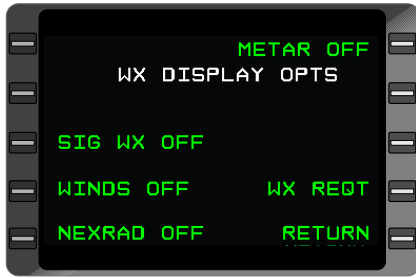
Figure 7-174

3. On the **WX REQUEST** page, press **NEXRAD** (LSK 1L) to display the NEXRAD geographical regions.

4. On the **NEXRAD** page, press the line select key corresponding to the desired region, then press **RETURN** (LSK 5R) to display the **WX REQUEST** page. Transmit the request by pressing **SEND WX REQT** (LSK 4R).

Figure 7-175

5. After pressing the **SEND WX REQT** line select key, **PENDING** displays during the transmission process. When the transmission is complete **PENDING** is replaced with **SEND WX REQT** and the requested item is shown in brackets until the product has been received.

6. When the product has been received, the brackets will go away, and there will be a "**Y**" next to the product label on the **WX REQUEST** page indicating that the map is available for viewing. Also, an available weather graphic code indication will display on the bottom of the **WX REQUEST** page.

The weather graphic codes indications are:

NX = NEXRAD
CT = CATMET
FD = WINDS
SW = SIG WX

HISTORICAL NEXRAD REPLAY FUNCTION

A **Historical NEXRAD** replay function is available on request, and provides a historical replay of time sequenced NEXRAD products on the **MAP** page when the US REPLAY product is stored in the RPU. The maximum number of maps uplinked in each Historical NEXRAD reply product is limited to five plus the current NEXRAD product, but there may be fewer historical NEXRAD maps available in the event that the file size exceeds the maximum size limit.

1. From the **MAP** page, press the **HISTORY** icon (LSK 5L) with the **NEXRAD** feature displayed. See Figure 7-176. There must be a sufficient number of NEXRAD images stored in memory to utilize the **Historical NEXRAD** replay feature.
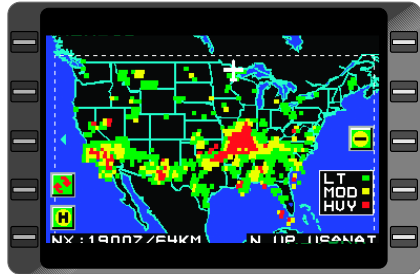
Figure 7-176

REQUEST CATMET WEATHER GRAPHIC

CATMET (METAR) reports are available for all listed regions of the world.

1. From the **MAP** page, access the **WX DISPLAY OPTS** page by selecting the **Blue Caret** (LSK 3L) on the left of the screen.

2. Press **WX REQT** (LSK 4R) on the **WX DISPLAY OPTS** page to display the **WX REQUEST** page.

Figure 7-177

3. On the **WX REQUEST** page, press **CATMET** (LSK 2L) to select the CATMET product. See Figure 7-177.

4. Transmit the request by pressing **SEND WX REQT** (LSK 4R).

5. After pressing the **SEND WX REQT** line select key, **PENDING** displays during the transmission process. When the transmission is complete **PENDING** is replaced with **SEND WX REQT** and the requested item is shown in brackets until the requested item has been received. See Figure 7-178.

Figure 7-178

6. When the product has been received, the brackets will go away, and there will be a "**Y**" next to the product label on the **WX REQUEST** page indicating that the map is available for viewing. Also, a weather graphic code indication will display on the bottom of the **WX REQUEST** page. The weather graphic code indications are as follows:

NX	= NEXRAD
CT	= CATMET
FD	= WINDS
SW	= SIG WX

REQUEST SIG WX WEATHER GRAPHIC

Turbulence and icing are currently available only for the continental U.S., border areas of Canada and Mexico, and limited areas in the Caribbean. Other regions will be added in the future. Miscellaneous significant weather information is available worldwide and contains fronts, the jet stream, and events such as hurricanes and convective storms.

1. From the **MAP** page, access the **WX DISPLAY OPTS** page by selecting the **Blue Caret** (LSK 3L) on the left of the screen.

2. Press **WX REQT** (LSK 4R) on the **WX DISPLAY OPTS** page to display the **WX REQUEST** page. See Figure 7-179.

Figure 7-179

3. On the **WX REQUEST** page, press **SIG WX** (LSK 3L) to display the SIG WX geographical regions. See Figure 7-180.

4. On the **SIG WX** page, press the line select key corresponding to the desired region, then press **RETURN** (LSK 5R) to display the **WX REQUEST** page. Transmit the request by pressing **SEND WX REQT** (LSK 4R).

Figure 7-180

5. After pressing the **SEND WX REQT** line select key, **PENDING** displays during the transmission process. When the transmission is complete **PENDING** is replaced with **SEND WX REQT** and the requested item is shown in brackets until the requested item has been received. See Figure 7-181.

Figure 7-181

6. When the entire product has been received, the brackets will go away, and there will be a "**Y**" next to the product label on the **WX REQUEST** page indicating that the map is available for viewing. Also, a weather graphic code indication will display on the bottom of the **WX REQUEST** page. The weather graphic code indications are as follows:

NX	= NEXRAD
CT	= CATMET
FD	= WINDS
SW	= SIG WX

The following is a list of available SIG WX products:

TURB	= Turbulence Forecast
NCWF	= National Convective Weather Forecast
ICE	= Icing Forecast
MISC	= Miscellaneous Significant Weather Information

Note: Significant weather is uplinked as three separate files, one containing turbulence and icing information; the second contains worldwide High Significant weather charts and NEXRAD cell top information for the U.S., and the third file contains the National Convective Weather Forecast.   Due to the size of the second file it may require more time to uplink this product.

REQUEST WINDS WEATHER GRAPHIC

WINDS Aloft information is available for all displayed regions, from the surface up to FL510 (flight level 510).

1. From the **MAP** page, access the **WX DISPLAY OPTS** page by selecting the **Blue Caret** (LSK 3L) on the left of the screen.

2. Press **WX REQT** (LSK 4R) on the **WX DISPLAY OPTS** page to display the **WX REQUEST** page. See Figure 7-182.

3. On the **WX REQUEST** page, press **WINDS** (LSK 4L) to display the WINDS geographical regions. See Figure 7-183.

Figure 7-182

4. On the **WINDS** page, press the line select key corresponding to the desired region, then press **RETURN** (LSK 5R) to display the **WX REQUEST** page. Transmit the request by pressing **SEND WX REQT** (LSK 4R).

5. After pressing the **SEND WX REQT** line select key, **PENDING** displays during the transmission process. When the transmission is

Figure 7-183

complete **PENDING** is replaced with **SEND WX REQT** and the requested item is shown in brackets until the requested item has been received. See Figure 7-184.


```
        NEXRAD
              WX REQUEST
        CATMET

        SIG WX

        <WINDS>           PENDING

        NX CT FD SW       RETURN
```

Figure 7-184

6. When the product has been received, the brackets will go away, and there will be a "**Y**" next to the product label on the **WX REQUEST** page indicating that the map is available for viewing. Also, a weather graphic code indication will display on the bottom of the **WX REQUEST** page. The weather graphic code indications are as follows:

NX = NEXRAD

CT = CATMET

FD = WINDS

SW = SIG WX

The following is a list of available WIND products:

Altitude / Flight Level	Pressure Level
Surface*	1000 Mb
10,000 msl	700 Mb
18,000 msl	500 Mb
FL 240	400 Mb
FL 300	300 Mb
FL 340	250 Mb
FL 390	200 Mb
FL 450	150 Mb
FL 510	100 Mb

Surface Winds are part of the CATMET and will not be displayed unless that product has been received.

Wind speed is coded in the following manner for all but surface winds:

Color	Wind Speed
Green	0 - 30kts
Yellow	30 - 60kts
Red	> 61kts

For surface winds, wind speed is coded in the following manner:

Color	Wind Speed
Green	0 - 10kts
Yellow	10 - 20ks
Red	> 20kts

NOTE: Although WIND data is available worldwide, occasionally WIND data is not available at all the listed altitudes in every region of the world due to a lack of source data. When WIND data is not available for a particular altitude or flight level, that map will display the geographic image without the WIND overlay.

DISPLAY WX GRAPHICS

When the initial weather graphic request is received by the RPU, the available weather graphic products are accessed from the **WX DISPLAY OPTS** page. Weather graphics received by the aircraft are displayed with an **OFF** just to the right. **OFF** indicates that the weather graphic product is available but is not turned on. By pressing the corresponding line select key next to the received weather graphic product, **OFF** will toggle to **ON**, enabling the weather graphic to be displayed. But, before displaying the weather graphic product, first select the scale of the weather graphic. Only one weather graphics product at a time may be displayed. For example, toggling **WINDS ON** will toggle **NEXRAD OFF**.

With any graphical weather selected and the map scale set to 100 NM or greater, press the **Scroll** icon (LSK 4L) on the **MAP** page to scroll through all the weather graphic products selected **ON**. To ascertain the timeliness of the graphical weather, check the effectivity times at the bottom of each individual product. Uplinked AFIS Graphical Weather products that are older than 6 hours will delete automatically to prevent unintended use.

NOTE: If the aircraft position or route of flight (depicted from the active flight plan in the GNS-XLS) is located in the selected region it is also displayed in weather graphic page.

WX DISPLAY OPTIONS

OVERVIEW

To access the **WX DISPLAY OPTIONS** page, press the line select key (LSK 3L) corresponding to the caret on the left side of the **MAP** page. Prior to requesting a graphical weather product, the initial **WX DISPLAY OPTS** screen has only two line select options **WX REQT** and **RETURN**. When weather graphics are available, the weather graphic code displays on the status line at the bottom left corner of the **MAP** page. The weather graphic codes are as follows: NEXRAD "**NX**"; CATMET "**CT**"; SIG WX "**SW**"; WINDS "**FD**". Also, when a weather graphic product has been received, there will be a "**Y**" next to that product on the appropriate **WX REQUEST** page indicating it is available for viewing. If the requested product is not available, the Global Data Center will issue an AFIS message to the aircraft indicating that the requested product is not currently supported and the letter "**X**" will appear on the appropriate **WX REQUEST** page next to the requested product .

NOTE: If any weather graphic is selected ON, the moving MAP PAGE will not display.

DISPLAY NEXRAD WX GRAPHIC

Some NEXRAD data is available when "**NX**" displays on the status line. NEXRAD products are available in a 100 NM scale or higher. From the **MAP** page, press "**+**" or "**-**" (LSK 2R and 3R) to resize the map if desired. The "**NX**" code indicates that a NEXRAD product is available for display, unless an 8km NEXRAD has been requested and received, the 100 and 200 NM products will not be available.

1. To display the **WX DISPLAY OPTS** page from the **MAP** page, press the **Blue Caret** (LSK 3L) on the left side of the **MAP** page.

2. Press the **NEXRAD** line select key to toggle the NEXRAD from **OFF** to either the **ON**, **NX/CELL TOPS**, or **NX/NCWF** settings, where:

> **ON** = NEXRAD Map
>
> **NX/CELL TOPS** = NEXRAD Map with Cell Tops
>
> **NX/NCWF** = NEXRAD Map with National Convective Weather Forecast

3. After selecting a NEXRAD product to display, on the **WX DISPLAY OPTS** page press **REGL DISPLAY** (LSK 2R) to change the map scale, or you may change scale later by pressing "**+**" or "**-**" from the **MAP** page. Press **RETURN** to view the **MAP** page. See Figure 7-185.
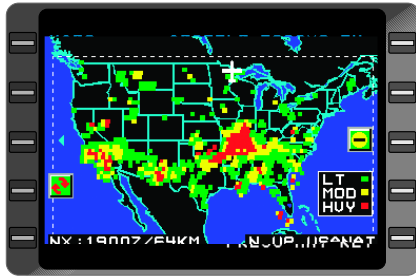
Figure 7-185

NOTE: Cell Tops and Convective Weather Forecast are uplinked as part of the SIG WX product and will not be displayed unless that product has been received. Missing NEXRAD information is indicated by a white line across the region on the display where the NEXRAD information is missing. Subsequent NEXRAD maps with a complete transmission will overwrite the white line with the correct NEXRAD information. A dashed white line denotes the effective boundary of the NEXRAD data. Diagonal dotted blue lines will be displayed when viewing NEXRAD information on a 100nm or 200nm scale in a region where weather has not yet been received. Until a regional (8Km) NEXRAD product has not been received, it is not possible to view the NEXRAD at either the 100nm or 200nm NEXRAD scale. Conversely, until a national (64Km) NEXRAD product has been received, it is not possible to view the NEXRAD at the National or Region scale.

HISTORICAL NEXRAD REPLAY

A **Historical NEXRAD** replay function is available on request, and provides a historical replay of time sequenced NEXRAD products on the **MAP** page when a US REPLAY product is stored in the RPU. The maximum number of maps uplinked in each Historical NEXRAD reply product is limited to five plus the current NEXRAD product, but there may be fewer historical NEXRAD products available in the event that the file size exceeds the maximum size limit.

SECTION 8

REGIONAL AIRLINES
AFIS
AIRBORNE FLIGHT INFORMATION SYSTEM

This section applies exclusively to aircraft operating an AFIS system DMU with part number 400-045500-0211 or 400-045500-2011.

The purpose of this section is to acquaint users of AFIS Flight Plan and Weather Advisory Services with the equipment, its capabilities, and its operation. AFIS services are ADVISORY only, as they contain elements provided by the National Weather Service and information supplied by the pilot. Therefore, it is the responsibility of the pilot in command to exercise reasonable and prudent judgment in the use of these ADVISORY services.

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AFIS DMU P/N 400-045500-0211 & -2011

DESCRIPTION

This section discusses additional features in the AFIS system intend-ed for regional airline use. This discussion begins at the **INITIALIZE** Page .   The information in Section 7 discussed prior to the **AFIS MENU** Page also applies to this section.

INITIALIZE PAGE

This page appears when the **AFIS** Key is first pressed after power-up. This page allows the operator to enter and trans-mit flight information to initialize the flight at the home base. All information must be entered before subsequent pages can be accessed. See Figure 8-1. This page can also be accessed from the **AFIS MENU** Page in order to change data.

```
20:09     INITIALIZE

FLT# 1290     CA
DEPT KIXD     FO
DEST KLAX     FA
ETD  2045     ACM
ETE  3+30


        TRANSMIT
```

Figure 8-1

20:09: UTC hours and min-utes. Four digits can be entered if the time is not available from the navigational system or the data link.

FLT#: This four digit field is used for entering the flight number.

DEPT: A four character field is used for entering the departure air-port identifier.

DEST: This four character field is used to enter the destination air-port identifier.

ETD: Estimated time of departure. Enter one or two digits for hours and two digits for minutes.

ETE: Estimated time in route. Enter one digit for hours and two dig-its for minutes. ETE is an optional field for EMB 120 aircraft.

CA: Enter up to five characters for captain identification.

FO: Enter up to five characters for first officer identification.

FA: Enter up to five characters for flight attendant identification.

ACM: Enter up to five characters to identify additional crew member.

TRANSMIT: Pressing **ENTER** with the cursor over **TRANSMIT** will send the displayed data to the home base via the data link. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

AFIS MENU PAGE

WGT/BAL: This accesses the Weight and Balance Page which allows operator to enter, review, modify and transmit, via data link, weight and balance information. The display varies depending upon aircraft type: J41 or J32. This page is not available for the EMB120. See Figure 8-2.


```
20:09  AFIS MENU
WGT/BAL        CLOSE OUT
STATION        INITIALIZE
WEATHER          DVT/HOLD
DISPATCH
AIRPORT ANALYSIS

SEND MSG
DISPLAY MSG
```

Figure 8-2

STATION: The **STATION MENU** Page is accessed here. This page allows operator to enter, review, modify and transmit, via data link, services requested at the destination. The display varies depending upon aircraft type: J41,J32 or EMB120

WEATHER: Selecting this prompt accesses a **WEATHER** menu page. The Weather menu page provides Terminal Weather, Winds Aloft and Sigmet information access.

DISPATCH: This selects the **DISPATCH** Page which allows operator to request various information via the data link.

AIRPORT ANALYSIS: This selects the **AIRPORT ANALYSIS** Page which allows operator to transmit airport information.

CLOSE OUT: Accessing the **CLOSE OUT** Page allows the operator to review termination of flight information and to close out the flight.

INITIALIZE: Accessing the **INITIALIZE** page allows the operator to enter, review, modify, and transmit information related to the flight via the data link.

DVT/HOLD: Selecting the Divert/Hold Page allows the operator to enter, review, modify and transmit information related to a divert or hold situation via the data link.

SEND MSG: The **SEND AFIS MSG** Page is accessed here. For a detailed discussion of this page, see Section 7.

GNS-XLs Enhanced FMS with Regional Airline AFIS

DISPLAY MSG: The **DISPLAY AFIS MSG** Page is accessed here. For a detailed discussion of this page, see Section 7.

WGT/BAL PAGE FOR J32 AIRCRAFT CONFIGURATION

J32 aircraft weight and balance information for a specific flight is entered on this page. See Figure 8-3. Any enterable field may be left blank.
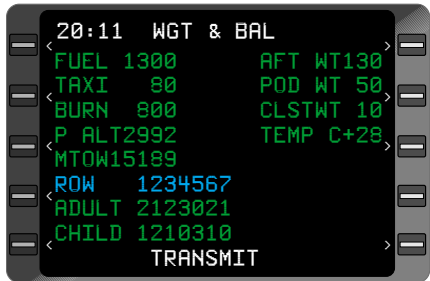
```
 20:11   WGT & BAL
‹ FUEL 1300      AFT WT130 ›
  TAXI   80      POD WT 50 ›
‹ BURN  800      CLSTWT 10
  P ALT2992      TEMP C+28 ›
‹ MTOW15189
  ROW   1234567
‹ ADULT 2123021
  CHILD 1210310           ›
        TRANSMIT
```

Figure 8-3

20:11: UTC hours and minutes.

FUEL: Pounds of fuel on board. Input range is 0 to 3248 pounds. Entry is checked against maximum limit.

TAXI: Pounds of fuel (estimated) for taxi. Input range is 0 to 999 pounds.

BURN: Pounds of fuel burn-off (estimated) for the flight. Input range is 0 to 3248 pounds. Entry is checked against maximum limit.

P ALT: Current pressure altitude at departure airport. Input range is 0 to 9999.

MTOW: Maximum takeoff weight in pounds. Input range is 0 to 16204.

ROW: Row numbers.

ADULT: Number of adult passengers in row. Input range for each entry is 0 - 3 for rows 1 through 6 and 0 - 1 for row 7. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted. An * may be entered in the first **ADULT** field to indicate all seats are filled by adults. No other entries are needed.

CHILD: Number of child passengers in row. Input range for each entry is 0 - 3 for rows 1 through 6 and 0 - 1 for row 7. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted.

AFT WT: Pounds of cargo in the rear baggage compartment. Input range is 0 to 628 pounds.

POD WT: Pounds of cargo in the pod. Input range is 0 to 435.

CLSTWT: Pounds of carry-on bags in the aft closet. Input range is 0 to 100.

TEMP C: Outside air temperature. Input range is -99C° to 100C°.

TRANSMIT: Pressing **ENTER** with the cursor over **TRANSMIT** will send the displayed data to the home base via the data link and the **AFIS MENU** page will be accessed. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

WGT/BAL PAGE FOR J41 AIRCRAFT CONFIGURATION

J41 aircraft weight and balance information for a specific flight is entered on this page. See Figure 8-4. Any enterable field may be left blank.

20:11: UTC hours and minutes.

FUEL: Pounds of fuel on board. Input range is 0 to 5818 pounds. Entry is checked against maximum limit.

TAXI: Pounds of fuel (estimated) for taxi. Input range is 0 to 999 pounds.

BURN: Pounds of fuel burn-off (estimated) for the flight. Input range is 0 to 5818 pounds. Entry is checked against maximum limit.

F/A: Flight Attendant on board. Toggle to **YES**, **NO** or **10A**.

MTOW: Maximum takeoff weight in pounds. Input range is 0 to 24000.

ROW: Row numbers.

Figure 8-4

ADULT: Number of adult passengers in row. Input range for row 1 is 0 - 2. Input range for rows 2 through 10 is 0 to 3. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted. An ***** may be entered in the first **ADULT** field to indicate all seats are filled by adults. No other entries are then needed.

CHILD: Number of child passengers in row. Input range for row 1 is 0 - 2. Input range for rows 2 through 10 is 0 to 3. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted.

AFT WT: Pounds of cargo in the rear baggage compartment. Input range is 0 to 1200 pounds.

POD WT: Pounds of cargo in the pod. Input range is 0 to 350.

CLSTWT: Pounds of carry-on bags in the aft closet. Input range is 0 to 200.

ACM: Additional crew member. Input range is 0 to 1.

TRANSMIT: Pressing **ENTER** with the cursor over **TRANSMIT** will send the data displayed to the home base via the data link and the **AFIS MENU** page will be displayed. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

STATION MENU PAGE FOR J32 AIRCRAFT CONFIGU- RATION

Desired services at the desti- nation for the J32 aircraft are entered on this page. See Figure 8-5. Any enterable field may be left blank.

20:21: UTC hours and min- utes.

ETA: Estimated UTC time of arrival. Input range is 0 to 23 hours and 0 to 59 minutes.


```
20:21  STATION MENU
ETA 2215     DETAILING N
FUEL  Y      WINDSHIELD Y
DEICE N
GPU   Y
                  UM  1
            WC  3 A 12 S

           TRANSMIT
```

Figure 8-5

FUEL: Select if fuel service is needed. Enter Y for yes or N for no.

DEICE: Select if deicing service is needed. Enter Y for yes or N for no.

GPU: Select if a ground power unit is needed. Enter Y for yes or N for no.

DETAILING: Select if detailing service is needed. Enter Y for yes or N for no.

WINDSHIELD: Select if windshield service is needed. Enter Y for yes or N for no.

UM: Enter the number of unaccompanied minors. Input range is 0 to 99.

WC: Enter the number of wheel chairs required.

A: Enter the number of aisle type wheel chairs required. Input range is 0 to 99.

S: Enter the number of standard type wheel chairs required. Input range is 0 to 99.

Two lines of free text can be entered with a maximum of 20 alpha/numeric characters for each line.

TRANSMIT: Press **ENTER** with the cursor over **TRANSMIT** to send the displayed data via the data link and the **AFIS MENU** page will be displayed. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

STATION MENU PAGE FOR J41 AND EMB120 AIRCRAFT CONFIGURATION

Desired services at the destination for the J41 and EMB120 aircraft are entered on this page. See Figure 8-6. Any enterable field may be left blank.
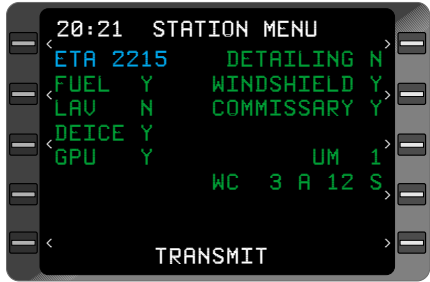
```
20:21  STATION MENU
ETA 2215    DETAILING N
FUEL  Y    WINDSHIELD Y
LAV   N    COMMISSARY Y
DEICE Y
GPU   Y            UM  1
             WC 3 A 12 S

        TRANSMIT
```

Figure 8-6

20:21: UTC hours and minutes.

ETA: Estimated Time of arrival. Input range is 0 to 23 hours and 0 to 59 minutes.

FUEL: Select if fuel service is needed. Enter Y for yes or N for no.

LAV: Select if lavatory service is needed. Enter Y for yes or N for no.

DEICE: Select if deicing service is needed. Enter Y for yes or N for no.

GPU: Select if a ground power unit is needed. Enter Y for yes or N for no.

DETAILING: Select if detailing service is needed. Enter Y for yes or N for no.

WINDSHIELD: Select if windshield service is needed. Enter Y for yes or N for no.

COMMISSARY: Select if commissary service is needed. Enter Y for yes or N for no.

UM: Enter the number of unaccompanied minors. Input range is 0 to 99.

WC: Enter the number of wheel chairs required.

A: Enter the number of aisle type wheel chairs required. Input range is 0 to 99.

S: Enter the number of standard type wheel chairs required. Input range is 0 to 99.

Two lines of free text can be entered with a maximum of 20 alpha/numeric characters for each line.

TRANSMIT: Pressing **ENTER** with the cursor over **TRANSMIT** will send the displayed data to the home base via the data link and the **AFIS MENU** page will be displayed. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

WEATHER MENU PAGE

The **WEATHER MENU** Page allows the operator to select **AFIS TERMINAL WEATHER**, **AFIS WINDS ALOFT** or **AFIS SIGMETS** pages. See Figure 8-7. See Section 7 for a detailed discussion of these pages.

20:12: UTC hours and minutes.


```
20:12  WEATHER
TERMINAL WEATHER

WINDS ALOFT

SIGMETS
```

Figure 8-7

DISPATCH MENU PAGE

This page allows the operator to request various information via the data link. See Figure 8-8. Any enterable fields may be left blank.

20:12: UTC hours and minutes.


```
20:14  DISPATCH MENU
Y NEED RELEASE
N NEED FLIGHT PLAN
N MANUAL RELEASE
Y AMEND RELEASE



        TRANSMIT
```

Figure 8-8

NEED RELEASE: Select to request release if needed. Enter Y for yes or N for no. The release will be sent to a station printer.

NEED FLIGHT PLAN: Select if a flight plan needs to be refiled. Enter Y for yes or N for no.

MANUAL RELEASE: Select if manual release is needed. Enter Y for yes or N for no. The release will be sent to the AFIS display.

AMEND RELEASE: Select if release needs to be amended. Enter Y for yes or N for no.

Two lines of free text can be entered with a maximum of 20 alpha/numeric characters for each line. This field is available if **AMEND RELEASE** has been marked with a **Y**.

TRANSMIT: When the cursor is over this field and **ENTER** is pressed, each of the items marked with a **Y**, along with any free text, will be transmitted via the data link. The **DATA LINK DISABLED** message will appear on this line if the data link is disabled and the request will not be transmitted.

AIRPORT ANALYSIS PAGE

This page allows the operator to transmit a request for takeoff and landing weight restrictions for a specific airport runway. See Figure 8-9.

AIRPORT IDENT: A four character field for entering the identifier associated with the airport. At least two characters must be entered.

```
       AIRPORT ANALYSIS

 AIRPORT IDENT KLAX

 RUNWAY ID RW25R

 TEMP C -25

           TRANSMIT
```
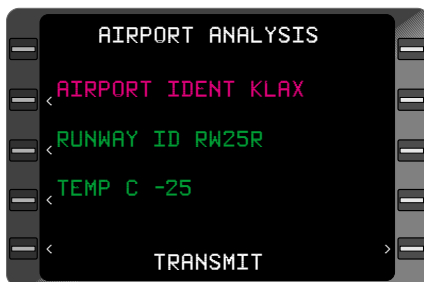
Figure 8-9

RUNWAY ID: A ten character field for entering the runway identifier. At least one character must be entered.

TEMP C: A three character field. The leading character is the character is the + or - sign followed by two numeric characters for airport temperature. If no sign is entered a positive value is assumed. If a third digit is needed for a positive temperature, a + will not be displayed.

Two lines of free text can be entered with a maximum of 20 alpha/numeric characters for each line.

TRANSMIT: Pressing **ENTER** with the cursor over **TRANSMIT** will send the displayed data to the home base via the data link. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

DVT/HOLD PAGE

The Divert/Hold page allows the operator to enter and then transmit data pertaining to a divert or hold situation to the home base. The page is divided with divert data entered on the left side and hold data entered on the right side. See Figure 8-10.
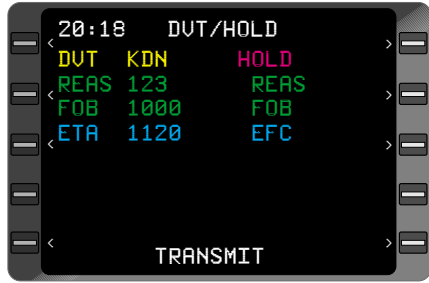
Figure 8-10

20:10: UTC hours and minutes.

DVT: Enter up to four characters for the divert airport identifier. At least two characters must be entered.

REAS: The reason field consisting of four characters identifying the reason for the diversion. At least two characters must be entered.

FOB: Enter up to four digits for fuel on board. The amount entered is in pounds. At least two characters must be entered.

ETA: Estimated UTC time of arrival. Enter two digits for hours and two for minutes.

HOLD: This five character field is used to enter the hold fix.

REAS: The reason field consisting of four characters identifying the reason for the hold.

FOB: Enter up to four digits for fuel on board. The amount entered is in pounds.

EFC: This is the expecting further clearance field. Enter two digits for hours and two for minutes specifying the next expected UTC time release will granted.

Two lines of free text can be entered with a maximum of 20 alpha/numeric characters for each line.

TRANSMIT: Pressing **ENTER** with the cursor over **TRANSMIT** will send the displayed data to the home base via the data link. **DATA LINK DISABLED** will appear on this line if the data link is disabled and the request will not be transmitted.

CLOSE OUT PAGE

This page allows the operator to view data which will be used to calculate flight time and block time. See Figure 8-11.

20:19: UTC hours and minutes.

FUEL UPLOAD: This five character field displays the fuel (in gallons) actually uploaded for the current flight. First character is always 0. Input range is 0 to 2135. Fuel upload field is optional for EMB 120 aircraft.

Figure 8-11

DEICE: Enter Y for yes if taxiing to the de-ice pad, or N for no.

OUT: The out time of the flight is displayed here in hours and minutes. The time is recorded when the parking brake is released and there is oil pressure.

OFF: The off time of the flight is displayed here in hours and minutes. The time is recorded at takeoff when weight is removed from the wheels.

ON: The on time of the flight is displayed here in hours and minutes. The time is recorded at landing when weight is applied to the wheels.

IN: The in time of the flight is displayed here in hours and minutes. The time is recorded when the parking brake is set, there is no oil pressure and the left engine stop switch has been pressed.

DLY: This delay field must have a delay code entered if the **OUT** time is greater than the **ETD** +6 minutes. If a delay code is not entered in this situation the cursor will not move to **TRANSMIT**. DLY field is optional for EMB 120 aircraft.

FLT: This field displays the calculated flight time in minutes that elapsed between the **OFF** time and the **ON** time.

BLOCK: This field displays the calculated block time in minutes that elapsed between the **OUT** time and the **IN** time.

TRANSMIT: Pressing **ENTER** with cursor over **TRANSMIT** will send the displayed data to the home base via the data link and will clear flight related information from the **INITIALIZE**, **STATION MENU**, **DISPATCH**, **AIRPORT ANALYSIS**, **WGT/BAL** and **DVT/HOLD** pages.
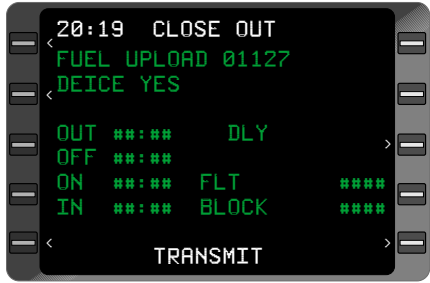
NEED TO CALL TIMES will appear on this line if the **ON** time and/or **IN** time have not been acknowledged.

SEND MSG PAGE

The Send Message Page is discussed in detail in Section 7.

DISPLAY MSG PAGE

The Display Message Page is discussed in detail in Section 7.

SYSTEM OPERATION

The FMS must be initialized before the **AFIS** Key is pressed. See Section 3, Initialization.

PRE-DEPARTURE

An AFIS flight plan may be selected at this point. See AFIS FLIGHT PLAN SELECTION in Section 7.

AFIS INITIALIZATION

When the **AFIS** Key is first pressed after power-up and FMS initialization, the **INITIAL-IZE** Page is displayed. See Figure 8-12. With the exception of the **ETE** field, information must be entered on this page before the **AFIS MENU** Page can be displayed. Entries to the **ETE** field are optional in the EMB120 and mandatory in the J32 and J31

```
20:09    INITIALIZE

FLT# 1290    CA
DEPT KIXD    FO
DEST KLAX    FA
ETD  2045    ACM
ETE  3+30


       TRANSMIT
```

Figure 8-12

1. **20:09:** - INSERT GMT hours and minutes if time has not been received from the FMS or data link. If the time has been received from the FMS or data link, this field will be filled and the procedure will begin with Step 3.

2. **ENTER** Key - DEPRESS. Cursor is positioned over **FLT #**

3. **FLT #**: INSERT flight number (digits only) of flight.

4. **ENTER** Key - DEPRESS.

5. **DEPT** - INSERT departure ICAO identifier (three or four characters).

6. **ENTER** Key - DEPRESS.

7. **DEST** - INSERT destination ICAO identifier (three or four characters).

8. **ETD** - INSERT GMT estimated time of departure.

9. **ENTER** Key - DEPRESS.

10. **ETE** - INSERT estimated time in route in hour and minutes. This may be left blank for EMB120 only.

11. **ENTER** Key - DEPRESS.

12. **CA** - INSERT the Captain's identifier code or leave blank.

13. **ENTER** Key - DEPRESS. If the Captain identifier code is left blank, the cursor will move to **TRANSMIT** when the key is pressed. If an entry is made, the cursor will move to the **FO** field.

14. **FO** - INSERT the First Officer's identifier code or leave blank.

15. **ENTER** Key - DEPRESS. If the First Officer identifier code is left blank, the cursor will will move to **TRANSMIT** when the key is pressed. If an entry is made, the cursor will move to the **FA** field.

16. **FA** - INSERT the Flight Attendant's identifier code or leave blank.

17. **ENTER** Key - DEPRESS. If the Flight Attendant identifier code is left blank, the cursor will move to **TRANSMIT** when the key is pressed. If an entry is made, the cursor will move to the **ACM** field.

18. **ACM** field - INSERT Additional Crew Member identifier code or leave blank.

NOTE: The Line Select Keys may be used at any time to enter or change data.

19. **ENTER** Key - DEPRESS. The cursor is positioned over **TRANSMIT**.

20. **ENTER** Key - DEPRESS for data link transmission. The flight is now initialized and the **AFIS MENU** page is displayed. See Figure 8-13.

*NOTE: If a **DATA LINK DISABLED** message appears when **ENTER** is pressed, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

WEIGHT & BALANCE ENTRY/REVIEW/UPDATE

There are two types of weight and balance pages, depending on the system configuration. The system may be configured for a J32 or a J41 aircraft.

J32 AIRCRAFT CONFIGU-RATION:

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. See Figure 8-13.

2. Line Select Key - DEPRESS to position the cursor over **WGT/BAL**.

3. **ENTER** Key - DEPRESS. **WGT/BAL** Page is displayed. See Figure 8-14.

4. Line Select Key - DEPRESS to position the cursor in **FUEL** field, left side.

5. INSERT pounds of fuel on board.

NOTE: The Line Select Keys may be used at any time to enter or change data.

6. **ENTER** Key - DEPRESS. The cursor moves to the **TAXI** field.

Figure 8-13

```
20:09  AFIS MENU
WGT/BAL        CLOSE OUT
STATION        INITIALIZE
WEATHER        DVT/HOLD
DISPATCH
AIRPORT ANALYSIS

SEND MSG
DISPLAY MSG
```

Figure 8-14

```
20:11  WGT & BAL
FUEL 1300      AFT WT130
TAXI   80      POD WT 50
BURN  800      CLSTWT 10
P ALT2992      TEMP C+28
MTOW15189
ROW   1234567
ADULT 2123021
CHILD 1210310
       TRANSMIT
```

7. INSERT the estimated pounds of fuel for taxi.

8. **ENTER** Key - DEPRESS. The cursor moves to the **BURN** field.

9. INSERT the estimated pounds of fuel used for the flight.

10. **ENTER** Key - DEPRESS. The cursor moves to the **P ALT** field.

11. INSERT the pressure altitude at the airport.
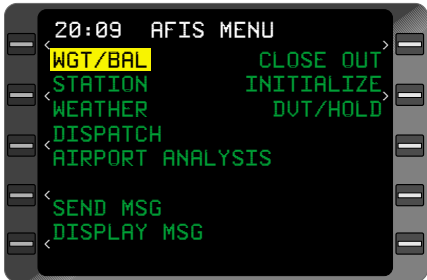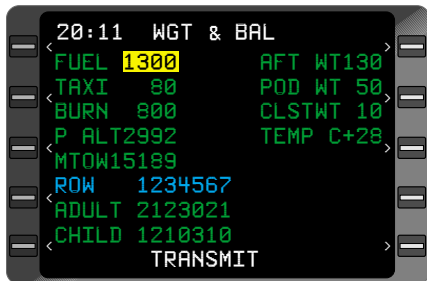
12. **ENTER** Key - DEPRESS. The cursor automatically moves to the **MTOW** field.

13. INSERT the maximum takeoff weight in pounds.

14. **ENTER** Key - DEPRESS. The cursor moves to the **AFT WT** field.

15. INSERT pounds of cargo in the rear baggage compartment.

16. **ENTER** Key - DEPRESS. The cursor moves to the **POD WT** field.

17. INSERT pounds of cargo in the pod.

18. **ENTER** Key - DEPRESS. The cursor moves to the **CLSTWT** field.

19. INSERT pounds of cargo in the forward closet.

20. **ENTER** Key - DEPRESS. The cursor moves to the **TEMP C** field.

21. REVIEW the value in the temperature field or INSERT a value for temperature. Enter a + or -, followed by one, two or three digits. The + sign is omitted if three digits are entered. Temperature is in degrees Celsius.

22. **ENTER** Key - DEPRESS. The cursor moves to the row 1 **ADULT** field.

23. INSERT the number of adult passengers in row 1. Input range for each entry is 0 - 3 for rows 1 through 6 and 0 - 1 for row 7. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted. An * may be entered in the first **ADULT** field to indicate all seats are filled with adults. No other entries in **ADULT** or **CHILD** fields are needed.

24. **NXT** Key - DEPRESS. The cursor moves to the row 1 **CHILD** field.

25. INSERT the number of child passengers in row 1. Input range for each entry is 0 - 3 for rows 1 through 6 and 0 - 1 for row 7. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted.

26. **NXT** Key - DEPRESS. The cursor moves to the row 2 **ADULT** field. Enter the appropriate number.

27. Continue pressing the **NXT** Key and the cursor will move to the right alternating between the **ADULT** and **CHILD** fields. Pressing the **PRV** Key moves the cursor to the left alternating between the **ADULT** and **CHILD** fields.

28. **ENTER** Key - DEPRESS. The cursor moves to **TRANSMIT**.

29. **ENTER** Key - DEPRESS to transmit weight and balance data via the data link. The **AFIS MENU** Page will then be displayed.

*NOTE: Data will not be deleted after transmission. If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

J41 AIRCRAFT CONFIGU-RATION:

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. See Figure 8-15.

2. Line Select Key - DEPRESS to position the cursor over **WGT/BAL**.

3. **ENTER** Key - DEPRESS. **WGT/BAL** Page is displayed. See Figure 8-16.
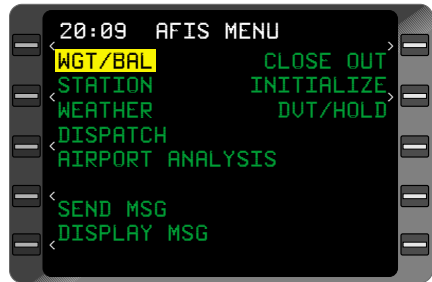
4. Line Select Key - DEPRESS to position the cursor in **FUEL** field, left side.

5. INSERT pounds of fuel on board.
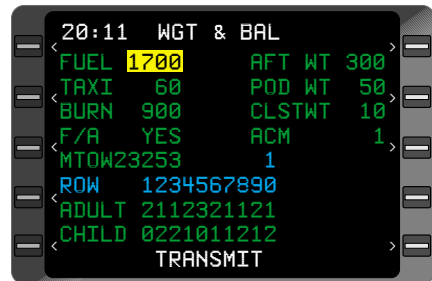
NOTE: The Line Select Keys may be used at any time to enter or change data.

6. **ENTER** Key - DEPRESS. The cursor moves to the **TAXI** field.

Figure 8-15

Figure 8-16

7. INSERT the estimated pounds of fuel for taxi.

8. **ENTER** Key - DEPRESS. The cursor moves to the **BURN** field.

9. INSERT the estimated pounds of fuel used for the flight.

10. **ENTER** Key - DEPRESS. The cursor moves to the **F/A** field.

11. TOGGLE **YES, NO** or **10A** for flight attendant.

12. **ENTER** Key - DEPRESS. The cursor automatically moves to the **MTOW** field.

13. INSERT the maximum takeoff weight in pounds.

14. **ENTER** Key - DEPRESS. The cursor moves to the **AFT WT** field.

15. INSERT pounds of cargo in the rear baggage compartment.

16. **ENTER** Key - DEPRESS. The cursor moves to the **POD WT** field.

17. INSERT pounds of cargo in the pod.

18. **ENTER** Key - DEPRESS. The cursor moves to the **CLSTWT** field.

19. INSERT pounds of cargo in the forward closet.

20. **ENTER** Key - DEPRESS. The cursor moves to the **ACM** field.

21. INSERT a 0 or 1 for additional crew member occupying the jump seat, ect. This field may also be left blank.

22. **ENTER** Key - DEPRESS. The cursor moves to the row 1 **ADULT** field.

23. INSERT the number of adult passengers in row 1. Input range for row 1 is 0 - 2. Input range for rows 2 through 10 is 0 to 3. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted. An ***** may be entered in the first **ADULT** field to indicate all seats are filled with adults. No other entries in **ADULT** or **CHILD** fields are needed.

24. **NXT** Key - DEPRESS. The cursor moves to the row 1 **CHILD** field.

25. INSERT the number of child passengers in row 1. Input range for row 1 is 0 - 2. Input range for rows 2 through 10 is 0 to 3. Sum of adults plus children must not exceed the maximum value for the row. If the maximum value for the row is exceeded, both fields will blink and the entry will not be accepted.

26. **NXT** Key - DEPRESS. The cursor moves to the row 2 **ADULT** field. Enter the appropriate number.

27. Continue pressing the **NXT** Key and the cursor will move to the right alternating between the **ADULT** and **CHILD** fields. Pressing the **PRV** Key moves the cursor to the left alternating between the **ADULT** and **CHILD** fields.

28. **ENTER** Key - DEPRESS. The cursor moves to **TRANSMIT**.

29. **ENTER** Key - DEPRESS to transmit weight and balance data via the data link. The **AFIS MENU** Page will then be displayed.

*NOTE: Data will not be deleted after transmission. If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

DISPATCH REVIEW/UPDATE

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.
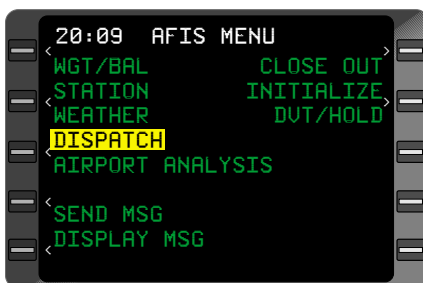
2. Line Select Key - DEPRESS to position the cursor over **DISPATCH**. See Figure 8-17.

Figure 8-17

3. **ENTER** Key - DEPRESS. The **DISPATCH MENU** Page is displayed. See Figure 8-18.

4. Line Select Key - DEPRESS to position the cursor in the **NEED RELEASE** field.

NOTE: The Line Select Keys may be used at any time to enter or change data.

Figure 8-18

5. TOGGLE **Y** for yes or **N** for no. The default is **N.**

6. **ENTER** Key - DEPRESS. The cursor will automatically move to the **NEED FLIGHT PLAN** field.

7. INSERT a **Y** for yes or **N** for no.

8. **ENTER** Key - DEPRESS. The cursor will move to the **MANUAL RELEASE** field.

9. INSERT a **Y** for yes or **N** for no.

10. **ENTER** Key - DEPRESS. The cursor will move to the **AMEND RELEASE** field.

11. INSERT a **Y** for yes or **N** for no.

12 Two free lines of text will only be available if a Y has been entered in the **AMEND RELEASE** field.

13. Line Select Key - DEPRESS to position the cursor in the first line of free text. See Figure 8-19

Figure 8-19

14. INSERT up to 20 characters of text or leave the field blank.

15. **ENTER** Key - DEPRESS. If the field is blank, the cursor will move to **TRANSMIT**. If there is text in the first line, the cursor will move to the second line of free text. See Figure 8-20.

16. INSERT up to 20 characters of text or leave the field blank.

Figure 8-20

17. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.

18. **ENTER** Key - DEPRESS to transmit dispatch data via the data link. The **AFIS MENU** Page will then be displayed.

*NOTE: If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

AIRPORT ANALYSIS REVIEW/UPDATE

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.
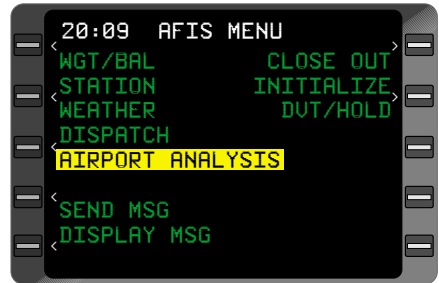
2. Line Select Key - DEPRESS to position the cursor over **AIRPORT ANALYSIS**. See Figure 8-21.

Figure 8-21

3. **ENTER** Key - DEPRESS. The **AIRPORT ANALYSIS** Page is displayed. See Figure 8-22.
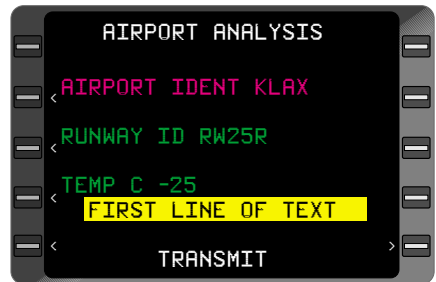
2. Line Select Key - DEPRESS to position the cursor in the **AIRPORT IDENT** field.

3. INSERT the ICAO identifier or verify the airport identifier already displayed.

Figure 8-22

4. **ENTER** Key - DEPRESS. The cursor will automatically move to the **RUNWAY ID** field.

5. INSERT the runway identifier.

6. **ENTER** Key - DEPRESS. The cursor will move to the **TEMP C** field.

7. INSERT the current temperature. Enter a + or - followed by one or two characters (if three digits are entered no + sign is entered), or verify the temperature already displayed.

8. **ENTER** Key - DEPRESS. The cursor will move to the first line of the free text field.

9. INSERT text up to 20 characters or leave the field blank.

10. **ENTER** Key - DEPRESS. If the field is blank the cursor will move to **TRANSMIT**. Otherwise the cursor will move to the second line of free text.

11. INSERT up to 20 characters of text or leave the field blank.

12. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.

13. **ENTER** Key - DEPRESS to transmit airport data via the data link. The **AFIS MENU** Page will then be displayed.

*NOTE: If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

HOLD REVIEW/UPDATE

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.

2. Line Select Key - DEPRESS to position the cursor over **DVT/HOLD**. See Figure 8-23.

Figure 8-23

3. **ENTER** Key - DEPRESS. The **DVT/HOLD** Page is displayed. See Figure 8-24.
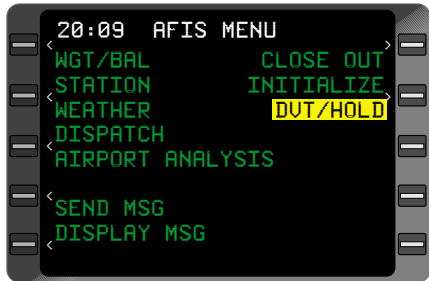
4. Line Select Key - DEPRESS to position the cursor over the **HOLD** field.

5. INSERT the holding fix.

6. **ENTER** Key - DEPRESS. The cursor will move automatically to the **REAS** field.

7. INSERT the hold reason code.
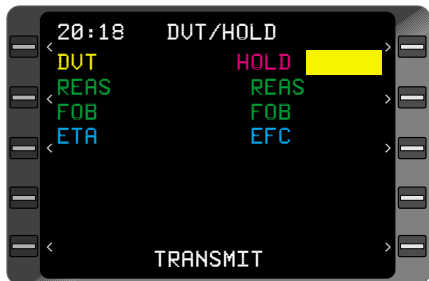
8. **ENTER** Key - DEPRESS.

Figure 8-24

The cursor will move to the **FOB** field.

9. INSERT the fuel on board in pounds.

10. **ENTER** Key - DEPRESS. The cursor will move to the **EFC** field.

11. INSERT the Expect Further Clearance estimated time in GMT.
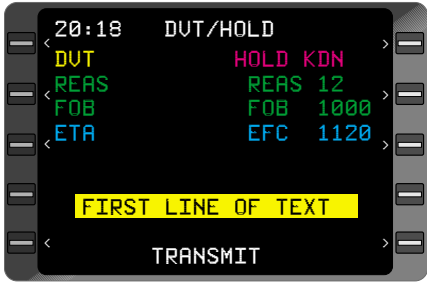
12. **ENTER** Key - DEPRESS. The cursor will move to first free text line. See Figure 8-25.

13. INSERT text up to 20 characters or leave the field blank.
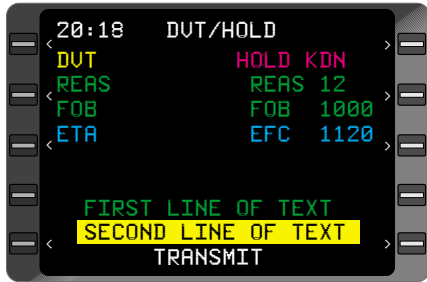
14. **ENTER** Key - DEPRESS. If the field is blank the cursor will move to **TRANSMIT**. Otherwise the cursor will move to the second line of free text. See Figure 8-26.

Figure 8-25

Figure 8-26

15. INSERT up to 20 characters of text or leave the field blank.

16. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.

17. **ENTER** Key - DEPRESS to transmit hold data via the data link. The **AFIS MENU** Page will then be displayed.

*NOTE: If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

ENROUTE

WEATHER UPDATE

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.
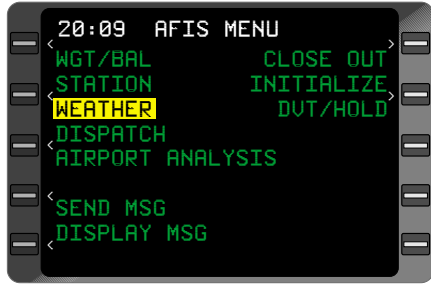
2. Line Select Key - DEPRESS to position the cursor over **WEATHER**. See Figure 8-27.

3. **ENTER** Key - DEPRESS. The **WEATHER** Page is displayed. See Figure 8-28.

4. Line Select Key - DEPRESS to position the cursor over **TERMINAL WEATHER**.

5. **ENTER** Key - DEPRESS to display the **TERMINAL WEATHER** Page. See TERMINAL WEATHER MENU - DATA UPDATE AND REVIEW in Section 7.

Figure 8-27

Figure 8-28

*NOTE: Wait for **AFIS LINK AK** message if sending multiple requests.*

6. Line Select Key - DEPRESS to position cursor over **WINDS ALOFT**.

7. **ENTER** Key - DEPRESS to display the **AFIS WINDS ALOFT** Page. See WINDS ALOFT MENU - DATA UPDATE AND REVIEW in Section 7.

*NOTE: Wait for **AFIS LINK AK** message if sending multiple requests.*

8. Line Select Key - DEPRESS to position the cursor over **SIG-METS**.

9. **ENTER** Key - DEPRESS to display the **AFIS SIGMETS** page. See SIGMETS REVIEW/UPDATE in Section 7.

10. Pressing the **NXT** Key will return to the **WEATHER** Page. Press the **AFIS** Key to return to the **AFIS MENU** Page.

*NOTE: Wait for **AFIS LINK AK** message if sending multiple requests.*

DIVERT REVIEW/UPDATE

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.
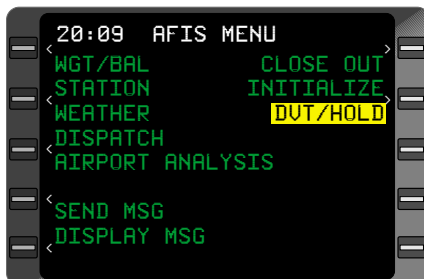
2. Line Select Key - DEPRESS to position the cursor over **DVT/HOLD**. See Figure 8-29.

Figure 8-29

3. **ENTER** Key - DEPRESS. The **DVT/HOLD** Page is displayed. See Figure 8-30.
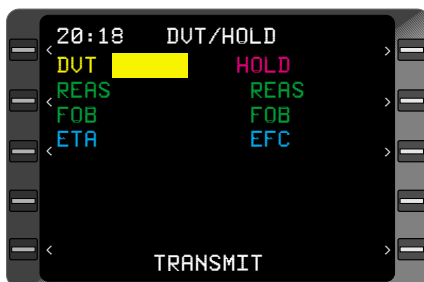
4. Line Select Key - DEPRESS to position the cursor over the **DVT** field.

5. INSERT the divert airport ICAO identifier.

Figure 8-30

6. **ENTER** Key - DEPRESS. The cursor will move automatically to the **REAS** field.

7. INSERT the divert reason code.

8. **ENTER** Key - DEPRESS. The cursor will move to the **FOB** field.

9. INSERT the fuel on board in pounds.

10. **ENTER** Key - DEPRESS. The cursor will move to the **ETA** field.

11. INSERT the estimated time of arrival in GMT.

12. **ENTER** Key - DEPRESS. The cursor will move to first free text line. See Figure 8-31.
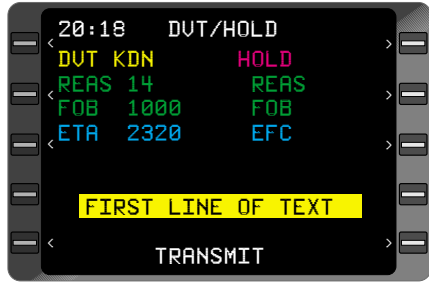
13. INSERT text up to 20 characters or leave the field blank.

14. **ENTER** Key - DEPRESS. If the field is blank the cursor will move to **TRANSMIT**. Otherwise the cursor will move to the second line of free text. See Figure 8-32.
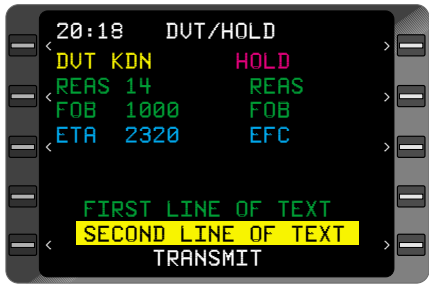
15. INSERT up to 20 characters of text or leave the field blank.

16. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.

17. **ENTER** Key - DEPRESS to transmit diversion data via the data link. The **AFIS MENU** Page will then be displayed.

Figure 8-31

Figure 8-32

*NOTE: If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

INITIALIZATION REVIEW OR UPDATE

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.
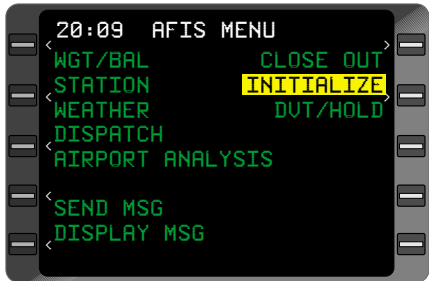
2. Line Select Key - DEPRESS to position the cursor over **INITIALIZE**. See Figure 8-33.

Figure 8-33

3. **ENTER** Key - DEPRESS. The **INITIALIZE** Page is displayed. The AFIS initialization data can be modified at this time. Refer to AFIS INITIALIZATION at the beginning of this SYSTEM OPERATION section.

SENDING AND RECEIVING AFIS MESSAGES

Refer to the discussions in Section 7 on sending and receiving AFIS messages.

STATION REVIEW/UPDATE

There are two types of station pages, depending on the system configuration. The system may be configured for a J32, J41 or EMB120 aircraft.

J32 AIRCRAFT CONFIGURATION:

Figure 8-34

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page.

2. Line Select Key - DEPRESS to position the cursor over **STATION**. See Figure 8-34.

3. **ENTER** Key - DEPRESS. The **STATION MENU** Page is displayed. See Figure 8-35.

4. Line Select Key - DEPRESS to position the cursor in the **ETA** field.
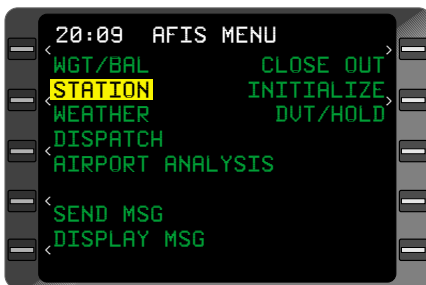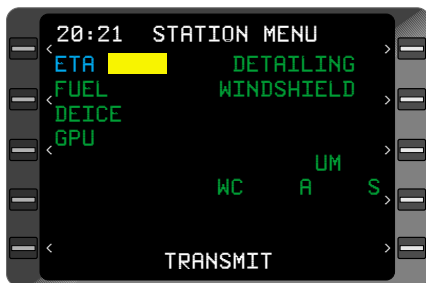
Figure 8-35

NOTE: The Line Select Keys may be used at any time to enter or change data.

5. INSERT the estimated time of arrival in GMT, hours,minutes. This field may be left blank.

NOTE: Entry of an invalid time will result in the field blinking.

6. **ENTER** Key - DEPRESS. The cursor will automatically move to the **FUEL** field.

7. INSERT a **Y** for yes if fueling will be needed. Insert an **N** for no if fueling will not be needed.

8. **ENTER** Key - DEPRESS. The cursor will move to the **DEICE** field.

9. INSERT a **Y** for yes if deicing will be needed. Insert an **N** for no if deicing will not be needed.

10. **ENTER** Key - DEPRESS. The cursor will move to the **GPU** field.

11. INSERT a **Y** for yes if a ground power unit will be needed. Insert an **N** for no if a ground power unit will not be needed.

12. **ENTER** Key - DEPRESS. The cursor will move to the **DETAIL-ING** field

13. INSERT a **Y** for yes if detailing service will be needed. Insert an **N** for no if detailing service will not be needed.

14. **ENTER** Key - DEPRESS. The cursor will move to the **WIND-SHIELD** field.

15. INSERT a **Y** for yes if windshield service will be needed. Insert an **N** for no if windshield service will not be needed.

16. **ENTER** Key - DEPRESS. The cursor will move to the **UM** field.

17. INSERT the number of unaccompanied minors on board.

18. **ENTER** Key - DEPRESS. The cursor will move to the first **WC** field. This first field is for aisle type (**A**) wheel chair.

19. INSERT the number of passengers on board needing aisle type wheel chairs.

20. **ENTER** Key - DEPRESS. The cursor will move to the second **WC** field. This second field is for standard type (**S**) wheel chair.

21. INSERT the number of passengers on board needing standard type wheel chairs.

22. **ENTER** Key - DEPRESS. The cursor will move to first line of free text. See Figure 8-36.

23. INSERT text up to 20 characters or leave blank.

24. **ENTER** Key - DEPRESS. If the field is blank, the cursor will move to **TRANSMIT**. If there is text in the first line, the cursor will move to the second line of free text. See Figure 8-37.

25. INSERT text up to 20 characters or leave blank.

26. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.

27. **ENTER** Key - DEPRESS to transmit data via the data link. When this information is transmitted, the page display will be cleared. The **AFIS MENU** Page is now displayed.
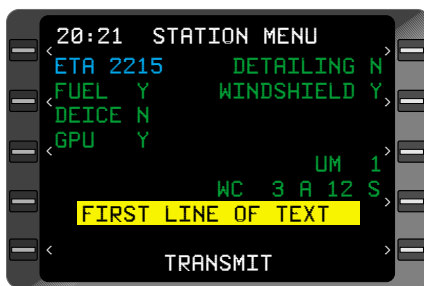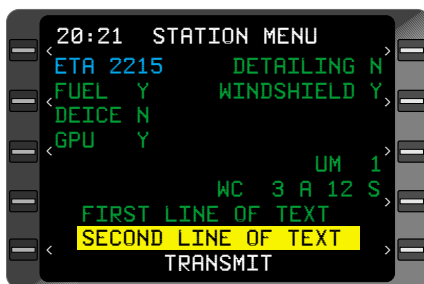
*NOTE: If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

J41 AND EMB120 AIRCRAFT CONFIGURATION:

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.

2. Line Select Key - DEPRESS to position the cursor over **STATION**. See Figure 8-38.

Figure 8-36

Figure 8-37

Figure 8-38

3. **ENTER** Key - DEPRESS. The **STATION MENU** Page is displayed. See Figure 8-39.
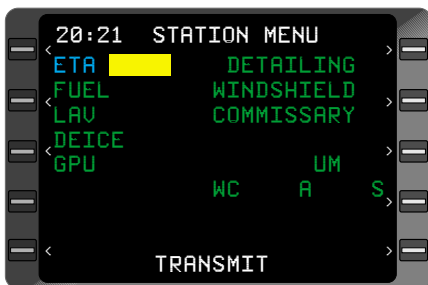
4. Line Select Key - DEPRESS to position the cursor in **ETA** field.

NOTE: The Line Select Keys may be used at any time to enter or change data.

Figure 8-39

5. INSERT the estimated time of arrival in GMT, hours,minutes. This field may be left blank.

NOTE: Entry of an invalid time will result in the field blinking.

6. **ENTER** Key - DEPRESS. The cursor will automatically move to the **FUEL** field.

7. INSERT a **Y** for yes if fueling will be needed. Insert an **N** for no if fueling will not be needed.

8. **ENTER** Key - DEPRESS. The cursor will automatically move to the **LAV** field.

9. INSERT a **Y** for yes if lavatory service will be needed. Insert an **N** for no if lavatory service will not be needed.

10. **ENTER** Key - DEPRESS. The cursor will move to the **DEICE** field.

11. INSERT a **Y** for yes if deicing will be needed. Insert an **N** for no if deicing will not be needed.

12. **ENTER** Key - DEPRESS. The cursor will move to the **GPU** field.

13. INSERT a **Y** for yes if a ground power unit will be needed. Insert an **N** for no if a ground power unit will not be needed.

14. **ENTER** Key - DEPRESS. The cursor will move to the **DETAIL-ING** field

15. INSERT a **Y** for yes if detailing service will be needed. Insert an **N** for no if detailing service will not be needed.

16. **ENTER** Key - DEPRESS. The cursor will move to the **WIND-SHIELD** field.

17. INSERT a **Y** for yes if windshield service will be needed. Insert an **N** for no if windshield service will not be needed.

18. **ENTER** Key - DEPRESS. The cursor will automatically move to the **COMMISSARY** field.

19. INSERT a **Y** for yes if commissary service will be needed. Insert an **N** for no if commissary service will not be needed.

20. **ENTER** Key - DEPRESS. The cursor will move to the **UM** field.

21. INSERT the number of unaccompanied minors on board.

22. **ENTER** Key - DEPRESS. The cursor will move to the first **WC** field. This first field is for aisle type (**A**) wheel chair.

23. INSERT the number of passengers on board needing aisle type wheel chairs.

24. **ENTER** Key - DEPRESS. The cursor will move to the second **WC** field. This second field is for standard type (**S**) wheel chair.

25. INSERT the number of passengers on board need-ing standard type wheel chairs.

26. **ENTER** Key - DEPRESS. The cursor will move to first line of free text. See Figure 8-40.
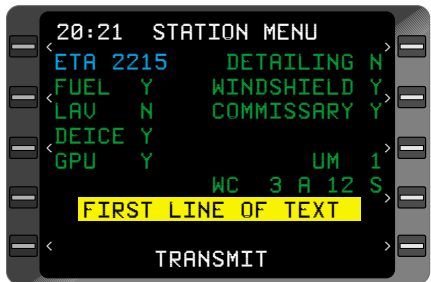
Figure 8-40

27. INSERT text up to 20 char-acters or leave blank.

28. **ENTER** Key - DEPRESS. If the field is blank, the cursor will move to **TRANSMIT**. If there is text in the first line, the cursor will move to the second line of free text. See Figure 8-41.

29. INSERT text up to 20 char-acters or leave blank.

30. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.
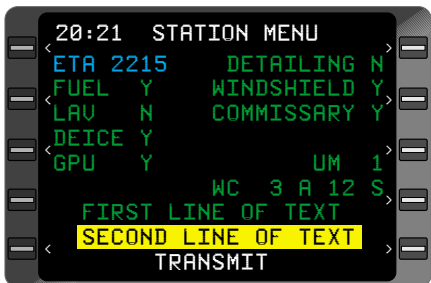
Figure 8-41

31. **ENTER** Key - DEPRESS to transmit data via the data link. When this information is transmitted, the page display will be cleared. The **AFIS MENU** Page is now displayed.

*NOTE: If a **DATA LINK DISABLED** message appears, the data link is not available. Wait for **TRANSMIT** to appear or notify maintenance of the problem.*

END OF FLIGHT

CLOSE OUT OF FLIGHT

1. **AFIS** Key - DEPRESS, if necessary, to display the **AFIS MENU** Page. The **WGT/BAL** field is not available and, therefore, is not displayed in the EMB120.
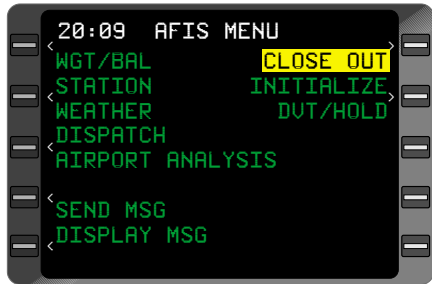
2. Line Select Key - DEPRESS to position the cursor over **CLOSE OUT**. See Figure 8-43.

3. **ENTER** Key - DEPRESS. The **CLOSE OUT** Page is displayed. See Figure 8-43.
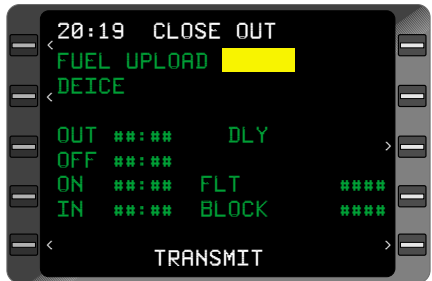
4. Line Select Key - DEPRESS to position the cursor over the **FUEL UPLOAD** field.

5. INSERT the actual fuel uploaded (in gallons) for the current flight.


```
20:09  AFIS MENU
WGT/BAL           CLOSE OUT
STATION           INITIALIZE
WEATHER           DVT/HOLD
DISPATCH
AIRPORT ANALYSIS

SEND MSG
DISPLAY MSG
```

Figure 8-42


```
20:19  CLOSE OUT
FUEL UPLOAD
DEICE

OUT ##:##    DLY
OFF ##:##
ON  ##:##    FLT      ####
IN  ##:##    BLOCK    ####

       TRANSMIT
```

Figure 8-43

6. Review the times displayed in the **OUT**, **OFF**, **ON**, and **IN** fields. The **BLOCK** and **FLT** fields are computed by the AFIS system using the **OUT**, **OFF**, **ON**, and **IN** times.

7. **ENTER** Key - DEPRESS. If the **OUT** time is greater than 6 minutes over the **ETD** time as previously entered on the **INITIALIZE** Page, the cursor will move to the **DLY** field (See Figure 8-44). If no delay has occurred the cursor will move to **TRANSMIT**. If the **DLY** field is skipped (EMB120 only), go to Step 10.
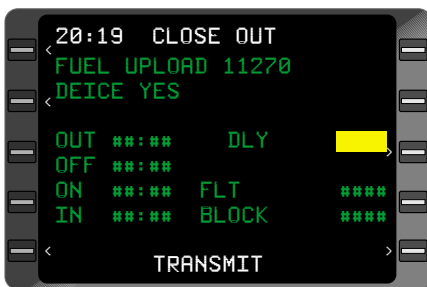
Figure 8-44

8. INSERT the required delay code.

9. **ENTER** Key - DEPRESS. The cursor will move to **TRANSMIT**.

10. **ENTER** Key - DEPRESS when ready to close out the flight. The times will be transmitted via data link and will cause flight related information from the **INI-**

Figure 8-45

TIALIZE, **STATION MENU**, **DISPATCH MENU**, **WGT/BAL** and **DVT/HOLD** pages to be cleared. **NEED TO CALL TIMES** will be displayed if the **ON** and/or **IN** event have not been acknowledged (see Figure 8-45). Press the **ENTER** Key and the **INITIALIZE** Page will appear with fields cleared and ready for next flight entry.
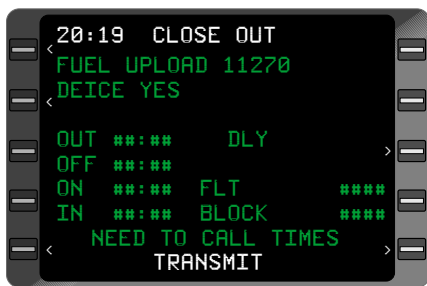
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AFIS COMMUNICATION ABBREVIATIONS

A

ABV — Above
ACFT — Aircraft
ACK — Acknowledge
ADD — Add
ADVS — Advise
AL — Altitude
ALTN — Alternate
AMDT — Amendment
AN — Aircraft Number
APCH — Approach
AR — Arrival Runway
ARPT — Airport
ARR — Arrive/Arrival
ATC — Air Traffic Control
AUTH — Authority
AVBL — Available

B

BF — Boarded Fuel
BLO — Below
BO — Burn Off
BRAF — Braking Action Fair
BRAG — Braking Action Good
BRAN — Braking Action Nil
BRAP — Braking Action Poor

C

XLD — Canceled
CFR — Crash/Fire/Rescue
CHG — Change
CIG — Ceiling
CHK — Check
CLNC — Clearance
CLSD — Closed
CONT — Continued
CTC — Contact

D

DCL — Declare
DEP — Depart/Departure
DIR — Direct
DSP — Dispatch
DVT — Divert

DLY — Delay
DLT — Delete

E

E — East
ETD — Estimated Time of Departure
EFF — Effective
EMER — Emergency
EXT — Extension

F

FB — Fuel on Board
FC — Flow Control
FLT — Flight
FREQ — Frequency
FT — Foot/Feet

G

GPS — Global Positioning System

H

HAZ — Hazard
HLD — Holding
HR — Hour

I

INDEF — Indefinitely
INFO — Information
INOP — Inoperative

L

LB — Pound/Pounds

M

M — Mile
MED — Medical
MEL — Minimum Equipment List
MIN — Minimum
MNTR — Monitor
MX — Maintenance

AFIS COMMUNICATION ABBREVIATIONS

N

N	North
NA	Not Authorized
NAI	Non-Airworthy Item
NM	Nautical Miles

O

OPER	Operate
ORIG	Original
OTS	Out of Service
OVR	Over

P

PB	Person on Board
PREV	Previous
PRCD	Proceed

R

RCV	Receive
RD	Departure Runway
REAS	Reassigned
REF	Reference
REL	Release
RMDR	Remainder
RMK	Remark/Remarks
RPLC	Replace
RPRT	Report
RQRD	Required
RQST	Request
RT	Route Information

S

S	South
SKED	Scheduled
SPD	Speed
SVC	Service

T

TB	Turbulence
THRU	Through
TIL	Until
TME	Time
T/O	Takeoff
TEMP	Temporary

TRAC	Tracking
TRML	Terminal
TWR	Tower

U

UNAB	Unable
UNAVBL	Unavailable

V

VIA	By Way Of
VD	Void
VR	Visual Range

W

W	West
WI	Within
WND	Wind
WX	Weather

75	Hijack
76	Lost Comm
/	And
+	In Addition/Also
>	More Than
<	Less Than
#	Number

A

Rev. 1
May/01
    GNS-XLS Enhanced Flight Management System
    I-1

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GNS-XLs Enhanced Flight Management System

Honeywell