

Operator's Guide

KLX 100



Bendix/King®  
Handheld  
GPS/COMM  
Software Version 2



AlliedSignal  
AEROSPACE

# KLX 100

## Handheld GPS/COMM

### Operator's Guide

006-08782-0001

Software Version 2



**WARNING:** It is extremely important to insert ALL of the batteries in the proper orientation as shown in section 1.1.2, figures 1-11 through 1-17 of this Operator's Guide, and as imprinted on the bottom of the KLX 100 case where the batteries are inserted. Improper installation may cause damage to the KLX 100 or personal injury due to battery leakage. Following installation of new batteries, ensure the BATT bar graph on the OPERATION SETUP page indicates a fully-charged set of batteries (refer to section 6.5 of this Operator's Guide). Recheck the battery orientation if the BATT bar graph indicates a partially-charged set of batteries.



**WARNING:** The SOS Beacon feature is for emergency use only. Transmitting on the emergency frequency is serious business and not to be taken lightly. If you want to listen to or demonstrate the SOS message, always use the SOS Setup page (section 6.7).



**WARNING:** *KLX 100 displays GPS-derived altitude on the NAV 3 page. Do not use the GPS altitude for navigation. Due to Selective Availability position degradation and other factors, the GPS altitude is normally 300 feet in error, which is unacceptable for vertical navigation.*




**CAUTION:** *The KLX 100's GPS functions are to be used for Visual Flight Rules (VFR) only, and not Instrument Flight Rules (IFR) navigation. Even though the KLX 100's GPS receiver is very accurate, it does not include receiver-autonomous integrity monitoring (RAIM) which is required for IFR flight using GPS navigation.*

*Use the KLX 100 at your own risk. Read and review this Operator's Guide and use the Simulator mode prior to use in an aircraft. When using the KLX 100 GPS for navigation, be sure to cross-check your GPS position with all available navigation sources, including charts and visual references. If there is any discrepancy, discontinue use of the KLX 100 until the discrepancy is resolved.*

*This device complies with FCC Part 15 limits for Class B digital devices. This equipment generates radio frequency energy, and may cause interference to radio communication and navigation if it is not used in accordance with this Guide. Interference may even occur in normal use. If this is the case, (which can be determined by turning the KLX 100 off and on), you should attempt to move the equipment to a location that doesn't produce interference. Operation is subject to these conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Use this device in accordance with CFR 14 FAR §91.21.*



**CAUTION:** *KLX 100 stores user data such as user-defined waypoints, flight plans, and page setups when the KLX 100 is powered down. If you remove power before turning the unit off (either by removing the batteries or by disconnecting a power cable), the user data you have created or changed since the unit was turned on will be lost. Always power down by holding the  button down.*

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## WELCOME

Welcome to the World's first handheld GPS/COMM! The Bendix/King KLX 100 from AlliedSignal will introduce you not only to some very innovative new GPS (Global Positioning System) features like the Mini-HSI, but also some ingenious ways of making GPS and COMM work together in ways you probably only dreamed of, like the new SOS Beacon feature!

As a new KLX 100 user, you can approach this Operator's Guide in several ways. If you want to learn about the KLX 100's navigation features, we suggest you turn to page iii and go through **GETTING YOUR BEARINGS**, which will introduce you to the primary KLX 100 features in the context of a simulated flight. If you want to take your KLX 100 outside and begin immediately to acquire GPS satellites, turn to page xi and go through **GPS INITIALIZATION**. If, on the other hand, you wish to learn more gradually, turn to chapter 1, **SYSTEM DESCRIPTION**, and start reading through the chapters in sequence.

Whichever type of user you are, you will find this Operator's Guide to be a good reference when you have specific questions. If you are new to using GPS, we invite your attention to Appendix G, "GPS Primer" for some basics of the powerful GPS satellite navigation system.



## ABOUT THIS GUIDE

This Operator's Guide will be of great help to you. It is written in plain, simple English and it assumes you are not an experienced user of GPS or other type of long range navigation equipment. If you are experienced, so much the better. This Operator's Guide also includes hundreds of sample screen figures and other illustrations to make your learning easier.

This guide is designed to fit easily in an aircraft or auto glove box, or in the seat pocket.

A "whisker" border is used on some of the figures in this Guide to indicate that the data inside the border is flashing.



There are many step-by-step procedures listed throughout this Guide. They are marked with a "footstep" icon:



There is an index of these step-by-step procedures located on page xii of this Guide.



**NOTE:** Throughout the book, there are numerous shaded boxes like this with special points of interest. Some, like this, are "NOTE:"s, and are marked with an "i" icon (i stands for "information").



**CAUTION:** More serious comments are "CAUTION:"s, and are marked with a black-on-white "!" icon.



**WARNING:** Pay close attention to the "WARNING:"s. They indicate matters of safety or regulations, and are marked with a white-on-black "!" icon.

# GETTING YOUR BEARINGS

This section will take you through an example flight using the navigation and communication features of the KLX 100 GPS/COMM. All this from the comfort of your own living room!

This section will not go into specifics on the exact content and use of each KLX 100 feature and page, there are six more sections for that. This is just for you to get "off the ground" so you can get outside and start using it with real-life GPS satellite signals.

**i** *NOTE: This simulated flight assumes that you have just taken the KLX 100 out of its box and installed the included batteries (battery installation is described in section 1.1.2). If you have already used the KLX 100, some of the procedures and screen graphics may be slightly different.*

Naturally, the first step is to turn on the KLX 100 unit:

1. Press the **ON/OFF LIGHT** button momentarily to turn on KLX 100 power. You may or may not hear some audio from the COMM receiver. The turn-on page (figure i-1) is displayed for about five seconds, followed by a page which shows you the software and data base versions (figure i-2).



Figure i-1

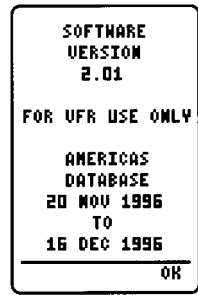


Figure i-2

2. Press the **OK** softkey to approve the Version page. The display will change to the GPS Status page (figure i-3). This page shows the locations of the GPS satellites in the sky, along with bar graphs to show the signal strengths of each individual satellite (see section 6.2 for more information on the GPS Status page). The GPS Status page should show **ACQ** indicating the GPS receiver is acquiring satellites. Where we're

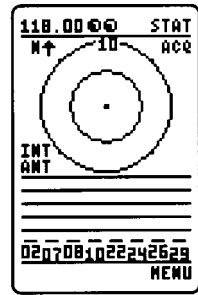
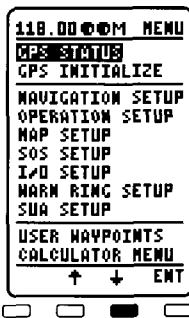


Figure i-3

going, we don't *need* satellites, since we'll be using the Simulator mode.

The GPS Status page is known as a **MENU** page, since it is accessed from the Main Menu. To see the Main Menu, press the **MENU** softkey on the GPS Status page (figure i-4). Notice that **MENU** is shown in the upper right corner of the screen. The **MENU** pages are used to customize KLX 100 features, and do things like trip planning and maintaining user defined waypoints.



There are four main page types, of which **MENU** is one. The four are:

Figure i-4

- NAV** Navigation (1-4). See chapter 3.
- COM** Communication (1-3). See chapter 4.
- FPL** Flight Plan (0-29). See chapter 5.
- MENU** Menus/Setups. See chapter 6.

where the three or four letter abbreviation at left is shown in the top right corner of the screen. For the **NAV**, **COM**, and **FPL** pages, the abbreviation is followed by a page number (the range of page numbers for each page type is shown in parentheses above).

We will now put the GPS in the Simulator mode and start moving:

1. From the Main Menu, press the **ENT** softkey until the cursor (an area of reverse video) is over the **GPS INITIALIZE** line and press the **MENU** softkey.
2. The current **GPS MODE** should be **NORMAL**. Press the **CHNG** softkey twice to change to the **SIMULATOR** mode (figure i-5).
3. Press the **ENT** softkey about 5 times to move the cursor to the **WPT** field (the initial position, and the departure point for the simulated trip).
4. We'll make our trip from New Century AirCenter in Olathe, Kansas (home of AlliedSignal Commercial Avionics Systems' Flight Operations) to Independence

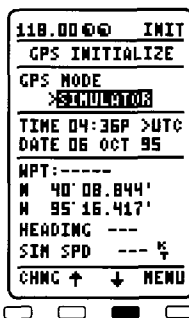


Figure i-5

Municipal Airport in Independence, Kansas. The identifier for New Century AirCenter is **KIXD**, which we will enter in the **WPT** field.



**NOTE:** This procedure assumes you are using an Americas data base. If you are using an Atlantic data base, try simulating a flight from London (identifier EGLL) to Birmingham (identifier EGBB). If you are using a Pacific data base, try simulating a flight from Sydney (YSSY) to Newcastle (YWLM).

5. To enter the first character (**K**), press the **[K]** key. Notice that the softkeys are now labeled **J, K, L, 4** (figure i-6).
6. Press the **K** softkey to select a **K** for the first character of the identifier.
7. Repeat steps 5 and 6 to enter **I** and **X**. The **D** should be filled in by the data base (figure i-7).

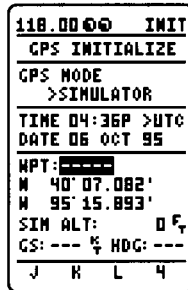


Figure i-6

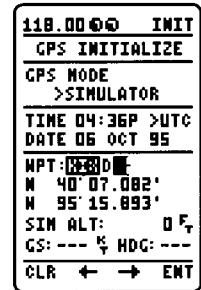


Figure i-7

8. Press the **[ENT]** softkey to approve the entry of **KIXD**.
9. Press the **[↓]** softkey until the cursor is on the **GS** field. This is the groundspeed you will be traveling on the simulated flight.
10. Press the **[ABC]**, **[DEF]**, and **[MNO]** keys to enter a simulated speed of 125 knots (figure i-8).
11. Press the **[ENT]** softkey to approve the groundspeed.

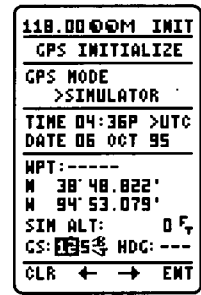


Figure i-8

Now press the **PAGE** key to change to the Navigation (NAV) 1 page, the moving map (figure i-9). You should be able to see a “trail of crumbs” behind you as you move along.

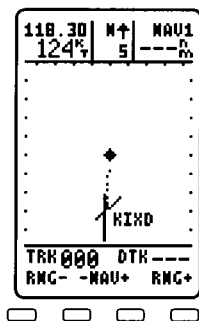


Figure i-9

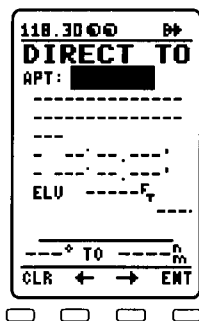


Figure i-10

We’re now ready to proceed Direct To Independence:

1. Press the **⊕** (Direct To) key (figure i-10).
2. Enter the identifier for Independence Municipal (**KIDP**) in the same manner you entered **KIXD** for the departure point (figure i-11).
3. Press the **ENT** softkey to start navigation Direct To Independence.



Figure i-11

The display should automatically go back to the moving map page (figure i-12). Notice that north is at the top of the map, and our flight will take us to the southwest. Press the **RNG+** softkey to zoom the map out until you have the 60 NM scale (figure i-13). Map scale is displayed the top center of the NAV 1 page. Notice that the nearby airports, nav aids and SUAs are displayed on the moving map. Press the **RNG+** softkey some more until the destination (**KIDP**) is displayed on the moving map. Kind of hard to read? With all the nearest airports and other objects on the screen, the map gets

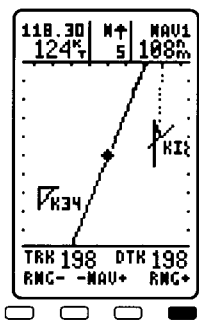


Figure i-12

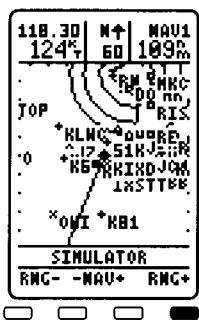


Figure i-13

very “busy” at wide ranges. You’ll want to declutter the map:

1. From the moving map (NAV 1) page, press the **CSRS** key and then the **SET** softkey to access the Map Setup page (figure i-14).
2. Press the **↓** softkey until the cursor is on the **CHANGE PLOTTED ITEMS** field, and press the **ENT** key.
3. The cursor should be on the **APT>** field. This field should show **9** (meaning that the map is displaying the 9 nearest airports).

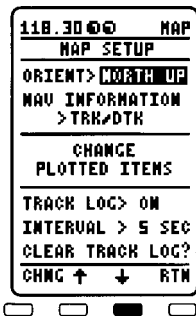


Figure i-14

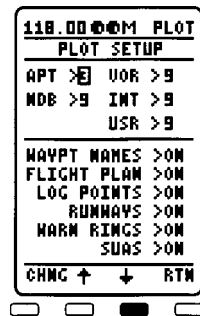


Figure i-15

4. Press the **CHNG** softkey until this changes to a **3** (figure i-15). If it was displaying **9** (the maximum), it will take four presses to make this change.
5. Now press the **↓** softkey until the cursor is on the **VOR>** field and press the **CHNG** softkey until **3** nearest VORs is selected. Use the same procedure to change the other navaid types to **0**.
6. Press the **RTN** softkey to leave the the **CHANGE PLOTTED ITEMS** screen.
7. While we’re at it, let’s change the moving map orientation so that it is actual track up instead of north up. Press the **↓** softkey to move the cursor to the **ORIENT** field and press the **CHNG** softkey twice to get to **TRACK UP** (figure i-16).

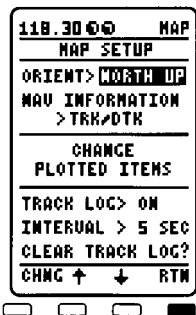


Figure i-16

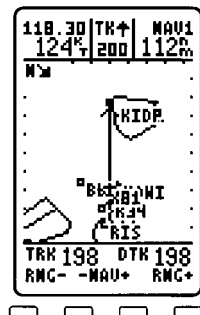


Figure i-17

8. Press the **RTN** softkey to go back to the moving map (figure i-17). See how much more usable the map is now?

The top of the map shows the active COMM frequency (118.30 in figure i-17) and the groundspeed on the left side, the map orientation (TK↑ for “actual track up”) and map range in the center, and the distance to the active waypoint (Independence Municipal) on the right side. The bottom of the screen shows a Course Deviation Indicator (CDI) which shows how far left or right of desired course you are (see section 2.10). Notice that every few seconds the CDI is replaced with the word **SIMULATOR** to remind you that this is not actual navigation data, but Simulator mode. During Simulator mode, the CDI should always remain centered, since the KLX 100 flight simulator is working like an autopilot to keep you on course.

Notice that the two softkeys in the middle are labeled **-NAV+**. If they are not, press the **(CRSR)** key to turn off the cursor, since the softkeys do different things with the cursor on versus with the cursor off. Press the **(+)** softkey to go from the NAV 1 page to the NAV 2 page (figure i-18).

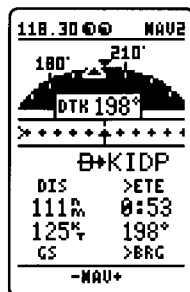


Figure i-18

The NAV 2 page includes a “Mini-HSI” (see section 3.2 for more specifics) and all the vital navigation data for the flight to Independence, including the destination waypoint, the desired track (DTK), the distance to the waypoint (DIS), the groundspeed (GS), the time to get there (ETE), and the Enroute Safe Altitude (ESA), which is also described more in section 3.2. Most of the navigation terminology is described in Appendix A at the back of this Operator’s Guide.

Interested in knowing what the nearest airports are? Press the **(NRST)** key, select **APT**, and press **(ENT)**, and you’ll get a listing of the nearest 9 airports (figure i-19). The nearest airport is **K81** which is 8.5 miles to our southeast (the nearest airport will vary depending where you are when you press the **(NRST)** key). It has a 2805 foot hard surface runway. Press the **(INFO)** softkey to see more information about K81 (figure i-20) and press the **(RTN)** softkey when ready to go back to the list of nearest airports. Press the **(RTN)** softkey again to go back to the NAV 2 page.

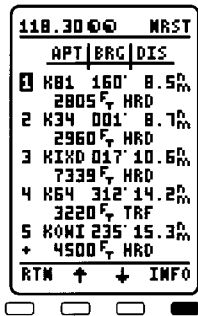


Figure i-19

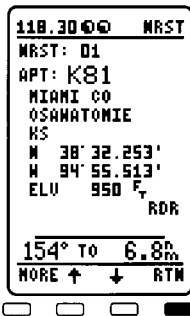


Figure i-20

Press the **PAGE** key to change from the NAV pages to the COM pages. The COM 1 page is displayed with an active and standby frequency. See section 4.1 for more on the COM 1 page. For now, press the **↓** softkey to change to the COM 2 page (figure i-21). Suppose we wanted to contact a Flight Service Station (FSS) to activate or modify our VFR flight plan or check weather, only we didn't know which FSS to contact, or what frequency to use:

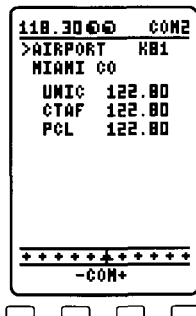


Figure i-21

1. Press the **CRSR** key to turn on the cursor.
2. The cursor is on a field that probably shows **AIRPORT**. Press the **CHNG** softkey until this area shows **NEAREST**.
3. Press the **↓** softkey until the cursor is on the **FSS** line (figure i-22). Notice that the nearest communication outlet for Columbia FSS is on 122.15 MHz.
4. To transfer the FSS frequency into the COMM radio, press the **XFER** softkey (figure i-23). This unique feature is something we call QuickTune®. You can read more about QuickTune® in section 4.2. If we were really on a flight, you would press the Push-to-talk (PTT) button on the left side of the KLX 100 to key the microphone for transmit.
5. Press the **CRSR** key to turn off the cursor.

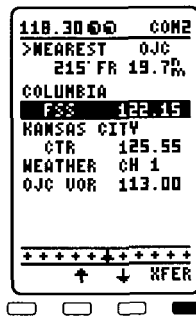


Figure i-22

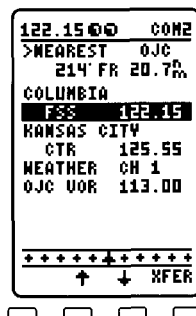


Figure i-23

Press the **PAGE** key three times to go back to the NAV pages, and press the **←** softkey to change from the NAV 2 page to the NAV 1 page. You can check your distance and groundspeed, as well as the locations of the nearest airports.



Since we're now getting close to Independence (my, how time flies!), we'll need to contact the airport to get an airport advisory. You can now get the COMM frequencies for Independence Municipal:

1. Press the **MAU4** softkey to change from the NAV 1 page to the NAV 4 page (figure i-24). The way-point page for **KIDP** is shown on the screen. Its elevation is 820 feet (from which you can figure out pattern altitude). Press the **MORE** softkey to view its run-

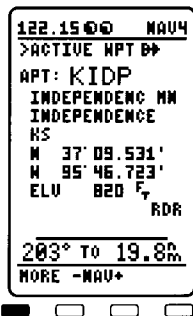


Figure i-24

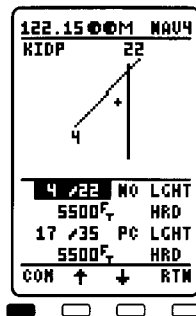


Figure i-25

2. Press the **COM** softkey to look at the COMM frequencies for our destination (figure i-26). Independence has a Unicom (UNIC) on 122.70 megahertz, and the same frequency is used for Common Traffic Advisory Frequency (CTAF) and Pilot-controlled Lighting (PCL). Let's go ahead and tell Unicom that we're coming and get that airport advisory.

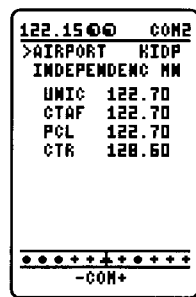


Figure i-26

3. Turn on the cursor by pressing the **CRSR** key, and use the **↓** key to move the cursor down to **UNIC 122.70** (figure i-27).

4. Press the **XFER** softkey to transfer the Unicom frequency to the COMM transceiver (figure i-28). You can even use the NAV 1 page information to tell Unicom you are "11.6 miles northeast of the airport," for example. Won't they be impressed that you give such precise position reporting?

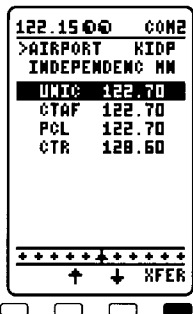


Figure i-27

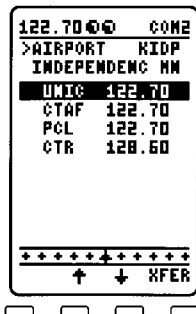



Figure i-28

When you've completed your trip with the KLX 100, be sure to turn the unit off by pressing and holding the  button on the left side of the KLX 100 for 3 seconds. Removing the batteries or disconnecting a power cord while the unit is on causes some of your user data to be lost. See the back side of the first page of this Operator's Guide.

Be sure to go back to the GPS Initialize page and change the **MODE** from **SIMULATOR** back to **NORMAL**, so you'll be able to receive actual GPS signals.








That does it for **GETTING YOUR BEARINGS**. We hope you had a good flight!

## GPS INITIALIZATION

Now that you are more familiar with using the KLX 100 in Simulator mode, this section will take you through the steps to acquire a GPS position.



*To initialize the KLX 100 GPS receiver:*

1. After you apply power and approve the versions page with the  softkey, the KLX 100 will display the GPS Status page. Press the  softkey to move to the Main Menu.
2. Press the  softkey once to move the cursor to **GPS INITIALIZE** and press the  softkey.
3. Check the date, time, and initial position displayed on this page. If you are certain that they are all correct, skip to step 16. Otherwise, complete steps 4-15.
4. If the cursor is not on the screen, press the  key.
5. Make sure the GPS mode is **NORMAL**. If it is not, press the  softkey until **NORMAL** is displayed.
6. Use the  softkey to move the cursor over the time zone field (figure i-29).

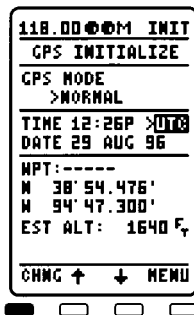


Figure i-29

7. If the time zone is incorrect, use the **CHNG** softkey to change time zones. The time zones and their abbreviations are listed in section 6.5.
8. Use the **↑** softkey to position the cursor over the **TIME** field. If the time is incorrect, enter the numbers of the correct time using the phonepad keys (figure i-30). If necessary to change between AM and PM, press the **CHNG** softkey, and press the **ENT** softkey.

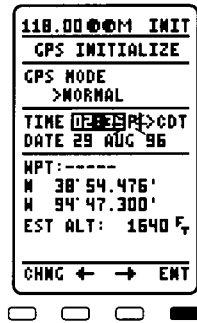


Figure i-30

9. Use the **↑** softkey to position the cursor over the **DATE** field. If the date is incorrect, use the phonepad keys to enter the numbers of the day of the month. After you enter the second digit, the cursor automatically moves to the month field (figure i-31). Alternatively, you can use the **←** or **→** softkey to move the cursor around.

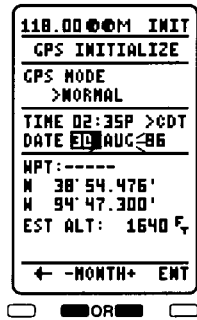


Figure i-31

10. Use the **←** and **→** softkeys to change the displayed month. You will cycle through the months in order. Use the **ENT** softkey to move to the year field.

11. Use the phonepad keys to enter the numbers for the year field. When you are done, press the **ENT** softkey to approve the date as entered.

12. Use the **↑** softkey to position the cursor over the **WPT** field.

13. Enter the identifier for the airport where you are presently located or the identifier of a navaid or other airport which is close to your present position, using the normal waypoint entry method. Any waypoint in the data base which is within 60 miles is acceptable, but the closer the better. If you are entering an airport identifier that is all letters (no numbers), then it will begin with a "K" prefix in the contiguous USA, a "P" in Alaska (in some cases; in others, the prefix is not added), or a "C" in Canada. If there are numbers in the identifier then a prefix is not used. Outside the contiguous USA, Alaska, and Canada, use the airport identifiers as they are charted. Note that the identifier name is not displayed after being entered but the position has been updated.

14. Once you have entered the complete identifier (figure i-32), press the **ENT** softkey.

15. If desired, you may enter your estimated altitude (**EST ALT**) at the bottom of the GPS Initialize page. This estimated altitude will be used to aid the GPS receiver in acquiring your position. The altitude is indicated altitude above mean sea level (MSL). Once the KLX 100 GPS receiver acquires a three-dimensional position, this altitude will be replaced with the derived GPS altitude. Move the cursor to the **EST ALT** field using the **↓** softkey, and use the

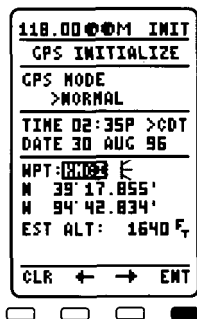


Figure i-32

the phonepad keys to enter the digits of the estimated altitude. If the GPS receiver gets to a point where it needs you to enter an altitude, the message **2D NAV, ENTER ALTITUDE ON GPS INIT PAGE** will activate.

16. Make sure the GPS antenna has a clear view of the sky. If you are using the KLX 100's built-in GPS antenna, hold the unit slightly up from horizontal (as in figure 1-8), so the surface with the Bendix/King logo is facing straight up into the sky. If you are using the external antenna, make sure the surface with the AlliedSignal logo is facing straight up into the sky.

17. Select the GPS Status page again, so you may watch the individual satellites being acquired, as well as the GPS receiver mode (it will probably be in acquisition (**ACQ**) mode initially, before transitioning to one of the navigation (**NAV 2D** or **NAV 3D**) mode. Refer to section 6.2 for more information on the GPS Status page.

18. Select the NAV 3 page. When the KLX 100 reaches the navigation-ready status, the NAV 3 page will display the present position. Verify that the latitude and longitude and the waypoint, radial, and distance display of present position are correct.

## STEP-BY-STEP INDEX

This is an index of all the step-by-step instructions in this Operator's Guide, and will help you find them at a glance. The list is alphabetized by action words.

<b>TO:</b>	<b>SEE PAGE:</b>
Activate one of the previously created numbered flight plans	. 5-6
Add a memory channel	4-14
Add a user-defined waypoint comment	2-17
Add a waypoint to a flight plan	5-6
Calculate ETE and fuel requirements on the Trip Planning page	6-36
Calculate pressure altitude, density altitude, and true airspeed (TAS)	6-37
Calculate the sunrise/sunset times	6-39
Calculate the winds aloft and head/tail wind	6-38
Cancel Direct To operation	2-11
Change between distance and desired track display on a numbered flight plan page	5-5
Change between distance, ETE, ETA, and desired track display on the FPL 0 page	5-14
Change the moving map setup	6-17
Change the NAV 4 displayed flight plan waypoint	3-20
Change the serial port settings	6-24
Create a flight plan	5-3
Create a user-defined waypoint at your present position	2-13
Create a user-defined waypoint using the radial/distance method	2-16
Create a user-defined waypoint with latitude/longitude	2-14
Create a Warning Ring	6-27
Delete a flight plan which is no longer required	5-8
Delete a memory channel	4-15
Delete a waypoint from a flight plan	5-7

**STEP-BY-STEP INDEX, Cont'd**

<b>TO:</b>	<b>SEE PAGE:</b>
Enable (or disable) SUA alerting . . . . .	6-30
Enter a local time zone offset . . . . .	6-14
Enter a manual magnetic variation . . . . .	6-12
Enter a route of flight on the Trip Planning page . . . . .	6-34
Go Direct To a waypoint (by entering the identifier) . . . . .	2-9
Go Direct To a waypoint (by first selecting its waypoint page) . . . . .	2-10
Go Direct To a waypoint in the active flight plan . . . . .	5-13
Initialize the KLX 100 GPS receiver . . . . .	.xi
Initialize the position . . . . .	6-8
Initialize the time and date . . . . .	6-7
Install the batteries . . . . .	1-5
Lock out COMM frequencies from a scan . . . . .	4-17
Recenter the D-bar by going Direct To the active waypoint . . . . .	2-11
Record your personalized SOS message . . . . .	6-21
Scan COMM frequencies . . . . .	4-16
Select a COMM frequency using QuickTune® . . . . .	4-13
Select an airport by entering the airport name or city (also applies to VOR name) . . . . .	3-14
Select an airport by scanning the airport identifier, name, or city . . . . .	3-14
Select an airport (or any waypoint) by identifier . . . . .	3-12
Set the alarm . . . . .	6-40
Specify the nearest airport criteria . . . . .	6-11
Store the active flight plan as a numbered flight plan . . . . .	5-9
Transmit using the SOS Beacon . . . . .	2-26
Tune a COMM frequency directly on the Title Bar . . . . .	2-5
Tune a COMM frequency on the COM 1 page . . . . .	4-7
Tune a duplex channel . . . . .	4-9

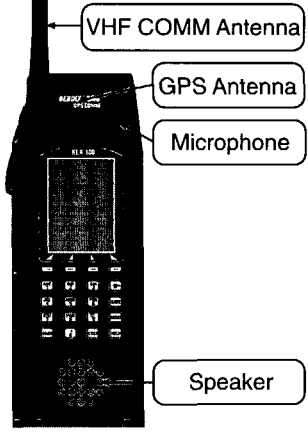
**STEP-BY-STEP INDEX, Cont'd**

<b>TO:</b>	<b>SEE PAGE:</b>
Tune a weather channel directly on the Title Bar . . . . .	2-6
Tune a weather channel on the COM 1 page . . . . .	4-8
Turn on the display backlight . . . . .	2-7
Update the KLX 100 data base . . . . .	6-25
Use the Simulator Mode . . . . .	6-5
Use the yoke-mount adapter . . . . .	1-7
View a message . . . . .	2-24
View the nearest airports . . . . .	2-18

# 1. SYSTEM DESCRIPTION

## 1.1 GENERAL INFORMATION

The KLX 100 (figure 1-1) is a first-of-its-kind handheld product which includes an 8-channel GPS receiver, a 760-channel VHF Aviation Band COMM, and a 10-channel Weather Receiver (Americas data base only).



### 1.1.1. CONTROLS

The KLX 100 controls are located in two distinct areas. The Power and COMM controls are located on the control console on the left side of the unit, and the remainder of the controls are on the 20-key keypad on the front of the unit.

Figure 1-1

The COMM controls are discussed in chapter 4. The only other control you need to know about now is the On/Off/Backlight switch, located right below the oval push-to-talk (PTT) switch (figure 1-2). Press the **ON/OFF/LIGHT** switch once to turn the unit on, and push and hold it for three seconds to turn off the KLX 100 power.

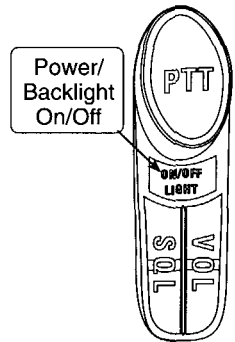


Figure 1-2

The keypad is composed of four "softkeys", ten alphanumeric "phonepad" keys, and six other miscellaneous keys (figure 1-3).

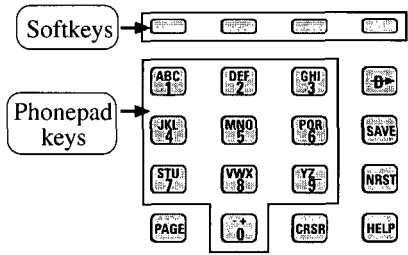



Figure 1-3



## Softkeys

The four softkeys directly below the LCD display are used for a multitude of functions, depending on the page displayed. In figure 1-4, the first softkey corresponds to **RTN**, the second to **IDX**, 3- **MORE**, and 4- **MSG**. The softkeys are represented as , for example, in this Operator's Guide.

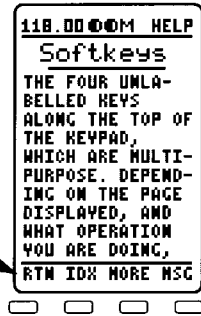



Figure 1-4

## Alphanumeric Phonepad Keys

The ten numbered keys, which are also labeled with two or three letters (just like a phonepad) comprise the alphanumeric entry keys. If the KLX 100 is expecting a number to be entered in a certain cursor field (like a COMM frequency, for example), pressing the alphanumeric keys place that number (0 through 9) into the cursor field. If, on the other hand, you are entering something which could be a number or a letter (like an airport identifier), pressing an alphanumeric key causes the display to appear as in figure 1-5, where each of the four softkeys corresponds to one of the characters on the key you pressed. In this example, the  key was pressed, so the four softkeys are **A**, **B**, **C**, and **1**. If you desired to select **C**, you would press the third softkey from the left as shown in figure 1-5.

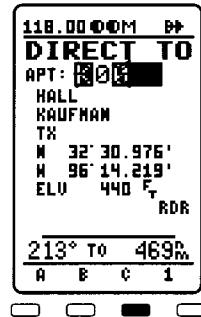





Figure 1-5

## Miscellaneous Keys

In addition to the four softkeys and 10 alphanumeric keys, there are six miscellaneous keys. They are described in detail throughout Chapter 2:

-  **(Page)** Changes the page type between Navigation (**NAV**), Communication (**COM**), Flight Plan (**FPL**), and Menu (**MENU**).
-  **(Cursor)** Toggles the cursor (an area of reverse video where data is entered or selected) on or off.
-  **(Direct To)** Initiates the Direct To operation. A press of this key is followed by entry of the desired Direct To waypoint.

- [SAVE] (Save)** Saves the present position as a user-defined waypoint for later use. KLX 100 will give you a default name for the new waypoint, or you may give it a name of your own.
- [NEST] (Nearest)** Gives you access to lists of the nearest waypoints and airspace to your present position.
- [HELP] (Help)** An on-line help feature which gives you help for the page you were on when the button was pressed, and lets you look through a topical help index for tidbits of knowledge. Also used for viewing messages.

**1.1.2. STANDARD ACCESSORIES**

Standard accessories include a carrying case, a remote GPS antenna, a headset adapter, eight alkaline batteries, and an 11-33 volt aircraft/automobile power adapter.

The carrying case (figure 1-6) is made of durable nylon, there is a belt attachment on the back, and the COMM antenna may be stored in the side pocket.

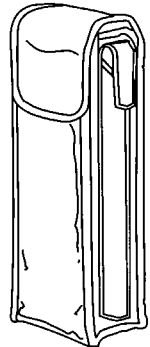


Figure 1-6

The remote GPS antenna (figure 1-7) includes a 5-foot coaxial cable. It may be placed on the glare shield of an aircraft, or the dashboard of an automobile. It should always be oriented so that the top (the side with the AlliedSignal logo) is facing straight up. The antenna cable plugs into the ANT connector on the right side of the KLX 100.

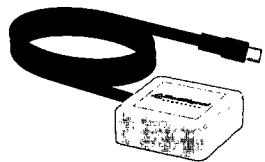


Figure 1-7

The remote antenna should be used when the KLX 100 cannot be oriented so the internal GPS antenna can "see" satellites. The internal GPS antenna is located at the top of the KLX 100 unit, directly beneath the Bendix/King logo. For best GPS reception using the internal antenna, hold the KLX 100, angled about 25° up from horizontal (figure 1-8), so the Bendix/King logo faces the sky.

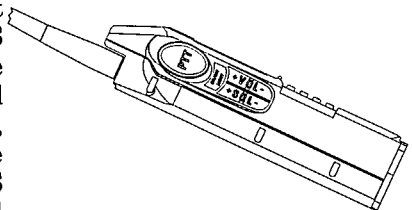


Figure 1-8

## System Description

Included are two additional adapters, a suction cup mount and a magnetic mount. The suction cup (figure 1-9) swivels so that it may be mounted on glass or plastic surfaces at any angle and still maintain good visibility of the satellites in the sky. It is intended for mounting in an aircraft or automobile window (figure 1-10). A replacement suction cup may be ordered under part number 071-00110-0004.



Figure 1-9

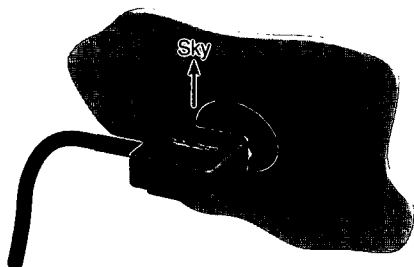


Figure 1-10

The magnetic mount (figure 1-11) slides in underneath the antenna and will stick to most metallic surfaces. A replacement magnet may be ordered under part number 071-00110-0002. As you can tell, several remote antenna installation options are available to you.

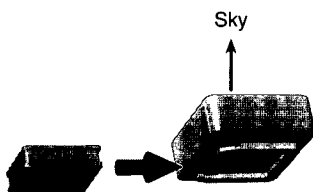
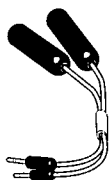


Figure 1-11



The headset adapter (figure 1-12) converts the mini-plug speaker and mic jacks on top of KLX 100 to full-size plugs. There is also a clip which attaches to the right side of the KLX 100 case for strain relief.

Figure 1-12

Eight alkaline AA cell batteries are included with the KLX 100. You may also use rechargeable alkaline or rechargeable Nickel Cadmium (NiCad) AA batteries. Please note that if you use NiCad batteries, the battery level shown on the Operation Setup page (see section 6.5) will not indicate full battery level, even if the NiCads are fully charged (figure 1-13). This is because NiCad batteries are typically 1.2 volts instead of 1.5 volts. If NiCads are used, we recommend high-quality NiCads with a rating of at least 600 mA-hr (milliamp-hours). Alkaline cells are recommended.

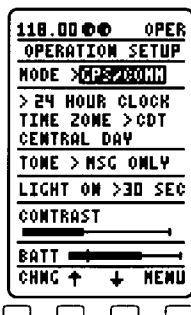


Figure 1-13

**To install the batteries:**

1. Slide the bottom cover off to the side, and remove the cover.
2. Insert the batteries as shown in figure 1-14. Note the small pictures below the battery holes that show whether the positive or negative terminals should stick out the end (figure 1-15).

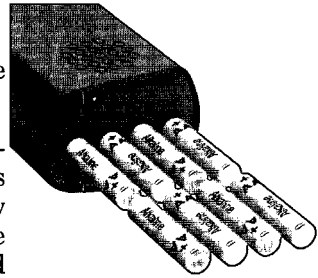


Figure 1-14

3. Replace the bottom cover by lining up arrows as shown in figure 1-16. Slide the bottom cover to the side until it stops (figure 1-17).

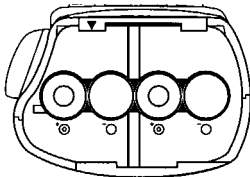


Figure 1-15

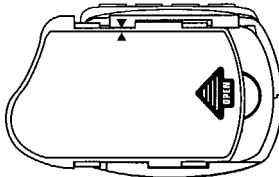


Figure 1-16

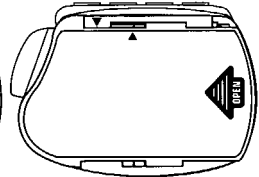


Figure 1-17

4. It is recommended to turn on the KLX 100 briefly following battery replacement, so that the internal clock and calendar are updated. You will probably get the message **CHECK DATE AND TIME ON GPS INIT PAGE**. If the KLX 100 is not turned on within 10 minutes of battery replacement, it is recommended to reset the time and date on the GPS Initialize page.

Battery life depends on the amount and type of usage. See Appendix B for the battery life during some typical usage profiles.



**WARNING:** It is extremely important to insert ALL of the batteries in the proper orientation as shown in section 1.1.2, figures 1-14 through 1-17 of this Operator's Guide, and as imprinted on the bottom of the KLX 100 case where the batteries are inserted. Improper installation may cause damage to the KLX 100 or personal injury due to battery leakage. Following installation of new batteries, ensure the BATT bar graph on the OPERATION SETUP page indicates a fully-charged set of batteries (refer to section 6.5 of this Operator's Guide). Recheck the battery orientation if the BATT bar graph indicates a partially-charged set of batteries.

## System Description

The 11-33 volt aircraft/automobile power adapter (figure 1-18) plugs into a cigarette lighter and allows you to run the KLX 100 from aircraft or automobile power. This will not trickle-charge the batteries, however. Replacement part number 071-00108-0000.

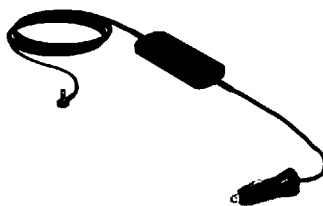


Figure 1-18

### 1.1.3. OPTIONAL ACCESSORIES

Optional accessories include an AC power adapter, a yoke-mount adapter, a PC interface cable, an aircraft antenna adapter, a clip-on speaker/microphone, and an earphone.

The AC (alternating current) power adapter (figure 1-19) converts 110 or 220 volts AC to the DC voltage necessary to power a KLX 100. Order part number 015-00261-0000. An extra adapter plug (not supplied by AlliedSignal) is required to physically plug the AC power adapter into most 220 volt receptacles.

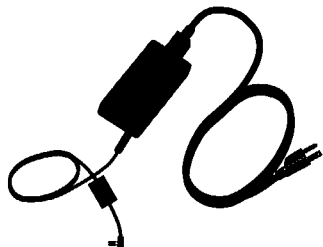


Figure 1-19

Both power adapters plug into the “DC IN” connection on the right side of the KLX 100. See figure 1-20.

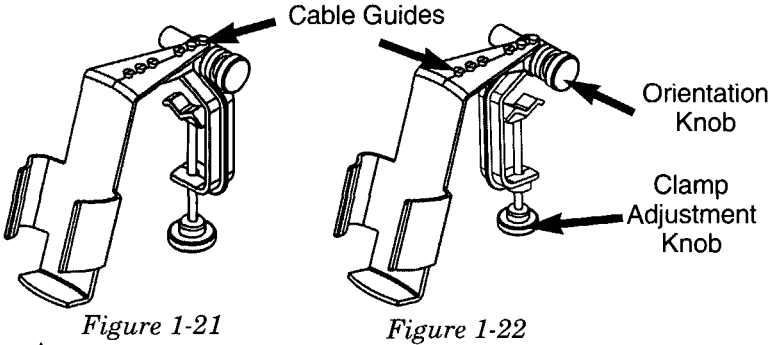


Figure 1-20



**WARNING:** Use of any other power adapters other than those specified here may damage the KLX 100 and void the warranty.

The yoke-mount adapter (figures 1-21 and 1-22) holds the KLX 100 in place on your aircraft's control yoke. The yoke-mount clamp may be rotated to attach to conventional control-yoke shafts (figure 1-21), or to attach to Raytheon/Beechcraft Baron and Bonanza control yokes or conventional control arms (figure 1-22). Order part number 071-00118-0000.



**To use the yoke-mount adapter:**

1. If it is necessary to change the direction of the clamp, completely loosen and remove the orientation knob, then mate up the appropriate sets of teeth so that the clamp opens to the left or right (for conventional yokes), or toward the instrument panel (for Baron and Bonanza yokes or conventional control arms). Re-tighten the orientation knob.
2. Loosen the clamp adjustment knob enough to slide the clamp over the control yoke shaft or arm.

**WARNING:** Make sure the yoke-mount adapter and the KLX 100 itself will not interfere with operation of the aircraft controls. Also, ensure that no primary flight instruments are obscured from view.

3. Tighten the clamp over the control yoke shaft or arm using the clamp adjustment knob.
4. The KLX 100 unit can most easily be inserted and removed from the top of the yoke-mount adapter (figure 1-23).

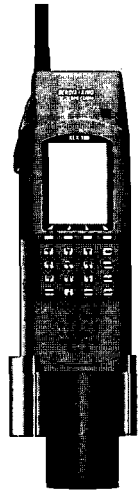


Figure 1-23

## System Description

5. It may be necessary to change the angle of the yoke-mount for viewing angle considerations. To do so, loosen the orientation knob and rotate the KLX 100 up or down, then re-tighten the orientation knob.
6. If desired, connect the aircraft/automobile power adapter, discussed earlier. The cable guides on top of the yoke-mount are designed so that you may weave the power cable between them, providing strain relief.

The PC Interface Cable (not shown) is used to connect the KLX 100 RS-232 port to an "IBM-compatible" personal computer so that the data base or software may be updated. See section 6.8. Order part number 050-03376-0000.

The aircraft antenna adapter with cable (figure 1-24) allows the KLX 100 to use an existing external aircraft COMM antenna. See chapter 4 of this Operator's Guide for more details. Order part number 071-01443-0001.

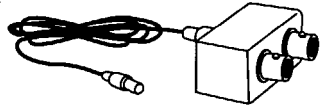


Figure 1-24

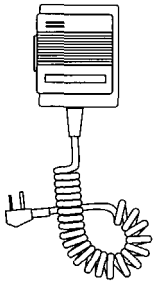


Figure 1-25

The clip-on speaker/microphone (figure 1-25) may be plugged into the speaker and microphone mini-jacks on top of the KLX 100 (figure 1-26) and provides a compact means of transmitting and receiving audio. A remote push to talk (PTT) switch is included with the speaker/mic. It is particularly useful if you have the KLX 100 attached to the yoke-mount adapter or some other mounting location, and wish to operate the COMM at the same time. Order part number 071-00092-0000.

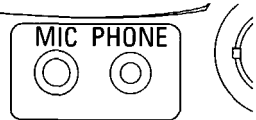


Figure 1-26

The earphone (figure 1-27) plugs into the 2.5 mm PHONE jack on top of the KLX 100. The earphone includes an ear loop, and the cord is 60 inches long. Impedance is 2000 $\Omega$ . Order part number 071-00039-0080.

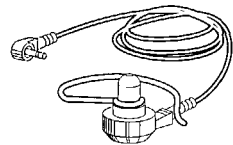


Figure 1-27

## 1.2. TECHNICAL SPECIFICATIONS

*Note:* Specifications are subject to change without notice.

### 1.2.1 GENERAL CHARACTERISTICS

<b>Compliance:</b>	FCC Part 87
<b>Dimensions:</b>	7.8 x 2.8 x 1.9" (19.8 x 7.1 x 4.8 cm)
<b>Weight:</b>	1.26 lbs. (.57 kg) (w/out batteries)
<b>Operating Temperature:</b>	-10°C to +55°C

### 1.2.2 VHF RECEIVER

<b>Frequency Range:</b>	108.000 to 136.975 MHz Aviation 161.650 to 163.275 MHz Weather
<b>Selectivity:</b>	6 dB bandwidth > 25 kHz 60 dB bandwidth < 100 kHz
<b>Sensitivity:</b>	AM: > 6 dB S+N/N at 2 $\mu$ V hard WX: > 12 dB SINAD at 2 $\mu$ V hard
<b>Adjacent Chan. Rejection:</b>	More than 35 dB down
<b>Channel Spacing:</b>	25 kHz (COMM), 50 kHz (NAV)
<b>Audio Power:</b>	> 300 mW into 8 $\Omega$
<b>Audio Distortion:</b>	< 15%

### 1.2.3 COMM TRANSMITTER

<b>Transmit Power:</b>	1.5 W typical (NiCads or fresh alkaline batteries)
<b>Sidetone Audio Power:</b>	300 mVrms into 600 $\Omega$
<b>Distortion:</b>	Total harmonic distortion < 15%
<b>Frequency Stability:</b>	+/- 300 Hz.
<b>Duty Cycle:</b>	No damage if continuously keyed
<b>Microphone:</b>	Internal electret or external mic

### 1.2.4 GPS RECEIVER

<b>Channels:</b>	8 Parallel
<b>Sensitivity (Acq &amp; Track):</b>	-133 dBm
<b>Pos'n Accuracy (Horiz.):</b>	25 meters RMS*
<b>Velocity Accuracy:</b>	+/- 0.2 meters/second
<b>Dynamics:</b>	800 knots, 3 Gs
<b>Update Rate:</b>	1 Hz
<b>Typical Acquisition Times:</b>	Total Signal Loss 10 seconds Warm Start 30 seconds Cold Start 90 seconds Self Locate 10 minutes

\* Horizontal accuracy is subject to 100 meters RMS degradation when Selective Availability (SA) is active. See Appendix G.



System Description

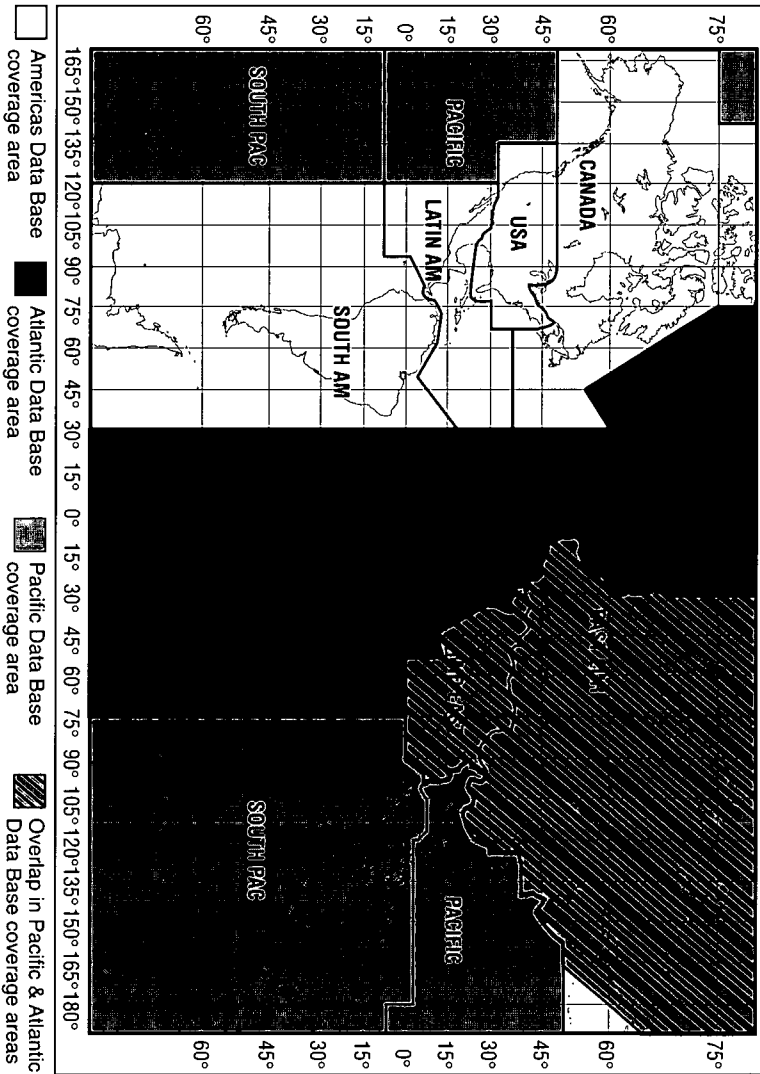


Figure 1-28 K LX 100 Data Base Geographical Regions

## 1.3. DATA BASE

### 1.3.1. DATA BASICS

The data base provides two primary functions. First, it makes pilot interface with the GPS sensor much easier. Rather than having to manually look up and then enter the latitude and longitude for a specific waypoint, it allows you to merely enter a simple waypoint identifier. The data base automatically looks up and displays the latitude and longitude associated with the identifier. It should be obvious that the data base saves a lot of tedious latitude/longitude entry and also greatly reduces the potential for data input mistakes.

The second function of the data base is that it serves as a very convenient means to store and easily access aeronautical information. Want to know the name of the airport, the nearest city to the airport, or the airport altitude? Just unleash the power of the KLX 100 and display the information right on the screen.

### 1.3.2. DATA BASE CONTENTS AND COVERAGE AREAS

There are three data base coverage areas available for the KLX 100. They are referred to as the "Americas" data base, the "Atlantic" data base, and the "Pacific" data base.

The International Civil Aviation Organization (ICAO) and Aeronautical Radio, Inc. (ARINC) break the world into the ten geographic regions shown in figure 1-28.

The following is a listing of the KLX 100 data base contents:

#### **AIRPORTS**

Identifier

Name

City, State or Country

Latitude and Longitude

Elevation

Runway numbers, lighting, length, surface, and diagram

Radar environment indicator

Communication frequencies

## System Description

**VORs**

Identifier

Name

Frequency

Latitude and Longitude

**NDBs**

Identifier

Frequency

Latitude and Longitude

**INTERSECTIONS** (low altitude, high altitude, SID/STAR, approach, and outer markers)

Identifier

Latitude and Longitude

**500 USER DEFINED WAYPOINTS**

Identifier

Remarks

Latitude and Longitude

**MISCELLANEOUS**

Special Use Airspace boundaries (Prohibited, Restricted, Warning, Alert, MOA, TRSA, Class B, Class C, CTA, TMA)

Minimum Safe Altitudes (MSAs)

Magnetic variation (between 60°S latitude and 74°N latitude)

Air Route Traffic Control Center (ARTCC and FIR) frequencies

Flight Service Stations (location of points of communication and associated frequencies)

Weather Station frequencies (for U.S.A. and its territories (except Hawaii), and Canada only)

### 1.3.3. ICAO IDENTIFIERS

Waypoints are stored in the KLX 100 data base almost exclusively by their ICAO identifiers. ICAO (International Civil Aviation Organization) is an internationally accepted reference for the data. In almost all cases the proper ICAO identifiers may be taken directly from Jeppesen Sanderson or government aeronautical charts.

Airport identifiers in the contiguous United States, Alaska, and Canada are special cases in the ICAO system. Many airport identifiers for these areas have four letters beginning with a prefix letter that corresponds to the geographic area in which it is located. The prefix letter for the contiguous U.S. is "K". Thus, the identifier for Dallas/Fort Worth International Airport is KDFW, not DFW (which would be identical to the VOR identifier). Likewise, the identifier for Orlando Executive Airport is KORL while the VOR identifier is ORL. The prefix letter for Canada is "C" and for Alaska is "P".

Not all airport identifiers receive the prefix letter. Airport identifiers which are combinations of letters and numbers do not apply to the prefix rule. Examples of airport identifiers not using the prefix are 3C2, 7TX6, and M33.

***So remember, if you are entering or looking for an airport identifier that is all letters (no numbers) then it will begin with a "K" prefix in the contiguous U.S., a "P" in Alaska (in some cases), or a "C" in Canada. If there are numbers in the identifier then a prefix is not used. For other areas of the world the airport identifier stored in the KLX 100 data base is identical to how it is charted.***

### 1.3.4. UPDATING THE DATA BASE

The information stored in the data base would eventually become obsolete if there wasn't some means to update it. For example, new airports open, nav aids can move or change frequency, communication frequencies can change, and on and on.

The data base is updated by means of a 3.5-inch diskette supplied by AlliedSignal and an IBM-compatible personal computer. The diskettes are not returned to AlliedSignal.

Every 28 days, AlliedSignal receives new NavData™ information from Jeppesen Sanderson. This information is processed and

## System Description

downloaded onto diskettes. AlliedSignal makes the update service available to you in a choice of several subscription or random update programs. See section 1.3.6 for details on these programs.

In order to use the update program you must have access to a computer having a disk drive capable of utilizing 3.5-inch 1.44 megabyte high density diskettes. This computer also needs to have an available COM1 or COM2 serial port.



**NOTE:** *The diskettes sent to you can only be used to update one KLX 100, although they can update that specific unit numerous times. The first time the diskettes are used in an update operation, a unique identification code from the KLX 100 being used is uploaded to the diskettes. These diskettes may be used in this specific KLX 100 an unlimited number of times which could be required if you switch back and forth between data base regions during one update cycle. These diskettes may not, however, be used to update other KLX 100s. This update protection ensures that Jeppesen Sanderson is properly compensated for the use of their NavData™.*

The published data base update procedure is described in section 6.8, "I/O Setup page".

### **1.3.5. USER DEFINED DATA BASE**

In addition to the published data base of airports and VORs stored in the Jeppesen data base, you may create up to 500 other user-defined waypoints. Section 2.6, "Creating User-defined waypoints" describes this further.

### **1.3.6. DATA BASE UPDATE SERVICE OPTIONS**

The following tear-out page can be used for ordering data base update services from AlliedSignal. The forms may be mailed or FAXed for your convenience.

## 2. KEYS TO SUCCESS

This chapter will introduce you to the KLX 100 function keys on the front keypad, as well as some of the fundamental operational features like the Title Bar and the Course Deviation Indicator (CDI).

### 2.1. THE **PAGE** KEY--CHANGING PAGES

KLX 100 has four primary page types: Navigation (**NAV**), Communication (**COM**), Flight Plan (**FPL**), and Menu (**MENU**). The **PAGE** key is used to change between these four page types. There are a number of other miscellaneous pages, like the Nearest (**NRST**) page and the Save (**SAVE**) page, but are used only in special circumstances. Within the four primary page types, there are several individual pages. For example, the **NAV** page type includes four pages, known as NAV 1, NAV 2, NAV 3, and NAV 4. Here is a list of the primary pages and a brief description of their functions:

#### Navigation (NAV)

<b>NAV 1</b>	Moving map
<b>NAV 2</b>	"Mini-HSI" and navigation data
<b>NAV 3</b>	Position and altitude summary
<b>NAV 4</b>	Waypoint library

#### Communication (COM)

<b>COM 1</b>	Flip-flop and duplex COMM tuning
<b>COM 2</b>	QuickTune® frequency selection, memory channels
<b>COM 3</b>	COMM scanning

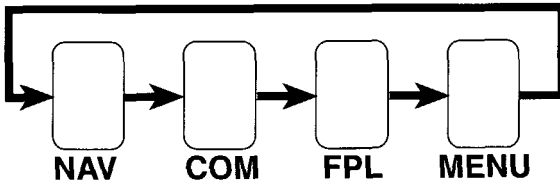
#### Flight Plan (FPL)

<b>FPLS</b>	Directory of flight plans
<b>FPL 0</b>	Active flight plan
<b>FPL 1-29</b>	Stored flight plans

**Menu**

<b>MENU</b>	Main Menu
<b>STAT</b>	GPS signal status
<b>INIT</b>	GPS mode, time, and position initialization
<b>NAV</b>	Navigation setup
<b>OPER</b>	Operation setup
<b>MAP</b>	Moving map setup
<b>SOS</b>	SOS Beacon setup
<b>I/O</b>	Input/Output setup
<b>WARN</b>	Warning Ring setup
<b>SUA</b>	SUA setup
<b>WYPT</b>	User waypoints
<b>CALC</b>	Calculator Menu

The **[PAGE]** key changes between the four primary page types. Figure 2-1 illustrates how the **[PAGE]** key cycles through the four types.





*Figure 2-1*

There is never a time when the **[PAGE]** key doesn't work (that is, unless the KLX 100 is turned off). No matter how deep you get in to an operation, you can always get out of it by pressing the **[PAGE]** key. If you are on a page like the Nearest page, the Help page, or the Direct-to page, pressing **[PAGE]** always takes you immediately back to the page you were on before you started the operation.

When the **[PAGE]** key is used to change page types, you will usually go back to the last page of that type that you looked at (The exception is the **MENU** pages; in this case, the **[PAGE]** key always takes you back to the Main Menu page). For example, suppose you were viewing the moving map page (NAV 1), and decided to do a COMM scan on the COM 3 page (by pressing the **[PAGE]** key). At this point, you could press **[PAGE]**, **[PAGE]**, **[PAGE]** to go back to the NAV 1 page. You could then press **[PAGE]** once more and the COM 3 page would be displayed again.

## 2.2. THE SOFTKEYS

The four unlabeled keys directly below the KLX 100's LCD display are known as "softkeys". Softkeys are multi-purpose, in that their functions change depending on the page which is displayed and the operation you are doing. Each of the screen illustrations in this Operator's Guide includes the row of softkeys. If the procedure calls for pressing a particular softkey, that softkey is blackened in for better understanding.

When the cursor is off (see section 2.3 later), the NAV, COM, and FPL pages are displayed with **-NAV+**, **-COM+**, and **-FPL+**, respectively, over the middle two softkeys (see figure 2-2). pressing the  softkey increases the page number (i.e. goes from NAV 1 to NAV 2, see figure 2-3), while pressing the  softkey decreases the page number (i.e. goes from COM 3 to COM 2).

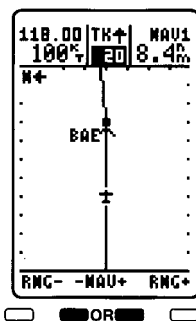






Figure 2-2



Figure 2-3

When the cursor is on (again, see section 2.3) and there is more than one cursor field on the screen, the , ,  or  softkeys may be used to move the cursor from one place to another (only two of the four will be displayed at any one time, either up/down or left/right) (figure 2-4).

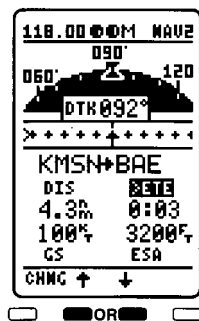


Figure 2-4



### 2.3. THE CRSR KEY--CURSOR OPERATION

The cursor is an area of reverse video (light characters on a dark background) on the screen. Many pages allow you to add, delete, or change data on the screen by first pressing the CRSR key to turn the cursor function on and bring the cursor on the screen. The phonepad keys and softkeys are then used to enter or change data. In figure 2-5, the cursor is over **KLAM**.

There are times when the cursor is flashing. Figure 2-6 shows an example of how "whiskers" are used in this Operator's Guide to depict a flashing cursor (over **DELETE?**).

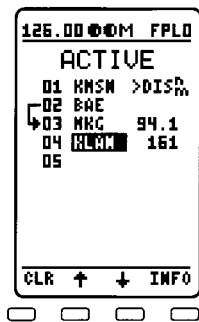


Figure 2-5

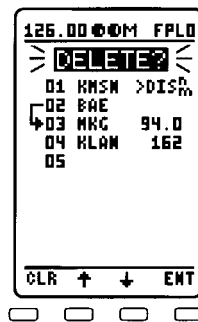


Figure 2-6

Sometimes when you complete an operation, the cursor is automatically removed from the screen. Other times, you will have to press the CRSR key again to turn the cursor off.

Here are some important things to remember about KLX 100 cursor operation.

1. To enter data on a KLX 100 page, the cursor has to be on. Sometimes when you access a page, the cursor is automatically turned on (for example, the Direct To page).
2. The cursor must be off to change page numbers within a main page type (i.e. to change from the COM 2 to COM 3 page).
3. For a given page, the softkeys will usually perform different functions with the cursor on (refer to figure 2-5), as opposed to with the cursor off (figure 2-7).
4. The cursor must be off to change the Title Bar active COMM frequency directly from any page (see section 2.4).

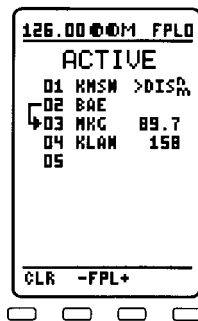


Figure 2-7

## 2.4 THE TITLE BAR

The Title Bar is the information across the top line of the KLX 100 screen (figure 2-8). The Title Bar shows:

- The active COMM frequency.
- If the COMM is scanning.
- The COMM volume and squelch levels.
- If the COMM is transmitting or receiving.
- If there are any messages or not.
- If the LCD display backlighting is on.
- The current page name and number.

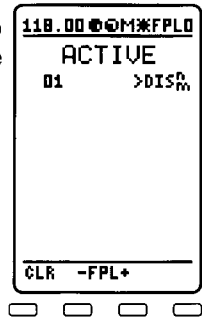


Figure 2-8

The active COMM frequency is shown in the very top left corner of the screen. If you are currently performing a scanning operation with the COMM (see section 4.3), this area displays **SCAN** when it is looking for a channel with activity and, when it finds one, it displays the frequency of that channel.



### *To tune a COMM frequency directly on the Title Bar:*

1. Make sure the cursor is not on the screen. If the cursor is on, press the **GRSR** key to turn it off.
2. Press the **ABC** key to initiate frequency entry (figure 2-9).
3. Press the **DEF**, **GHI**, **JKL**, and **MNO** keys to complete the frequency (figure 2-10). If you decide not to change the tuned frequency after all, you may press the **CLR** softkey to cancel the operation. If you wish to move the cursor forward or backward to correct an entry error, you may use the **←** and **→** softkeys.

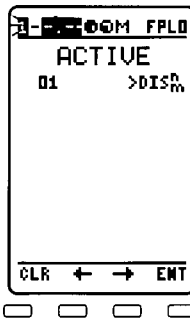


Figure 2-9

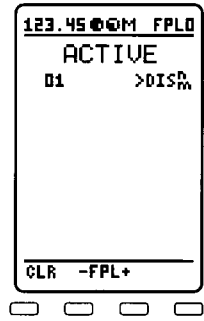


Figure 2-10

If your KLX 100 has a valid Americas data base, you may also tune any one of 10 VHF weather channels. The frequencies corresponding to these 10 channels are listed in section 4.1, "The COM 1 Page". In addition to aviation channels, you may also tune a weather channel on the Title Bar.



**To tune a weather channel directly on the Title Bar:**

1. Make sure the cursor is not on the screen. If the cursor is on, press the **[CRSR]** key to turn it off.
2. Press the **[WX 8]** key to initiate weather channel entry (figure 2-11). When you do this, the KLX 100 searches the data base to find the nearest weather transmitter, and puts the channel number for that transmitter in the window. In this case, the nearest transmitter uses channel 1 (**WX 01**).

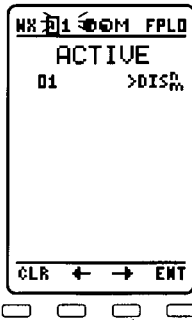


Figure 2-11

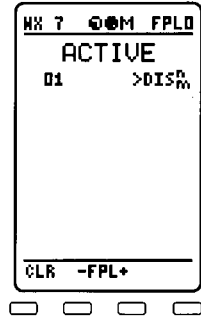


Figure 2-12

3. If you wish to accept the nearest channel, simply press the **[ENT]** softkey. Otherwise, press the phonepad key (like **[STU 7]**) for the weather channel you want (figure 2-12). If you decide not to change the tuned frequency after all, you may press the **[CLR]** softkey to cancel the operation.

During normal operation, there are two “pie graphs” at the top of the KLX 100 display (refer to figure 2-12). The pie graph on the left shows the volume level and the pie graph on the right shows the squelch level. The more the pie is filled in, the higher the level. In figure 2-12, the volume is adjusted to a low level, and the squelch is adjusted to a high level.

When the volume or squelch rocker switches on the left side of the KLX 100 are pressed, the Title Bar changes so that two “bar graphs” are displayed, volume on top and squelch below (figure 2-13). The bar graphs give you a more precise idea of how much you are adjusting the volume or squelch. A few seconds after you cease adjustments, the display changes back to the pie graphs.

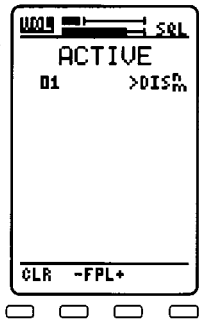


Figure 2-13

When you are transmitting, the letters **TX** appear in reverse video in place of the volume

and squelch indicators (figure 2-14). Also, the letters **RX** appear if the KLX 100 COMM is receiving audio which breaks the squelch. If the SOS Beacon is transmitting an SOS message on the emergency frequency, the Title Bar appears as in figure 2-15. Remember that the SOS Beacon feature is for emergency use only.

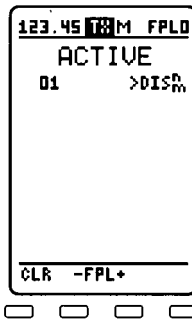


Figure 2-14

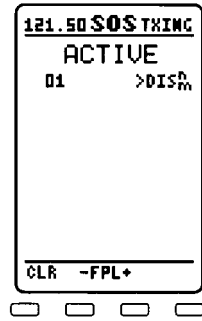


Figure 2-15

When there is a new message, the Title Bar will flash **MSG PRESS HELP** (figure 2-16). If the message is one that remains after you have viewed it, there will be an **M** to the right of the volume and squelch pie graphs (figure 2-17). See section 2.7.2 for more information on messages.

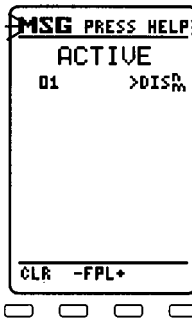


Figure 2-16

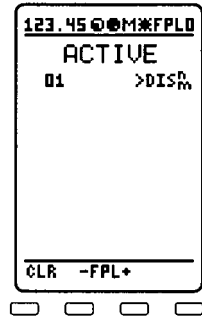





Figure 2-17

When the LCD display backlight is on, a "light" icon appears on the Title Bar (figure 2-17). When you first turn the KLX 100 on, the display backlight is initially off.



**To turn on the display backlight:**

1. Press the  button once. The backlight will turn on to its brightest level.
2. If you desire a lower backlighting level, press the  button again.
3. To turn the backlighting off, press the  button while the backlighting is on the lower level.

If you don't press any keys for a certain length of time, the display backlight will turn off ("time out"), to conserve battery life. If the display is timed out, pressing any key will turn the backlight on once again. This backlight time out is adjustable on the Operation Setup page under the Main Menu (see section 6.5).

## 2.5. THE KEY--GOING DIRECT TO






The  key is used to initiate Direct To operation (navigation from your present position directly to a destination). When  is pressed, the Direct To page will be displayed with the cursor over a waypoint identifier (figure 2-18) with a page of information about that waypoint. The waypoint identifier which appears on the Direct To page is chosen by the KLX 100 according to the following rules:




Figure 2-18

1. In most cases, if you are on a KLX 100 page, and the cursor is highlighting a waypoint identifier when  is pressed, that waypoint identifier will appear on the Direct To page.
2. If you are on the NAV 4 (Waypoint) page when  is pressed, the Direct To page will contain the identifier of that waypoint will appear on the Direct To page.

If neither of the conditions above are occurring, then:

3. When  is pressed, the waypoint identifier for the active waypoint will be displayed.

If there is no active waypoint when  is pressed, then:

4. The Direct To page displays blanks where the waypoint identifier would normally be (figure 2-19). In order for there not to be an active waypoint, there is no Direct To waypoint and there are no waypoints in the active flight plan (FPL 0).

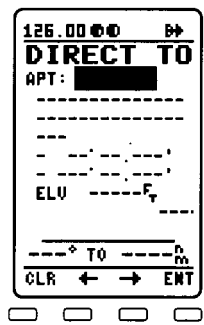


Figure 2-19

**2.5.1. INITIATING A DIRECT TO**

Now that you know the ground rules, let's go ahead and try some practical examples. First, let's say we wanted to fly directly to Wittman Regional Airport in Oshkosh, Wisconsin. Its ICAO identifier (see section 1.3.3) is **KOSH**.



**To go Direct To a waypoint (by entering the identifier):**

1. Press the **[D]** key. The Direct To page is displayed (figure 2-20). The cursor will already be on. A waypoint identifier may or may not be displayed; it doesn't matter at this point.

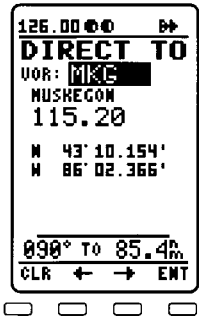


Figure 2-20



Figure 2-21

2. Press the keypad key which contains the first letter of the identifier. Remember to enter the "K", "C", or "P" prefix for certain airports in North America, if required (see section 1.3.3, "ICAO Identifiers"). In this case, press the **[J]** key (figure 2-21).

3. The four softkeys will each show a character above them (**J, K, L, 4**). Press the softkey below **K**. The cursor automatically moves to the second character in the identifier (figure 2-22). If you need to manually move the cursor left or right, use the **[←]** and **[→]** softkeys.

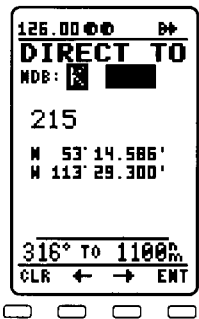


Figure 2-22

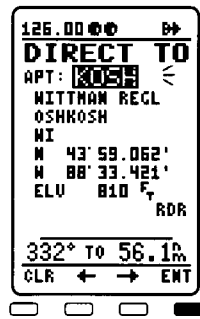


Figure 2-23

4. Repeat steps 2 and 3 to select the characters **O, S, and H**, so that **KOSH** is the displayed identifier. Notice that a bushel of airport information is displayed so you can verify entry of the desired waypoint (figure 2-23).

- If you wish to accept this waypoint as the Direct To waypoint, press the **ENT** softkey. If you made a mistake and want to start over, you can press the **CLR** softkey to completely erase the entered identifier, or you may use the **←** softkey to move the cursor back to the beginning of the identifier.



**To go Direct To a waypoint (by first selecting its waypoint page):**

- Select the desired NAV 4 waypoint page on the screen (figure 2-24) using the procedures described in section 3.4.
- Press the **⊕** key. The Direct To page is displayed and it contains the desired waypoint identifier (figure 2-25).
- Press the **ENT** softkey. You are on your way!

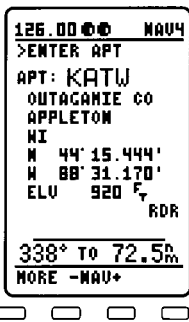


Figure 2-24



Figure 2-25

Remember that you can also use the above procedure if you go to a page (including the FPL 0 page), and highlight a waypoint identifier with the cursor, then press the **⊕** key.

If you get off-course and wish to recenter the left/right deviation bar (D-bar) to proceed to the same waypoint, use the following procedure.



**To recenter the D-bar by going Direct To the active waypoint:**

1. Select a page other than the waypoint (NAV 4) page. Also, make sure the cursor is not on a waypoint identifier.
2. Press the **[D]** key. The Direct To page is displayed and it contains the active waypoint identifier.
3. Press the **ENT** softkey.

**2.5.2. CANCELING A DIRECT TO**

The primary reason for wanting to cancel Direct To operation is to return to flight plan operation which is described later in section 5.2.4, "Combining Direct To and Flight Plan Operation".



**To cancel Direct To operation:**

1. Press the **[D]** key. The Direct To page is displayed.
2. Press the **CLR** softkey to blank out the waypoint identifier (figure 2-26).
3. Press the **ENT** softkey. If there are two or more waypoints in FPL 0, the active flight plan, you will resume flight plan operation. Otherwise, KLX 100 navigation will be flagged.

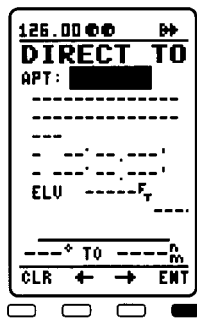


Figure 2-26

**2.5.3. WAYPOINT ALERTING FOR DIRECT TO OPERATION**

Approximately 36 seconds prior to reaching a Direct To waypoint, the arrow preceding the waypoint identifier on the waypoint page for the active waypoint will begin flashing. The arrow will also be flashing on any page displaying the active waypoint identifier. This is called "waypoint alerting".



## 2.6. THE **SAVE** KEY--STORING USER WAYPOINTS

You may create and store up to 500 user-defined waypoints using the **SAVE** key and **SAVE** page. These waypoints will be very helpful to you. One major application is private-use airstrips, which are not included in the Jeppesen data base. They are also handy for points which you fly over frequently, and wish to navigate to. For example, a crop sprayer would want to store the locations of the fields he or she dusts often.

There are three ways to save a user-defined waypoint. The first (and simplest) is to store your present position. If you happen to know the latitude and longitude of the point, that is another option. The waypoint can also be defined as a radial and distance from another waypoint.



**NOTE:** To edit an existing user-defined waypoint or to delete a user-defined waypoint that is no longer needed, use the User Waypoints page under the Main Menu. See section 6.11, "User Waypoints Page".

### 2.6.1. CREATING A WAYPOINT AT YOUR PRESENT POSITION

Creating a waypoint at your present position is the simplest possible way to create a user-defined waypoint, with as few as two keypresses. This is nice for "remembering" a location, such as a private airstrip; we'll call it **PVTAP**.



**To create a user-defined waypoint at your present position:**

1. When you are at the location you want to store a waypoint, press the **SAVE** key. KLX 100 will record the position and time at the instant you press **SAVE**. The **SAVE** page is displayed with a name between **SV000** and **SV499**, depending on which is the first available number (figure 2-27).

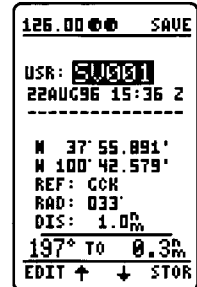


Figure 2-27

2. If you wish to accept the default name, press the **STOR** softkey now. The default name allows you to store multiple user-defined waypoints quickly.

3. If you wish to change the name of the waypoint, enter a **P** by pressing the **PBR** key (figure 2-28) followed by the **P** softkey.

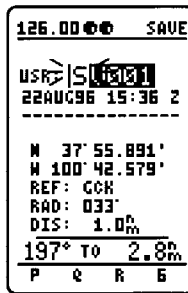


Figure 2-28

4. Repeat step 4 for the remainder of the characters in the identifier (figure 2-29), and press the **ENT** softkey. If at any time you wish to move the cursor around, use the **←** and **→** softkeys to do so. You may also press the **CLR** softkey to erase your entry.

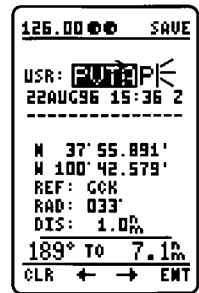


Figure 2-29

5. The default comment is the date and time (in Universal Coordinated Time or Zulu). If you wish to change the comment, see section 2.6.4 later.

6. Press the **STOR** softkey to store the new user-defined waypoint. The screen will return to the page you were on when you pressed the **SAVE** key.

### 2.6.2. CREATING A WAYPOINT USING LATITUDE/ LONGITUDE

It is also possible to create a user-defined waypoint by manually entering a latitude and longitude. Let's say you wanted to create a user waypoint over a farm at N 42°56.321', W 76°29.956'



**To create a user-defined waypoint with latitude/longitude:**

1. Press the **SAVE** key. The **SAVE** page is displayed with a name between **SV000** and **SV499**, depending on which is the first available number.
2. If you wish to accept the default name, skip to step 6.
3. To enter an **F**, press the **DEF** key followed by the **F** softkey.
4. Repeat step 4 for the remainder of the characters in the identifier (figure 2-30), and press the **ENT** softkey. If at any time you wish to move the cursor around, use the **←** and **→** softkeys to do so. You may also press the **CLR** softkey to erase your entry.
5. The default comment is the date and time (in Universal Coordinated Time or Zulu). If you wish to change the comment, see section 2.6.4 later.

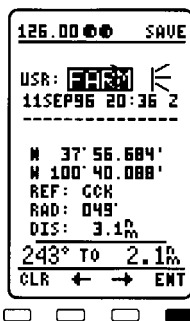


Figure 2-30

6. Use the **↑** softkey to move the cursor to the latitude field (figure 2-31).
7. Press the **MNU** key to select **N** for north or press the **7** key to select **S** for south (figure 2-32).

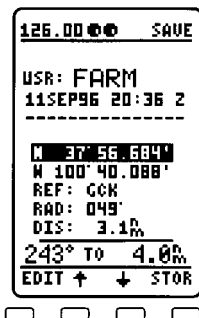


Figure 2-31

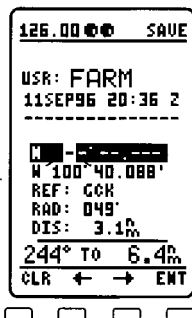


Figure 2-32

8. Use the phonepad keys to select the proper numbers to complete the latitude entry (figure 2-33).
9. Press **ENT**. The cursor will move to the longitude field.
10. Press the **DEF** key to select **E** for east or press the **VWX** key to select **W** for west (figure 2-34).

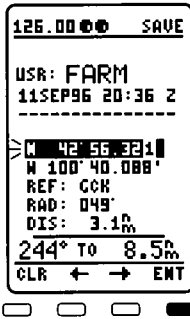


Figure 2-33

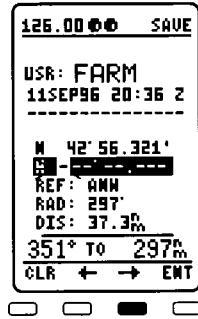


Figure 2-34

11. Use the phonepad keys to select the proper numbers to complete the longitude entry.
12. Press **ENT** to approve this position (figure 2-35). Press **CRSR** to turn off the cursor. The reference waypoint is updated to the nearest VOR to that position, and the radial and distance are displayed.

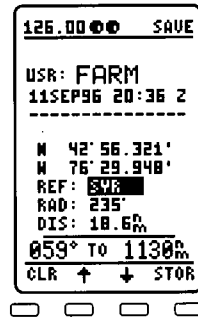


Figure 2-35

### 2.6.3. CREATING A WAYPOINT REFERENCED FROM ANOTHER WAYPOINT

The third method of creating a user-defined waypoint is as a radial and distance from a known waypoint.



**To create a user-defined waypoint using the radial/distance method:**

1. Press the **[SAVE]** key. The **SAVE** page is displayed with a name between **SV000** and **SV499**, depending on which is the first available number.
2. If you wish to accept the default name, skip to step 6.
3. To enter an **A**, press the **[ABC]** key followed by the **A** softkey.
4. Repeat step 4 for the remainder of the characters in the identifier (figure 2-36), and press the **[ENT]** softkey. If at any time you wish to move the cursor around, use the **[←]** and **[→]** softkeys to do so. You may also press the **[CLR]** softkey to erase your entry.
5. The default comment is the date and time (in Universal Coordinated Time or Zulu). If you wish to change the comment, see section 2.6.4 later.
6. Use the **[↑]** softkey to move the cursor to the **REF** field (figure 2-37).
7. Use the phonepad keys (as in step 4) to select the identifier of the desired reference waypoint (figure 2-38), and press **[ENT]**.

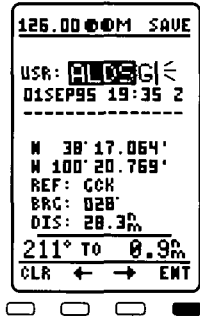


Figure 2-36

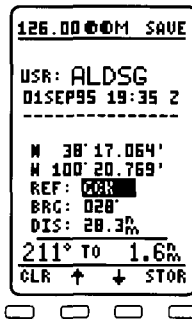


Figure 2-37

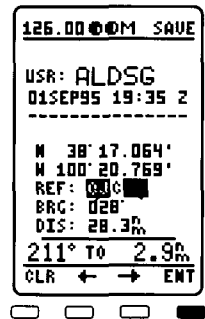


Figure 2-38

8. Use the phonepad keys to select the desired radial (figure 2-39).
9. Press **ENT** to approve the radial. The cursor will move to line 4.
10. Use the phonepad keys to select the desired distance from the reference waypoint.



Figure 2-39

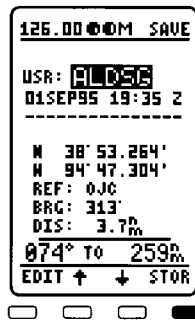


Figure 2-40

11. Press **ENT** to approve the distance (figure 2-40). The latitude and longitude are updated to match the data you have entered.

### 2.6.4. USER-DEFINED WAYPOINT COMMENTS

The **SAVE** page has room for a comment with two lines of 15 characters. As mentioned in the above procedure, the default comment for a user-defined waypoint is a date and time stamp on the first line (figure 2-31). This may be used as an aid in remembering what the waypoint was for by knowing when you created it. However, in many instances, you will want to change the comment. Another option is to keep the date/time stamp, and add a comment on the second line.



#### *To add a user-defined waypoint comment:*

1. This procedure will always be done in the midst of one of the three waypoint creation procedures discussed above. Use the **↑** and **↓** softkeys to move the cursor to the comment field (figure 2-41).

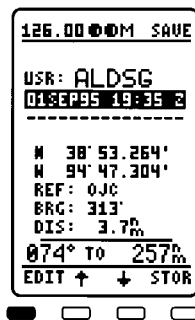


Figure 2-41

2. Press the **ENT** softkey and use the phonepad keys and the proper softkeys to select characters. As you select characters, the cursor will move over one space. Use the **←** and **→** softkeys to manually move the cursor (including to leave a blank space (figure 2-42)).
3. When you have completed the first line of the comment, press the **ENT** softkey.
4. If you wish to edit the second line of the comment, repeat steps 2 and 3.

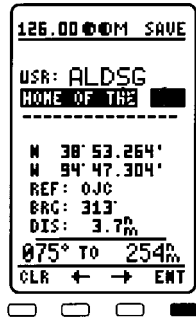


Figure 2-42

## 2.7. THE **NRST** KEY--NEAREST WAYPOINTS AND SUA

The **NRST** key is used to view the nine nearest airports, VORs, NDBs, intersections, and user waypoints, as well as the five nearest areas of special use airspace (SUA) to your present position.

### 2.7.1. NEAREST AIRPORTS

Knowing the nearest airports is a good safeguard in case of emergencies, where you need to know the nearest potential landing site, and it is also handy just for information's sake as you're flying along.



*To view the nearest airports:*

1. Press the **NRST** key to display the nearest waypoints page (figure 2-43). Press the **↓** or **↑** softkeys to select **APT?** and press **ENT**. A new page comes on the screen (figure 2-44), initially displaying the five nearest airports.

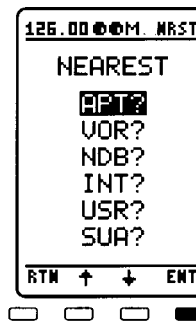


Figure 2-43

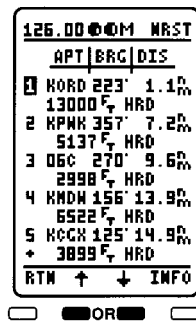


Figure 2-44

- You may press the **↑** and **↓** softkeys to move up and down the list. If you move down past **5**, the display will scroll to the sixth nearest, seventh nearest, etc.

For each nearest airport, the following information is displayed:

- The ICAO identifier of the airport (see section 1.3.3).
- The magnetic bearing from your present position to the airport.
- The distance from your present position to the airport, using the selected units.
- The length of the airport's longest runway, using the selected units.
- The surface of the airport's longest runway (runway surface abbreviations are listed in section 3.4).

The nearest airports which are displayed are those which meet the runway length and surface requirements on the **NAV SETUP** page (see section 6.4.2). These runway requirements are a minimum runway length and surface the airport must have before it can be included on the list. This allows you to "weed out" airports where you can't land your aircraft.

- Once you have selected an airport from the nearest list (using the **↑** and **↓** softkeys), there are two things you can do:
  - You may press the **INFO** softkey to see the waypoint page for that airport, which will include the full name, city, state or country, and elevation, among other things (figure 2-45). From here, you may press the **MORE** softkey to see a listing of the airport's runways and COMM frequencies. If you don't wish to see the runways or COMM frequencies, press the **RTN** softkey to go back to the nearest list.
  - You may press the **⊕** key to initiate a Direct To the selected waypoint (see section 2.5.1).



Figure 2-45



### 2.7.2. NEAREST VORS, NDBS, INTERSECTIONS, AND USER WAYPOINTS

The other nearest waypoints are displayed in much the same way as the nearest airports. After pressing the **NRST** key, simply select **VOR?**, **NDB?**, **INT?**, or **USR?** and the corresponding nearest waypoint list will be displayed. For example, by pressing **NRST**, then selecting **VOR?**, a page such as is shown in figure 2-46 is displayed.

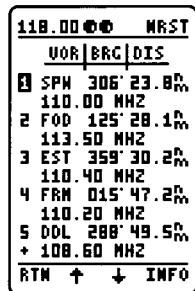


Figure 2-46

The format is similar to the nearest airport page, in that the identifier, and bearing and distance to the waypoint from your present position are displayed. In the case of VORs and NDBs, the frequency of the navaid is also displayed.

### 2.7.3. NEAREST SPECIAL USE AIRSPACE

The KLV 100 data base stores the locations of areas of special use airspace (SUA). The types of SUA areas stored in the data base and the abbreviations used to denote these areas are the following:

Class B Airspace	<b>CL B</b>
Class C Airspace	<b>CL C</b>
Control Area (used outside USA)	<b>CTA</b>
Terminal Area (used outside USA)	<b>TMA</b>
Military Operations Area	<b>MOA</b>
Training Area	<b>TRNG</b>
Warning Area	<b>WARN</b>
Caution Area	<b>CAUT</b>
Alert Area	<b>ALRT</b>
Danger Area	<b>DNGR</b>
Prohibited Area	<b>PROH</b>
Restricted Area	<b>REST</b>
Terminal Radar Service Area	<b>TRSA</b>

The nearest SUA feature is constantly keeping track of the five nearest areas of SUA. Pressing the **[NRST]** key and selecting the SUA option will initially display the three nearest SUAs to your location (figure 2-47), including those for which you are inside the lateral limits. Only those types selected on the SUA Setup page will be shown (see section 6.10).

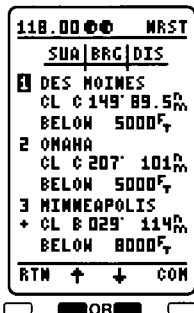


Figure 2-47

For each SUA, the KLX 100 displays the following information:

- The name of the special use airspace area.
- The SUA type (see the list of abbreviations above, Des Moines is a Class C airspace).
- The bearing and distance from the present position to the nearest point on the border of the SUA, or if the aircraft is inside the lateral limits of the SUA, the second line will read **INSIDE**. If you are above or below the SUA, as indicated by the GPS altitude, it will display **ABOVE** or **BELOW**, respectively.
- The altitude limits of the SUA.

To view and select the other SUAs in the nearest list, use the **↑** and **↓** softkeys. The screen will scroll to show you the remaining airspaces.

Class B and Class C airspaces often have ATC frequencies associated with the central airport there. When this is the case, the COM softkey will be on the screen (refer to figure 2-47). Press the COM softkey to display the frequencies for the central airport (figure 2-48).

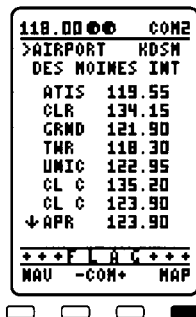


Figure 2-48

**i** **NOTE:** The KLX 100 displays the five nearest SUAs regardless of your present altitude and the altitude limits of the SUA. For instance, it will include SUAs specified as "BELOW 8000 FT" even if you are cruising at 10,000 feet.

## 2.8. THE **HELP** KEY--HELP AND MESSAGES

The **HELP** key has two functions. Not only is it used to access the on-line help functions of the KLX 100, but it is also used to see messages which the KLX 100 needs to communicate to you.

### 2.8.1. ON-LINE HELP

The KLX 100 on-line help is a first among aviation handheld GPSs. This handy help feature has two major parts: Context-sensitive Help and the Help Index.

Context-sensitive Help means that when you are on a certain page (let's say the Operation Setup page) and press the **HELP** key, you will get help information about that specific page (figure 2-49). No matter what page you are on, you can always get a help screen about your specific situation.

The four softkeys are **RTN**, **IDX**, **MORE**, and **MSG**. The **RTN** softkey takes you back to the page you were on when you pressed the **HELP** key, and the **MSG** softkey changes the display to the Message Page (see section 2.8.2).

Each help topic has from one to three pages of information (text and some have graphics). If there is only one page of help, the **MORE** softkey will not be on the screen (figure 2-50). If there are multiple pages, read the first page, and then press the **MORE** softkey. When you get to the last of the help pages, the **TOP** softkey will replace the **MORE** softkey. Press **TOP** to go to the first page of help information.

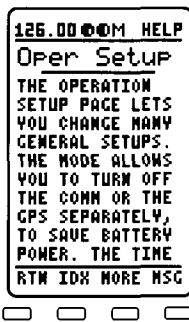


Figure 2-49

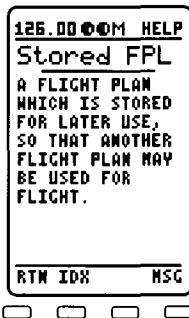


Figure 2-50

You may be saying, "This Context-sensitive Help is all fine and dandy, but suppose I want to know about a page other than the one I was on, or better yet, a general topic not relating to any specific page?" The Help Index is for you. From any help information screen, press the **IDX** softkey to view the Help Index.

The Help Index (figure 2-51) is an alphabetical list of more than 100 topics. Some of the topics are the same as for the Context-sensitive Help. Some help topic names are reworded, so you can find what you're looking for under multiple listings.

To go through the Help Index topics one by one, press the **↑** and **↓** softkeys. If you want to skip ahead to a certain letter, press the phonepad key which contains that letter. For example, if you wanted to skip ahead to the topics starting with the letter I, you would press the **GHI** key. Since the **GHI** key includes G, H and I, this will take you to the beginning of the G topics (figure 2-52). It only takes a couple of **↓** presses to get you to the I topics.

Once you have settled on a help topic you'd like to know more about (figure 2-53), press the **ENT** softkey to see the help information page (figure 2-54). This looks and operates just like a Context-sensitive Help page.

When you have finished reading all pages of this help topic, you may press the **IDX** softkey to go back to the Help Index, or you may press the **RTN** softkey to exit the help functions.

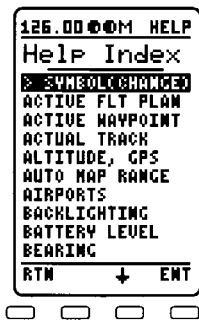


Figure 2-51



Figure 2-51



Figure 2-51

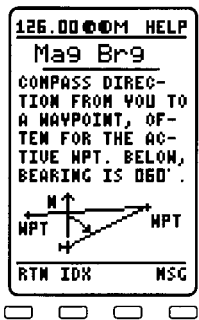


Figure 2-54

2.8.2. THE MESSAGE PAGE

Whenever the KLX 100 wants to get your attention, the words "MSG PRESS HELP" flash on the title bar across the top of the KLX 100 screen (figure 2-55). You should view the message at your earliest opportunity because the unit may be alerting you to some situation of immediate concern to its condition or to your flight. A description of each possible message is included in Appendix B of this Operator's Guide.

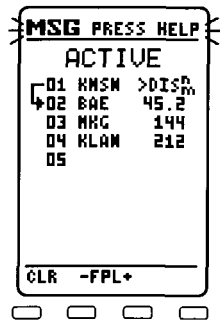


Figure 2-55



To view a message:

1. Press the **HELP** key. When there is a new message, pressing the **HELP** key takes you directly to the Message page (figure 2-56).

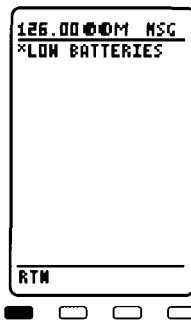


Figure 2-56

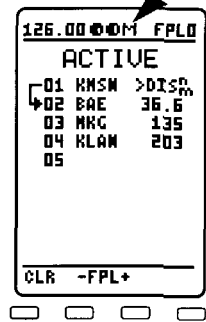


Figure 2-57



**NOTE:** It is possible that several messages are displayed at one time on the Message page. The newest message appears first and the rest in reverse chronological order.

2. After reading the message, press the **RTN** softkey to return to the page previously in view. If a message condition exists which requires a specific action by you, an **M** will appear on the title bar (figure 2-57).



**NOTE:** To view a persistent message like this, press the **HELP** key and then the **MSG** softkey.

## 2.9. THE **SAVE** AND **HELP** KEYS--THE SOS BEACON

The SOS Beacon feature is another KLX 100 first: a feature which, in case of emergency, transmits a prerecorded message along with your exact latitude and longitude on a specified emergency frequency. 121.50 megahertz (MHz) is the international standard for transmission of aviation emergency messages on the VHF air band, and you may change the frequency from 121.50 to one of your choice.

The SOS Setup Page is accessed from the Main Menu and is used to modify and listen to a sample SOS transmission, as well as change the repetition rate and the emergency frequency to transmit on. See section 6.7 for more on the SOS Setup page.

We recommend that your recorded message be in the standard form of an SOS broadcast. This includes the aircraft type, registration (tail) number, and color scheme. An example message would be "Archer November Papa Lima Alfa November Echo, white over red." When the KLX 100 assembles the entire message, it adds the last known latitude and longitude, and the time it was valid.

The complete message is of the form:

"Mayday, mayday, mayday; Archer November Papa Lima Alfa November Echo; white over red; north three eight degrees, five three point two seven minutes; west niner four degrees, four seven point two seven minutes at one eight five two Zulu."

The above message would indicate your position was N38°53.27' W94°47.27' at 1852 Z.



**WARNING:** *The SOS Beacon feature is for emergency use only. Transmitting on the emergency frequency is serious business and not to be taken lightly. If you want to listen to or demonstrate the SOS message, always use the SOS Setup page (section 6.7).*



**To transmit using the SOS Beacon:**

1. Press the **[SAVE]** and **[HELP]** keys at the same time. Notice how the **KLX 100** case has **SOS** with an arrow pointing to the **[SAVE]** and **[HELP]** keys.

2. The active COMM frequency (shown in the upper left corner of the screen) is automatically changed to **121.50** or whatever the selected emergency frequency is, and a page showing **SOS BEACON ARMED** is displayed (figure 2-58).

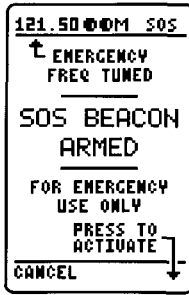


Figure 2-58

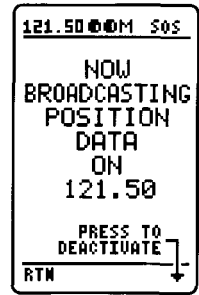


Figure 2-59

3. If this is an actual emergency, press the fourth softkey which shows **PRESS TO ACTIVATE**. The screen should change to look like figure 2-59, stating **NOW BROADCASTING POSITION DATA ON 121.50**.



**NOTE:** If the **KLX 100 GPS** does not currently have a valid position, but has had a valid position during the past 24 hours, the screen will look like figure 2-60. The **SOS Beacon** will still transmit your position and say what time it was valid for. If the **KLX 100** has not had a valid position in the last 24 hours, the screen will look like figure 2-61, and it will only transmit the pre-recorded part of the message. In either case, you should attempt to orient the **KLX 100** unit or the external antenna (whichever is in use), so that it faces straight up toward the sky, if you are able to. Once the **GPS** determines your position, it will update the **SOS** message to include the new position.

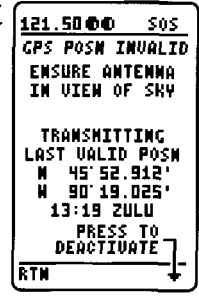


Figure 2-60

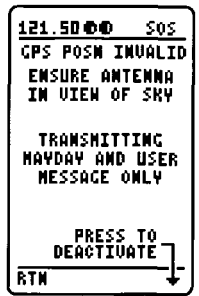


Figure 2-61

- There are two ways to stop the SOS Beacon transmission. One is to turn the KLX 100 unit off. The other is from the SOS page itself. If you have not changed to another page, press the fourth softkey which reads **PRESS TO DEACTIVATE**. If you have changed pages, press the **SAVE** and **HELP** softkeys at the same time to get back to the SOS page, and then press the fourth softkey.



**NOTE:** If you manually change the COMM frequency to an air band channel (118.000 to 136.975 MHz) during the time the SOS Beacon is transmitting, the SOS Beacon transmission will change to the newly selected frequency. If the tuned frequency is a NAV (108.00 to 117.95 MHz) or weather (WX) channel, the SOS Beacon transmission is automatically canceled.



**NOTE:** When using the SOS Beacon feature, the battery life is affected by the REPEAT RATE specified on the SOS Setup page (section 6.7). Remember that the radio will stop transmitting before the KLX 100 unit shuts down. You will know this when you see the **BATTERIES TOO LOW TO TRANSMIT** message.



## 2.10. THE COURSE DEVIATION INDICATOR (CDI)

Many of the KLX 100 pages display a course deviation indicator (CDI). We thought we'd take this opportunity to explain the "ins and outs" of the CDI (not to mention the TOs and FROMs!).

The CDI's vertical bar operates like a navigation deviation needle on a conventional CDI or HSI using VOR/Localizer navigation. An on-course indication is displayed when the vertical deviation bar is centered on the triangle in the middle of the CDI. Full-scale deviation (five dots) is determined both by the units of measure (**NAUTICAL**, **STATUTE**, or **METRIC**), and the CDI scale. Both items are selected on the navigation setup page (see section 6.4.1). Typical operation is for the units to be **NAUTICAL** and the CDI scale to be **5.0 NM**. If this is the case, then each dot represents one nautical mile deviation from the desired track. A vertical deviation bar positioned two dots to the right of the center triangle indicates the aircraft is two nautical miles to the left of course (figure 2-62).

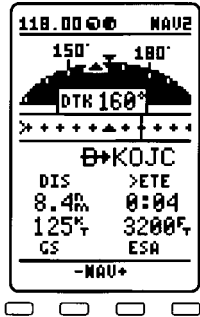


Figure 2-62

The center triangle also serves as the CDI's TO/FROM indicator and operates in the same manner as a conventional CDI TO/FROM indicator; a triangle pointing up indicates "to" the active waypoint while a "down" triangle (figure 2-63) indicates "from" the active waypoint. The word **FLAG** is displayed over the CDI when the KLX 100 is not usable for navigation (figure 2-64).

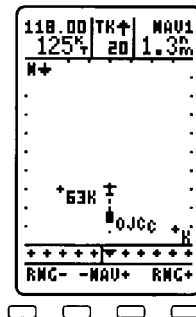


Figure 2-63

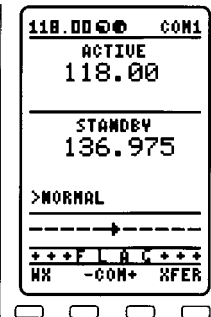


Figure 2-60

### 3. NAVIGATION PAGES

#### 3.1. THE MOVING MAP (NAV 1) PAGE

The NAV 1 page is a graphical moving map which offers excellent “bird’s-eye-view” situational awareness to you as the pilot in command (which raises the question: If you’re flying higher than the birds, is it still a bird’s-eye-view?). This page can show you where you’ve been, where you are, and where you’re going relative to your active flight plan or leg, your destination waypoint(s), the nearby airports, VORs, NDBs, intersections and user waypoints, and even the boundaries of special use airspace (SUA) and any warning rings you have set up.

When you are navigating with a flight plan (see chapter 5), the NAV 1 page can display the waypoints of the active flight plan (FPL 0) with their waypoint identifiers (figure 3-1). Course lines connect the flight plan waypoints.

When operating Direct To a waypoint which is not in the active flight plan, the Direct To waypoint is shown on the map, and although the waypoints of the active flight plan may still be shown on the screen (if you have chosen for them to be on from the map setup), they are not connected by course lines.

At the top of the display area is the map range scale in your current distance units—nautical miles (nm), statute miles (mi), or kilometers (km). The range scale indicates the distance from the bottom to the top of the screen. You may select a range scale of 0.2 to 400 with several choices in between by using the **RNG+** and **RNG-** softkeys to select the desired range scale. For example, figure 3-2 illustrates the results of changing the range scale of the map in figure from 400 nautical miles to 120 nautical miles.

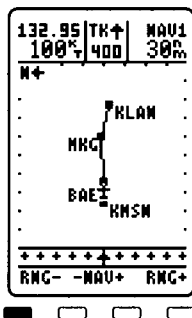


Figure 3-1

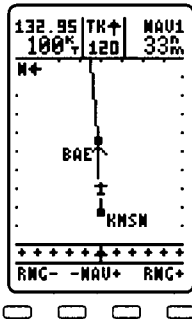



Figure 3-2

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Additionally, there is a choice called autorange. This choice is located “below” the 0.2 scale, such that if you continue to press the  key, you will get autorange. You can tell you’ve got autorange if the map scale is in reverse video (figure 3-3). The autorange feature “zooms” the map in and out in a useful way so that you don’t have to. Specifically, it chooses the smallest map scale that will display the active waypoint. Choosing autorange means there is one less item for you to worry about.

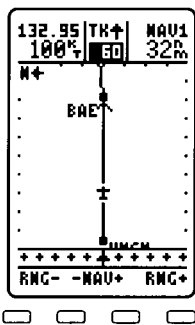


Figure 3-3

The tick marks along the edge of the map display area each represent one-tenth of the map scale range. For example, if the map scale range is 20 nautical miles, each tick mark represents two nautical miles. This is a convenient way for you to judge distances on the map.

In addition to the map, navigation data is displayed on the NAV 1 page’s title bar area (refer to figure 3-3). As usual, the active COMM frequency is shown in the upper left corner of the screen. However, the volume and squelch graphs are not shown unless you make an adjustment to one or the other. Below the active COMM frequency is a groundspeed display. Moving to the right side of the title bar, under the page indicator (NAV 1), is the distance to active waypoint.

An optional navigation data display area is available at the bottom of the map. This area may display:

1. A graphical or numerical course deviation indicator (CDI) (refer to figure 3-3). For a detailed description of the KLX 100’s CDI function, see section 2.10.
2. The actual track (TRK) and desired track (DTK) (figure 3-4),
3. The bearing (BRG) to waypoint and estimated time enroute (ETE) to waypoint, or
4. You may blank this area out, so that the map display area is maximized (figure 3-5).

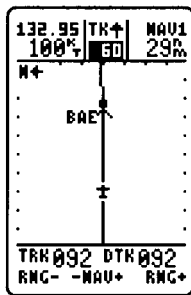


Figure 3-4

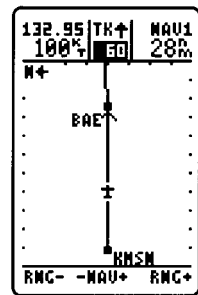


Figure 3-5

If you press the **CRSR** key while displaying the NAV1 page, the cursor will highlight a waypoint with reverse video (figure 3-6). You may then press the **↑** and **↓** softkeys to select other waypoints currently displayed on the screen.

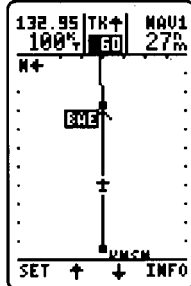


Figure 3-6

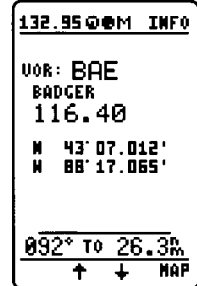


Figure 3-7

Once you have selected a waypoint you like, you may press the **INFO** softkey to see its waypoint page (figure 3-7).

This is extremely helpful when you're bound for an unfamiliar airport and need to find out important stuff like elevation, runway numbers and lengths, and COMM frequencies for initial contact. It is also helpful for finding out the names and cities of nearby airports as you fly by them. When you're ready to return to the moving map, simply press the **MAP** softkey.

Another thing you may do after highlighting a waypoint on the map (refer to figure 3-6) is to go Direct To it (see section 2.5.1) by pressing the **⊕** key.

Most customization of the map display is done from the Map Setup page. The Map Setup page may be accessed from the Main Menu page, or directly from the NAV 1 page. To view the Map Setup page from the NAV 1 page, turn on the **CRSR** and then press the **SET** softkey.

The Map Setup page is described exhaustively in section 6.6, but to summarize, items that may be configured from the Map Setup include:

- Map orientation: North Up (**N↑**), Desired Track Up (**DT↑**), or Actual Track Up (**TK↑**).
- NAV Information: **CDI**, **TRK/DTK**, **BRG/ETE**, or blank (as mentioned above and shown in figures 3-3 through 3-5).
- Nearest Waypoints: Quantity (0 to 9) of nearest airports, VORs, NDBs, intersections, and user waypoints that are displayed on the map. Zero is an option for any of the choices, meaning that the waypoint type will not be shown at all.

- Other Plotted Items: Waypoint identifiers, active flight plan waypoints and legs, Warning Rings, track log, airport runways, and special use airspace (SUA). Select each on or off.



*NOTE: SUAs are displayed showing all sectors and inner rings of Class B and Class C areas (figure 3-8). However, SUA alerting (see section 6.10) is only given to the lateral limits (outer edge) of the entire airspace. This is only true for Class B and Class C airspaces.*

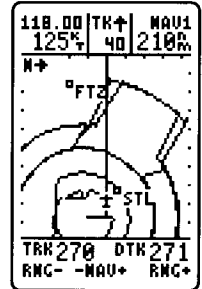


Figure 3-8

- Track Log Configuration: Set position recording interval, and clear (or reset) the track log. The track log is like a “trail of breadcrumbs” that the KLV 100 leaves on the moving map to let you see where you have been. The fine accuracy of the GPS receiver and the magnified map scales (such as 0.2 and 0.5) allow you to track very small movements, to the extent that you can walk around a city block and see the path you walked on the NAV 1 page.

It is easy to clutter the display with so much data that it is unusable. Select a range scale that allows an uncluttered presentation of the chosen flight plan waypoints and nearest waypoints. Or, select another combination of these from the menu. Experiment and continue to make new selections for different phases of your trip.

There are three common map orientation formats that may be selected on the Map Setup page: a True North up (N↑) display, a Desired Track up (DT↑) display, or an Actual Track up (TK↑) display. When the North up display is selected, viewing the NAV 1 page is like looking at a navigation chart with north at the top (figure 3-9). When the desired track up display is selected the NAV 1 page is like looking at a chart that is turned so that your course line is always pointing up. When the actual track up

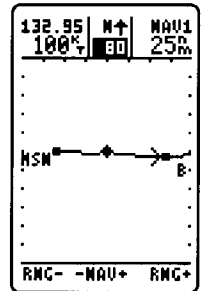


Figure 3-9

display is selected, viewing the NAV 1 page is like looking at a chart that is turned so that the direction the aircraft is tracking over the ground is pointing up (figure 3-10). In a no-wind condition, actual track is identical to the aircraft's heading. The upper left corner of the map shows an arrow pointing approximately to magnetic north.

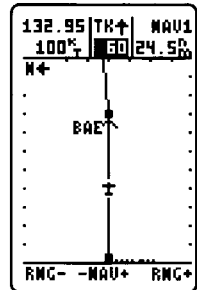


Figure 3-10

Actual track up display is usually preferred for use in flight. However, the track up display is only usable when you are moving 2 knots or more so the North up display may be a good choice if you are stationary.

**CAUTION:** When using the actual track up format it is typical for there to be a slight delay from the time a heading change is made until the correct map orientation is displayed. Be careful when using either the desired track up display or the actual track up display to not think that a heading up display is being used.

Notice that in both the North up format and the desired track up format, the aircraft's position is depicted by a diamond. In the actual track up format, the aircraft's position is depicted by an aircraft symbol.

**CAUTION:** The NAV 1 page does not display weather, terrain, or other data.

Sometimes while using the KLX 100 moving map, it is desirable to look at waypoints that are away from your present position, or to look at a certain part of the track log to see what movements the aircraft made at that time. Normally, the NAV 1 map is displayed with your present position at the center of the map. The Pan mode allows you to change this reference point.

You may change to Pan mode by selecting the Map Setup page (either through the Main Menu or by pressing **CASR** and then **SET** from the NAV 1 page). **PAN MODE** is one of the selections under the orientation (**ORIENT**) item on the Map Setup page. When

you first view the NAV 1 page in Pan mode, it will look as in figure 3-11. Notice that the present position diamond is no longer in the center of the screen, but is moving. Pan mode is always North Up. At the bottom of the map display area, where the CDI or track/desired track data would be displayed, the KLX 100 tells you that you may press the (STU) key to pan to the left, (RND 5) to pan up, (D) to pan down, or (V 5) to pan to the right. Each press of one of these keys pans one tick mark in that direction. Notice that these four keys are oriented in an up/down/left/right manner on the KLX 100.

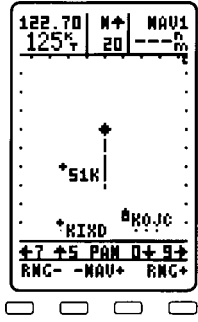


Figure 3-11

In the example in figure 1, notice that the nearby waypoints KOJC and OJC overlap because they are so close together (OJC is an on-airport VOR). Let's zoom in and see where OJC is located relative to KOJC. To do this, press the (V 9) key to pan right, and the (D) key several times to pan down. Then, press the (RNG-) softkey to zoom in until the screen looks like figure 3-12. You might have to pan after zooming to get this area on the screen.

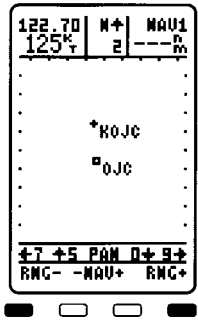


Figure 3-12

### 3.2. THE MINI-HSI (NAV 2) PAGE

The main attraction of the NAV 2 page is an innovative feature, known as the *Mini-HSI*.

A conventional HSI (short for Horizontal Situation Indicator) (figure 3-13) includes a compass card which indicates heading at the top, a heading bug used to select a desired heading, an OBS course selector arrow, and a course deviation indicator (CDI). Most of these features are included in the KLX 100's version of the HSI, the Mini-HSI.

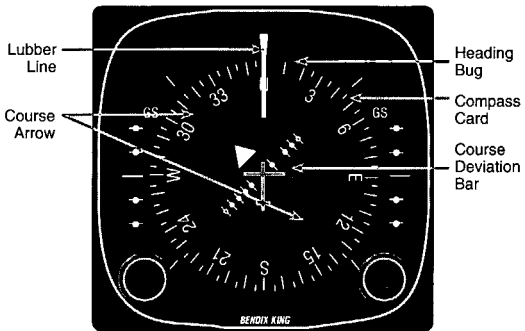


Figure 3-13

KLX 100 (like GPS receivers in general) is capable of determining your position and direction of movement (termed actual track) very precisely, but it has no way of knowing your aircraft's compass heading (some panel mount GPS systems have electrical inputs from compass systems, so they can make calculations based on aircraft heading). So, rather than using heading, the KLX 100 "compass card" uses the actual track angle, not aircraft heading.

There are two small pointers on the Mini-HSI (figure 3-14). One is the actual track pointer, which is always at the top of the compass card, pointing down. The other pointer is the desired track pointer, which is always on the inside edge of the compass card, pointing up. The compass card rotates as the actual track changes during turns or wind changes, and the desired track pointer moves with the compass card. Generally, your goal as the pilot/navigator will be to align these two pointers (figure 3-15). This is especially true when you are on course.

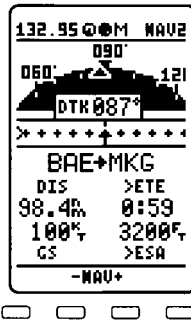


Figure 3-14

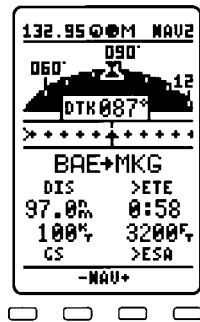


Figure 3-15

The desired track (DTK) is also displayed in text below the compass card. Below that, the NAV 2 page also includes a CDI, for which the format is described in-depth in section 2.10. The CDI tells you whether you need to fly left or right to intercept the desired course. It is available in either a graphical format (refer to figure 3-15) or in words and numbers (figure 3-16). To change between the two formats, place the cursor on this field and press the **CHG** soft-key.

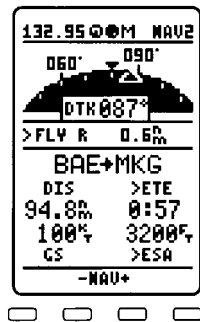


Figure 3-16

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The example in figures 3-17 and 3-18 shows the aircraft drifting off-course to the right. Notice the positions of the track arrows and the CDI in figure 3-17. To correct, the pilot must steer left, so that the desired track pointer is temporarily to the right of the actual track pointer (figure 3-18). Once back on the desired track, it is proper to align the actual track and desired track pointers again.

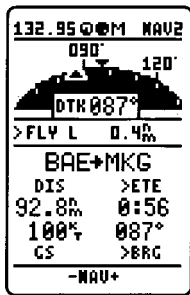


Figure 3-17

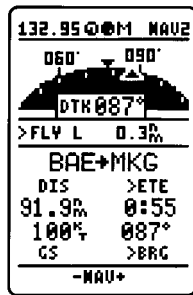


Figure 3-18



**NOTE:** Be careful not to think of the actual track and desired track pointers as being the same as a CDI. If you are trying to get back on course, it is desirable for the pointers not to be aligned. Use the track arrows in conjunction with the CDI to steer the aircraft.

Below the Mini-HSI is the primary navigation information:

- The active navigation leg. For Direct To operation this consists of the Direct To symbol, followed by the active Direct To waypoint identifier. For the leg of a flight plan this consists of the "from" waypoint identifier and the active "to" waypoint identifier. An arrow precedes the active waypoint identifier.
- Distance from your present position to the active waypoint.
- A change field which may either display estimated time en route (**ETE**) to the active waypoint or estimated time of arrival (**ETA**) at the active waypoint. Turn on the **CRSR**, move it to this field, and use the **CRS** softkey to change back and forth between **ETE** and **ETA**. If **ETA** is selected, it will be in terms of the system time zone, which is selected on the Operation Setup page.
- Groundspeed--your speed over the surface of Earth.
- A change field which may display magnetic bearing to waypoint (**BRG**), or minimum enroute safe altitude (**ESA**), which is defined as follows:

The minimum enroute safe altitude (ESA) is the highest minimum safe altitude (MSA) sector altitude from the present position to the active waypoint, then to the destination waypoint along the active flight plan, if there is one. See figure 3-19.

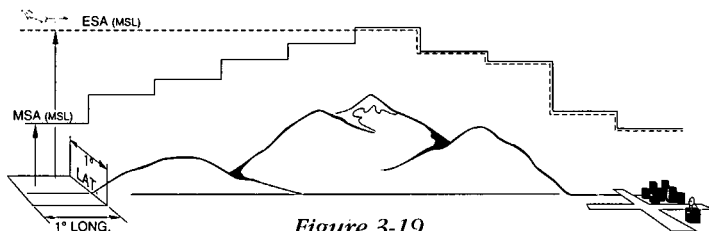


Figure 3-19

What, you ask, is an *MSA sector altitude*? We're glad you asked, because it is what Jeppesen-Sanderson calls "Grid Minimum Off-Route Altitude (Grid MORA)". This altitude is derived by Jeppesen for sectors which are one degree of latitude by one degree of longitude in size. One degree of latitude is 60 nautical miles. One degree of longitude is 60 nautical miles at the equator and progressively less than 60 nautical miles as one travels away from the equator. One degree of longitude is approximately 50 nautical miles at the southern most parts of the USA and is approximately 40 nautical miles at the northern most parts of the USA. The MSA altitude information is contained in the data base and is updated when the data base is updated by personal computer.

The minimum safe altitude (MSA) provides "reference point" clearance within these one degree latitude by one degree longitude sectors. Jeppesen defines a reference point as "a natural (Peak, Knoll, Hill, etc.) or man-made (Tower, Stack, Tank, Building, etc.) object". Jeppesen states the following about the Grid Minimum Off-Route altitude: "Grid MORA values clear all reference



**WARNING:** *The ESA altitudes displayed are advisory in nature only. They should not be relied upon as the sole source of obstacle and terrain avoidance information. Refer to current aeronautical charts for appropriate minimum clearance altitudes.*

points by 1000 feet in areas where the highest reference points are 5000 feet MSL or lower. MORA values clear all reference points by 2000 feet in areas where the highest reference points are 5001 feet MSL or higher".

### 3.3. THE POSITION SUMMARY (NAV 3) PAGE

The NAV 3 page (figure 3-20) is a complete description of your present position. The NAV 3 page displays (from top to bottom):

132.9500 MAU3	
POSITION	
N	43°07.271'
W	88°05.782'
EPEH	308F
>NRST VOR LJT	
	285°FR 2.7M
ALTITUDE	EPEV
	5700F ± 412F
11:41:40 CDT	
-MAU+	

1. The present position in terms of latitude and longitude, and the horizontal estimated position error (**EPEH**). See the GPS Primer in Appendix G for the definition of estimated position error (EPE).

Figure 3-20



**NOTE:** The KLX 100 displays latitude and longitude using the map datum called WGS-84 (World Geographical Survey, 1984). This is the only map datum available.

2. The present position in terms of a radial and distance from the nearest VOR, or the nearest airport. To change back and forth between the two options, turn on the **CRSR** and press the **CHNG** key. The nearest VOR option is good for position reporting when contacting ATC (air traffic control).

3. The altitude that is being indicated by the GPS position solution and the vertical estimated position error (**EPEV**). Typically, due to the geometry of the GPS satellites, the vertical EPE is greater than the horizontal EPE.



**WARNING:** Do not use the GPS-derived altitude for navigation. Due to Selective Availability position degradation and other factors, the GPS altitude is normally 300 feet or more in error, which is unacceptable for vertical navigation.

4. The current system time and system time zone. Although you cannot change the system time zone from this page, you may do so on the GPS Initialize page or the Operation Setup page.

### 3.4. THE WAYPOINT (NAV 4) PAGE

The NAV 4 page is where waypoint information is displayed for data base waypoints, both published and user-defined. Not only can you look for a specific type of waypoint (airport, VOR, NDB, intersection, or user), but you may also quickly see the information about the active waypoint, or any of the waypoint in the active flight plan (FPL 0).

Whenever you are viewing the NAV 4 page, pressing the **[E]** key initiates the Direct To process with the waypoint that was last seen on the NAV 4 page as the Direct To waypoint.

The type of display that is shown is indicated at a glance by the change field at the top of the page. This field may read **ACTIVE WPT**, **FPLN WPT**, **ENTER APT**, **ENTER VOR**, **ENTER NDB**, **ENTER INT**, or **ENTER USER**. To change the page format, turn on the **[CRSR]** and press the **[CHG]** softkey. The formats will change in the order they were listed above. For the sake of clarity, the **ENTER APT**, **ENTER VOR**, **ENTER NDB**, **ENTER INT**, and **ENTER USER** formats will be described first.

#### 3.4.1. NAV 4 ENTER AIRPORT (ENTER APT) WAYPOINT FORMAT

See figure 3-21.

The **ENTER APT** format includes the following information (top to bottom) about each of the published airports in the KLX 100 data base:

- The airport's ICAO identifier (see section 1.3.3), which is a maximum of four alphanumeric characters.

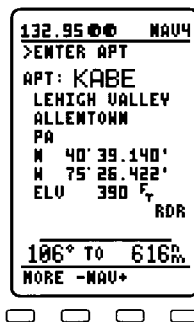


Figure 3-21



**To select an airport (or any waypoint) by identifier:**

1. Turn on the **CRSR** and press the **↵** softkey once to move the cursor to the ident field (figure 3-22).
2. Press the phonepad key which contains the first character of the desired identifier. Remember that many airports in the USA have ICAO identifiers with a K as the first character. To get a **K**, you would press the 4 key. As with any data entry field, the four character options for the phonepad key you just pressed are shown across the four softkeys.

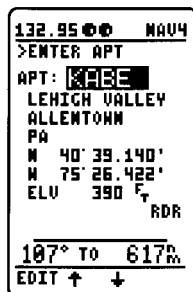


Figure 3-22

3. Press the softkey for the desired character. The cursor will automatically move to the next space (figure 3-23).
4. Continue entering characters in the same way until the desired waypoint is displayed (figure 3-24). Notice that you may not have to enter all characters of the identifier, because the KLX 100 automatically fills in the first airport in alphabetical order which matches the characters you have entered.

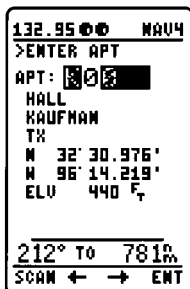


Figure 3-23

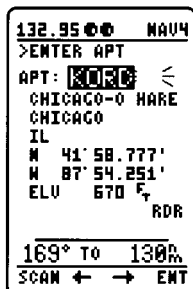


Figure 3-24

5. Press the **ENT** softkey to accept the entry and turn off the cursor.

- The name of the airport. There are a few changes made to airport and VOR names in order to accommodate the KLX 100 display and to make the names easier to find.
1. Names which are too long to fit on the display are abbreviated. The first six characters are usually exactly correct, but the following are exceptions:

North, Northern, East, Eastern, etc.—uses N, E

Southeast, Northwest, etc.—uses SE, NW

Point—uses PT

Port—uses PT

Fort—uses FT

Saint—uses ST

General—Deleted, or uses GEN

Person's name—uses initials for other than last name unless very well known (Will Rogers World airport)

Delete "City of" (City of Colorado Springs Municipal)

Delete "Greater" (Greater Buffalo Int'l)

Delete "The" (The Hartsfield Atlanta Int'l)

2. Unless the first word is greater than eight characters, it is usually not abbreviated.
  3. Delete most punctuation such as periods and apostrophes.
  4. Abbreviations for International are INTL, INT, and IN.
  5. Abbreviations for Regional are REGL and REG.
- The city where the airport is located. For the both the way-point name and city fields, you may manually enter characters, or you may scan in alphabetical order, if you don't know the exact spelling.



**To select an airport by entering the airport name or city (also applies to VOR name):**

1. Turn on the **CRSR** and use the **↑** softkey to move the cursor to the airport name field (figure 3-25). In this example, we will enter an airport name, but you may use the same procedure to enter the airport city.

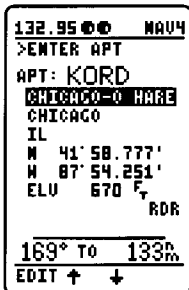


Figure 3-25

2. Use the normal method for entering characters (press the phonepad key containing the desired letter, then the softkey corresponding to the exact one you want), until you see the airport you are looking for (figure 3-26). Use the **←** and **→** softkeys if you wish to manually move the cursor back (if you happen to make an entry error) or forward (if the desired character is already displayed in the space you are on).

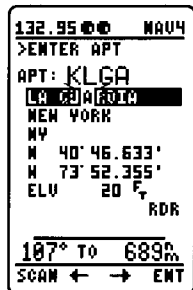


Figure 3-26

3. Turn off the **CRSR** if desired.



**To select an airport by scanning the airport identifier, name, or city:**

1. Turn on the **CRSR** and use the **↑** softkey to move the cursor to the airport city field (figure 3-27). In this example, we will scan an airport city (all the airports beginning with "DENVER"), but you may use the same procedure to enter the airport identifier or name.

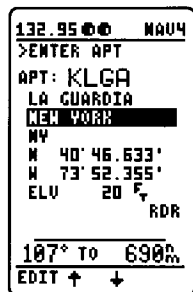





Figure 3-27

- Use the normal method for entering characters, until you have entered the desired city name (figure 3-28). Use the  and  softkeys if you wish to manually move the cursor back (if you happen to make an entry error) or forward (if the desired character is already displayed in the cursor position). In this case, use the  softkey to move the cursor one space to the right of the **R** in **DENVER**. Notice the Centennial airport is initially displayed.

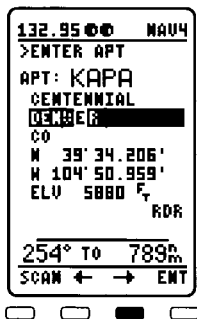



Figure 3-28

- Press the  softkey to initiate the scanning process.


- Use the  softkey to scan (alphabetically by city name, and if there are several airports with identical city names, those will be alphabetical by airport name) through the rest of the airports in Denver, including Jeffco, Denver Intl (figure 3-29), and others, including an airport in



Figure 3-29

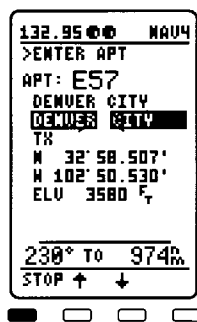




Figure 3-30

Denver City, Texas (figure 3-30), which obviously isn't in Denver, but its city starts with the same letters. If desired, you may also use the  softkey to scan back up the list.

- Press the  softkey to stop scanning.
  - The State if the airport is located in the USA, the Province if located in Canada, or the country if outside the USA and Canada. A listing of the abbreviations used for States, Provinces, and countries is contained in Appendix D.
  - The latitude and longitude of the airport reference point (the "official" location of the airport).
  - The airport elevation above mean sea level (MSL) in the selected units of measure (feet or meters). If feet are the altitude units, then the elevation is rounded to the nearest 10 feet.
  - An indicator of a radar environment around the airport (**RDR**).



- The magnetic bearing and distance to the displayed airport from the present position.

To display runway information for this airport, press the **CRSR** key to turn off the cursor, and press the **MORE** softkey. In many cases, a runway diagram is shown for the airport (figure 3-31). If a runway diagram for this airport is not included in the data base, this area will display **RUNWAY DIAGRAM NOT AVAILABLE**.

Below the runway diagram is a list of the runways, longest runway first. The cursor is initially on the longest runway, for which the numbers are shown on the diagram. Press the **+** softkey to move to the second longest runway (if applicable). If there are more than two runways for the airport, then pressing **+** again will scroll to the third runway, and so on. The following information is displayed for each runway:

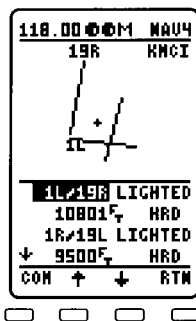


Figure 3-31

- The runway numbers and lighting.

Runway lighting abbreviations:

<b>LIGHTED</b>	Full-time lighting
<b>PC LGHT</b>	Pilot-controlled lighting
<b>PT LGHT</b>	Part-time lighting
<b>NO LGHT</b>	No lighting

- The length of the runway, and the runway surface.

Runway surface abbreviations:

<b>HRD</b>	Hard surface or paved
<b>TRF</b>	Turf
<b>GRV</b>	Gravel
<b>SNW</b>	Snow
<b>DRT</b>	Dirt
<b>CLY</b>	Clay
<b>ICE</b>	Ice
<b>MAT</b>	Steel Mat
<b>SHL</b>	Shale
<b>SND</b>	Sand

From the runways page, you may press the **COM** softkey to go directly to the COM 2 page for the displayed airport. The COM 2 page shows all of the VHF COMM frequencies and frequency types for that airport (figure 3-32). See section 4.2 for more on the COM 2 page.

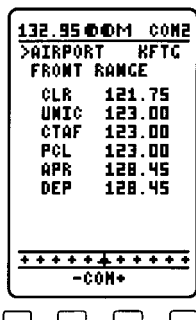


Figure 3-32

### 3.4.2. NAV 4 ENTER VOR WAYPOINT FORMAT

The **ENTER VOR** format of the NAV 4 page is very similar to the airport format, although the VOR format is much simpler.

The **ENTER VOR** format includes the following information about the displayed VOR (see figure 3-33):

- The identifier of the VOR, which is almost always three letters. In the same manner as airport pages, you may enter a new identifier or scan alphabetically on this field.
- The name of the VOR. Entry and scanning is also identical to that on the airport name field.
- The frequency of the VOR in megahertz (MHz), which will be in the range from 108.00 to 117.95 MHz. Note that you may tune VORs on the KLX 100 COMM to listen to any audio, such as weather broadcasts or Flight Service Station duplex channels which use a VOR as a voice transmitter. KLX 100 does not include any VOR, Localizer, or Glideslope navigation function.
- The latitude and longitude of the VOR.
- The magnetic bearing and distance to the displayed VOR from the present position.

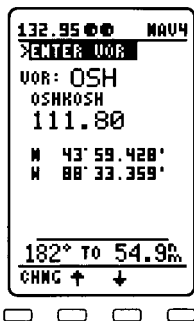


Figure 3-33

### 3.4.3. NAV 4 ENTER NDB WAYPOINT FORMAT

The **ENTER NDB** format includes the following information about the displayed NDB (see figure 3-34):

- The identifier of the NDB, which is up to three letters and/or numbers. In the same manner as the other waypoint pages, you may enter a new identifier or scan alphabetically on this field.
- The frequency of the NDB in kilohertz (kHz).
- The latitude and longitude of the NDB.

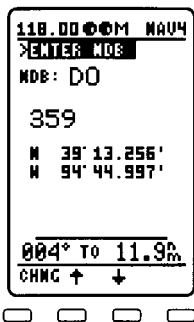


Figure 3-34

- The magnetic bearing and distance to the displayed NDB from the present position.

### 3.4.4. NAV 4 ENTER INTERSECTION WAYPOINT FORMAT

The KLX 100 database includes low altitude, high altitude, approach, and SID/STAR intersections, as well as outer markers and outer compass locators, which are all categorized as “intersections”. The **ENTER INT** format includes the following information about the displayed intersection (see figure 3-35):

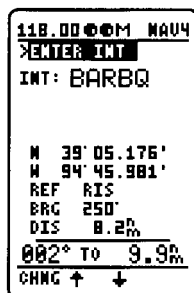


Figure 3-35

- The identifier of the intersection, which is typically five letters. In the same manner as the other waypoint pages, you may enter a new identifier or scan alphabetically on this field.
- The latitude and longitude of the intersection.
- The magnetic bearing and distance to the displayed intersection from the present position.
- The location of the intersection expressed in terms of a radial and distance from a nearby VOR.

### 3.4.5. NAV 4 ENTER USER WAYPOINT FORMAT

The **ENTER USER** format of the NAV 4 page allows you to select and scan user waypoints which you have entered. However, no modification to the user waypoint position or comments may be made from this page. These actions must be performed from the User Waypoints page under the Main Menu (see section 6.11).

The **ENTER USER** format includes the following information about the displayed user waypoint (see figure 3-36):

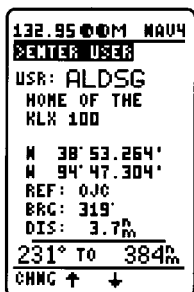


Figure 3-36

- The identifier of the user waypoint, which may be up to five characters. In the same manner as airport and VOR pages, you may enter a new identifier or scan alphanumerically on this field.

- Two lines of comments about the user waypoint. Remember that the default user comment is the date and time that the user waypoint was created.
- The latitude and longitude of the user waypoint.
- The three-letter identifier of the nearest VOR to the user waypoint, and the radial and distance from that VOR.
- The magnetic bearing and distance to the displayed user waypoint from the present position.

### 3.4.6. NAV 4 ACTIVE WAYPOINT FORMAT

During a flight, it's always convenient to be able to quickly find out information about the active waypoint, especially if it happens to be an airport. The elevation helps you determine what your pattern altitude will be. The runway information will help you decide which runway you will use and what kind of pattern entry you will make, and the airport COMM frequency will get your radio squared away so you can listen to ATIS or Tower frequency, or make traffic advisories on CTAF.

The **ACTIVE WPT** format of the NAV 4 page (figure 3-37) always displays the waypoint page for the active waypoint, be it an airport, VOR, or user waypoint. There is no waypoint entry or scanning on this page, since that would change the waypoint to something other than the active waypoint.

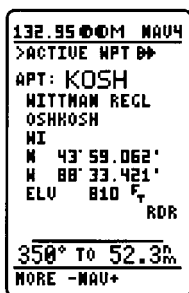


Figure 3-37

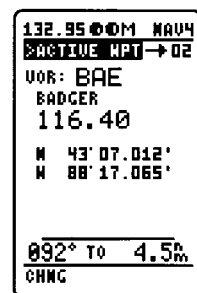


Figure 3-38

The upper right corner of the page indicates whether the active waypoint is a Direct To waypoint (refer to figure 3-37), or part of the active flight plan (FPL 0), in which case an arrow and the number of the waypoint in the flight plan sequence is shown (figure 3-38). In this case, **BAE** is the second waypoint in FPL 0.

### 3.4.7 NAV 4 FLIGHT PLAN WAYPOINT FORMAT





The **FPLN WPT** format of the NAV 4 page is somewhat the same idea as the **ACTIVE WPT** format, in that it's only for viewing a certain set of waypoints. In this case, that set is the waypoints of the active flight plan (FPL 0) (see figure 3-39). The number of the waypoint in the FPL 0 sequence is shown in the top right corner of the page. If this waypoint is the active waypoint, an arrow precedes the waypoint sequence number.



Figure 3-39



#### *To change the NAV 4 displayed flight plan waypoint:*

1. With the cursor on, press the  softkey to move the cursor to the waypoint sequence number (figure 3-39).
2. Press the  softkey
3. Press the  and  softkeys to look through the set of waypoints in FPL 0.

## 4. COMM OPERATION

### Transceiver Description

The KLX 100 COMM is a 760 channel, Very High Frequency (VHF) aviation communication transceiver with 1.5 watts transmitter output (output power is reduced when in low battery conditions). The aviation VHF band is at just slightly higher frequency than the FM Broadcast Band, which extends from 87.900 MHz (megahertz) to 107.900 MHz. The aviation VHF NAV (VOR/Localizer) band, which extends from 108.000 MHz to 117.950 MHz may be received using the KLX 100 (audio only, no navigation capability). The aviation COMM frequency range is from 118.000 MHz to 136.975 MHz, with channels every 25 kHz (0.025 MHz). In addition, KLX 100's with valid Americas data bases are capable of receiving 10 weather frequencies, including all 7 NOAA (National Oceanic and Atmospheric Administration) Weather Radio Broadcast channels in and around the USA, and most Canadian Weatheradio broadcast stations. These weather channels are at a higher VHF frequency, ranging from 161.650 MHz to 163.275 MHz, just above the the Marine and Public Service (Police, Highway Patrol, Fire, etc.) bands. The locations of the NOAA weather stations are shown in figure 4-1, and the locations of Canadian weather stations is shown in figure 4-2. For a listing of the USA and Canadian weather channel locations, see Appendix E.

### NOAA Weather Station Locations

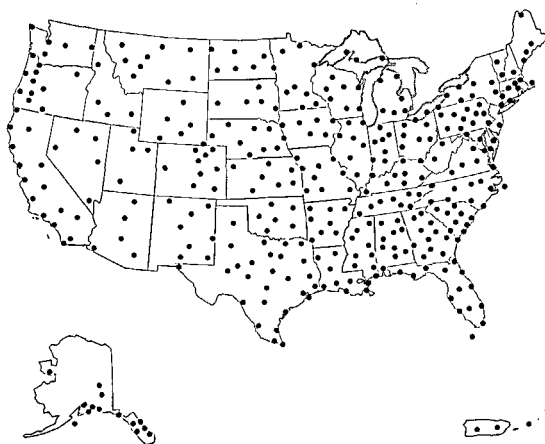


Figure 4-1

### Canadian Weather Station Locations

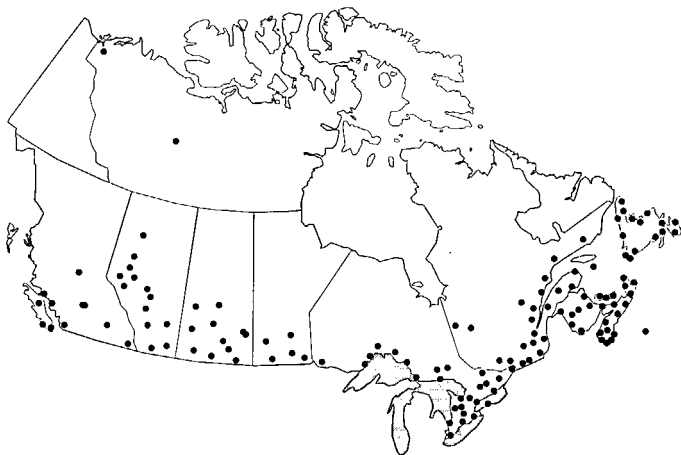


Figure 4-2

Regardless of transmitter power, VHF transmit and receive range is generally limited by "line of sight." This means that you must be located such that the Earth's surface does not substantially come between you and the antenna you are communicating with. Higher-power transmitters have the ability to propagate somewhat further than line-of-sight distance. An example of this phenomenon is shown in (figure 4-3).

Aircraft A and aircraft B are equipped with transmitters of an equal 1.5 watts, yet aircraft A cannot be received by the control tower, unless it increases altitude, to that of aircraft B.

### VHF Line-of-Sight Phenomenon



Figure 4-3



**NOTE:** Specifications for the KLX 100 COMM transceiver are located with KLX 100 unit specifications in Section 1.2.

**Controls**

The KLX 100 COMM controls are located on the left side of the unit, and are shown in figure 4-4.

The push-to-talk (PTT) switch is the large oval button on the top. Pressing the PTT switch activates the KLX 100 transmitter on the current active frequency, and you may speak into the internal mic, or an external mic or headset, if connected.

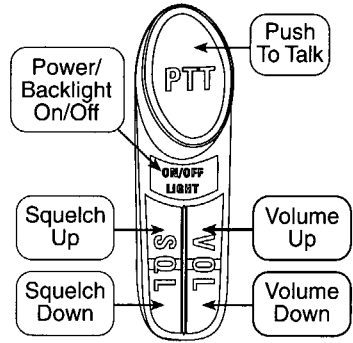




Figure 4-4

**CAUTION:** *Activating the COMM transmitter without an antenna connected may cause the KLX 100 to turn off.*

**NOTE:** *To avoid "stepping on" others' radio transmissions, listen on that channel before you attempt to transmit.*

Directly below the PTT switch is the  control switch. The operation of this switch is discussed in sections 1.1 and 2.4.

Below the  switch is a pair of rocker switches. On the right (toward the front of the unit) is the volume rocker switch, and on the left (toward the back of the unit) is the squelch rocker switch. Pressing on the top side of either switch increases the level, and pressing on the lower side of either switch decreases the level.

In the case of squelch, pressing on the bottom of the switch increases the received signal level that is required to actually hear the received audio. When the squelch control is adjusted to the top of the range, the squelch is completely open and receiver noise can be heard over the speaker. Reducing the squelch level until the receiver noise is just eliminated from the speaker will cause only received transmissions to be heard over the speaker. The squelch control must be set to tune out the receiver noise for the scanning functions to be operational. The squelch control should be adjusted to the highest possible setting for weather (WX) channel operation.

COMM Operation  
Chapter 4



During normal operation, there are two "pie graphs" at the top of the KLX 100 display (figure 4-5). The pie graph on the left shows the volume level and the pie graph on the right shows the squelch level. The more the pie is filled in, the higher the level. In figure 4-5, the volume is adjusted to a low level, and the squelch is adjusted to a high level.

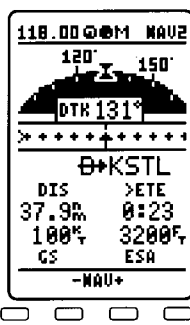


Figure 4-5

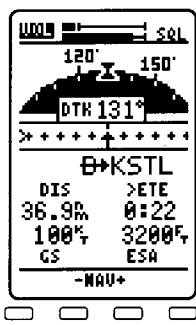



Figure 4-6

When the volume or squelch rocker switches are pressed, the top of the KLX 100 display changes so that two "bar graphs" are displayed, volume on top and squelch below (figure 4-6). The bar graphs give you a more precise idea of how much you are adjusting the volume or squelch. A few seconds after you cease adjustments, the display changes back to the pie graphs.

The COMM controls are positioned so that they can easily be operated with either hand. If you're holding the KLX 100 with your left hand, your left thumb can easily manipulate any of the switches. If on the other hand (pun intended), it's in your right palm, the right index finger can operate the PTT switch, the right middle finger can operate the  switch, the right ring finger can increase the volume and squelch, and the right pinky finger can decrease the volume and squelch.

### Antenna

The flexible antenna that is included with the KLX 100 is very convenient. However a more efficient antenna may be required for some applications. For maximum utilization of the KLX 100 inside an aircraft, automobile or other metal enclosure, an external COMM antenna should be used for communications. An external communications antenna will noticeably improve the reception and transmission of radio signals.

The BNC type connector located on the top of the unit is standard for use on aircraft radios and antennas, so little difficulty should be encountered when connecting to an existing aircraft COMM antenna. When the KLX 100 is to be used as an emergency backup COMM radio in an aircraft, an adapter (P/N 071-01443-0001) may be installed to easily connect the KLX 100 to the existing aircraft antenna (figure 4-7).

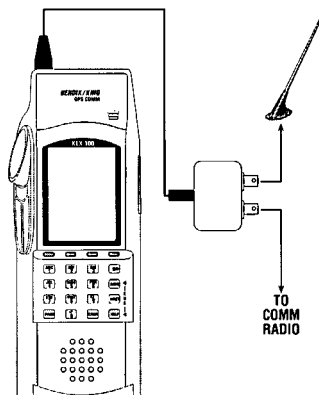


Figure 4-7

### Headset jack and adaptor

External headphone and microphone jacks are located on top of the KLX 100 (figure 4-8). An earphone or an external speaker having 2.5 millimeter, 2 conductor plug may be plugged directly into the speaker jack, and an external microphone having a 3.5 millimeter, 3 conductor plug with the tip of the connector connected to the mic key line and the ring connected to the microphone audio may be plugged directly into the microphone jack. Note that the microphone jack is slightly larger than the speaker jack. The clip on the adapter should be connected to the protruding attach point on the right side of the KLX 100 to provide strain relief. If a headset with a boom mic is used, the PTT switch on the left side of KLX 100 may be used to key the transmitter. A separate PTT switch may also be used with the headphone/microphone adapter.

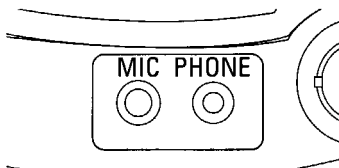


Figure 4-8

### **License requirements**

If the KLX 100 COMM transceiver is to be utilized in an aircraft which already has a station license, no additional radio station license is required.

See the included sheet “FCC Forms and Station Licensing” for up-to-date information regarding requirements for licensing portable transceivers for use in aircraft.

If the transceiver is to be used as a ground station, then a Ground Station Authorization is required. Call the FCC at 1-800-322-1117 or use the included FCC Form 207 to order FCC Form 406, “Application for Ground Station Authorization in the Aviation Services”.

You may also use the FCC’s FAX form service by calling 1-202-418-0177.

This equipment has been accepted by the FCC and entered on their list of Type Accepted Equipment as AlliedSignal Avionics, Inc. Model KLX 100 (ASYKLX100).

The KLX 100 owner accepts all responsibility for obtaining the proper licensing before using the transmitter.



3. Press the **[DEF 7]**, **[GHI 3]**, **[JKL 4]**, and **[MNO 5]** keys in that order (figure 4-12). 123.45 MHz is now in the standby frequency.
4. When you are ready to transmit and receive on 123.45, press the **[XFER]** softkey, and the active frequency will switch places with the standby.

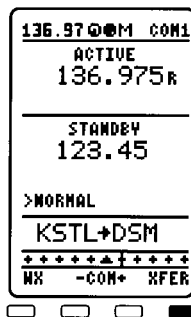


Figure 4-12

**i** **NOTE:** The KLX 100 will also tune aviation COMM frequencies at 25 kHz (kilohertz) intervals. For the purpose of frequency entry and display, these frequencies sometimes have the last digit erased (for example, 123.375 MHz is entered and sometimes displayed as 123.37 MHz).

When you are transmitting on the active COMM frequency by pressing the push-to-talk (PTT) switch on the left side of the KLX 100 or a remote PTT, a small **T** appears to the right of the active frequency display. In a like manner, a small **R** is displayed whenever the KLX 100 is receiving a signal strong enough to break the squelch as it is currently set. If you see the **R** but hear no audio and wish to, adjust the COMM volume to a higher level.

The procedure for entering a weather (WX) channel is actually easier yet than entering an aviation frequency. Remember that the weather channels are only available if the KLX 100 has a valid “Americas” data base.

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**i** **To tune a weather channel on the COM 1 page:**

1. Select the COM 1 page.
2. Press the **[WX]** softkey (figure 4-13).

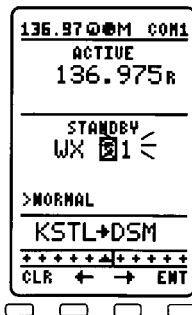


Figure 4-13

**i** **NOTE:** If there is a valid GPS position, the channel for the nearest weather transmitter in the data base is automatically displayed.

- Press the number of the weather channel you desire. In the U.S., most weather stations are channels 1, 2, or 3, and channels 4 through 7 are used sparingly. The following table may be of assistance if you know the frequency but don't happen to know the channel number:

Channel	Frequency
1	162.550 MHz
2	162.400 MHz
3	162.475 MHz
4	162.425 MHz
5	162.450 MHz
6	162.500 MHz
7	162.525 MHz
8	161.650 MHz
9	161.775 MHz
10	163.275 MHz

See Appendix E for a complete listing of the locations of weather channels for the USA and Canada.

Duplex COMM tuning operation may be performed on the COM 1 page, but on no other page of KLX 100. Duplex operation is transmitting on a VHF COMM frequency, and receiving on another frequency (usually in the VOR band). A frequent use is for Flight Service Stations. An FSS will broadcast from a VOR, and receive aircraft transmissions on 122.10 MHz.

The duplex feature is selected with the change field on the left side of the COM 1 page



**To tune a duplex channel:**

- Turn on the **CRSR** and use the **↓** softkey to move the cursor to the mode change field.
- Press the **CHNG** softkey to change from **NORMAL** mode to **DUPLEX** mode (figure 4-14). Notice that there are now two frequencies shown in the **STANDBY** window, **TX** (KLX 100 transmit frequency) and **RX** (KLX 100 receive frequency).

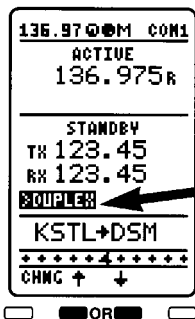









Figure 4-14

3. Press the  softkey twice to move the cursor to the **TX** frequency. In this case, press , , , , . If you enter less than five digits, press the  softkey, and the rest of the digits will be filled with zeros. Either way, the cursor moves to the **RX** field (figure 4-15).

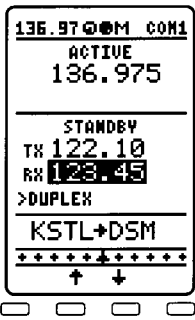



Figure 4-15

5. Press the phonepad keys for the desired numbers of the **RX** frequency. When you fill in the last digit (or press ), the cursor will automatically be removed from the screen (figure 4-16).

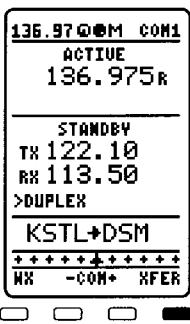



Figure 4-16

6. At this point, the duplex channels are still in the **STANDBY** window. To transfer the duplex channels to the **ACTIVE** window, press the  softkey (figure 4-17). You are now ready for duplex operation.

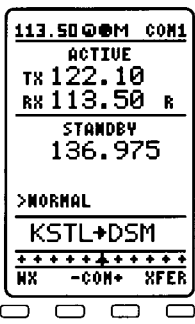


Figure 4-17

## 4.2. THE COM 2 PAGE--QUICKTUNE®

The COM 2 page is where you view COMM frequencies from the data base, and transfer them to the COMM transceiver, if desired. This process of frequency transfer is known as QuickTune®.

There are three distinct formats for the COM 2 page. One is **AIRPORT** format (figure 4-18), one is **NEAREST** format (figure 4-19), and the third is **MEMORY**

format (figure 4-20). The mode is indicated by the change field in the upper left corner of the display. To change formats, simply turn on the **CRSR**, and use the **CHNG** softkey to go between the three choices.

### 4.2.1. AIRPORT FORMAT

Refer to figure 4-18. The ICAO identifier of the airport is displayed on the right side of line 1, and the full airport name is displayed on line 2. Airports may only be entered by ICAO identifier on this page.

The VHF communication frequency types and actual frequencies (in MHz) associated with the airport are listed down the screen. If there are more than 8 COMM frequencies for the airport, a "↓" sign will precede the one on the last line (figure 4-21).

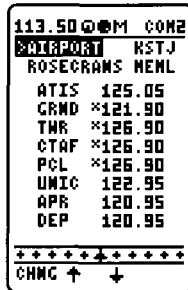


Figure 4-18

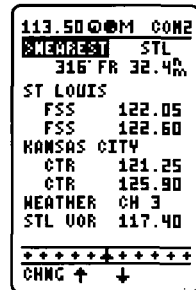


Figure 4-19

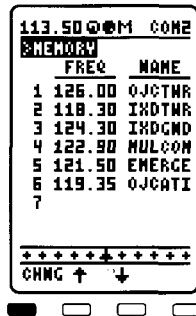


Figure 4-20

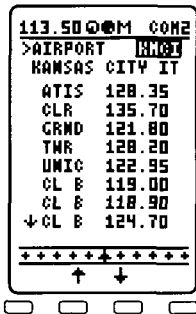


Figure 4-21



The frequency type abbreviations are:

<b>AAS</b>	Aeronautical Advisory Service
<b>AFIS</b>	Aerodrome Flight Information Service
<b>ARVL</b>	Arrival
<b>APR</b>	Approach
<b>ASOS</b>	Automated Surface Observation Station
<b>ATF</b>	Aerodrome Traffic Frequency
<b>AWOS</b>	Automated Weather Observation Station
<b>ATIS</b>	Automated Terminal Information Service
<b>CL B</b>	Class B Airspace (formerly Terminal Control Area)(VFR frequency)
<b>CL C</b>	Class C Airspace (formerly Airport RADAR Service Area)(VFR frequency)
<b>CLR</b>	Clearance Delivery
<b>CTA</b>	Control Area (VFR frequency used outside the U.S.A.)
<b>CTAF</b>	Common Traffic Advisory Frequency
<b>CTR</b>	Center (when center is used for approach/departure control)
<b>DEP</b>	Departure
<b>DIR</b>	Director (approach control/RADAR)
<b>GRND</b>	Ground Control
<b>MCOM</b>	Multicom
<b>MF</b>	Mandatory Frequency
<b>PCL</b>	Pilot-controlled Lighting
<b>PTAX</b>	Pre-taxi Clearance
<b>RAMP</b>	Ramp/Taxi Control
<b>RDO</b>	Radio
<b>RDR</b>	RADAR-only Frequency
<b>TMA</b>	Terminal Area (VFR frequency used outside the U.S.A.)
<b>TRSA</b>	Terminal RADAR Service Area
<b>TWR</b>	Control Tower
<b>UNIC</b>	Unicom

Part-time operation, such as for a control tower, is indicated with an **X** to the left of an airport frequency.

 **To select a COMM frequency using QuickTune®**

1. Turn on the **CRSR**.
2. Use the **↑** and **↓** softkeys to move down the list of frequencies. If there are more than 9 frequencies, keep pressing the **↓** softkey, and the display will scroll to the remaining frequencies (figure 4-22).
3. Once you have selected the desired frequency, press the **XFER** softkey to make the selected frequency the active COMM frequency (figure 4-23). Notice that the selected frequency is now displayed in the upper left corner of the screen.

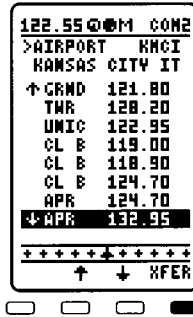


Figure 4-22

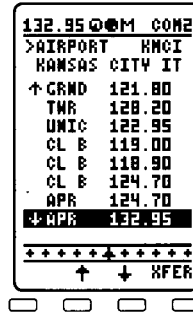


Figure 4-23

4. Turn off the **CRSR**.

**4.2.2. NEAREST FORMAT**

See figure 4-24. The **NEAREST** format of the COM 2 page displays:

- the nearest VOR to your present position and your radial and distance from the VOR.
- the name of the nearest Flight Service Station (FSS) facility, along with its frequency.
- the name of the nearest Center (ARTCC or FIR) facility, along with its frequency.
- the nearest Weather Station channel number (1 through 10).
- the frequency of the nearest VOR.

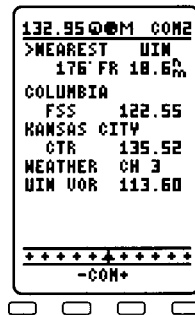


Figure 4-24

You may use QuickTune® to tune these frequencies using the same procedure that was described in section 4.2.1.

### 4.2.3. MEMORY FORMAT

See figure 4-25. The **MEMORY** format of the COM 2 page allows you to enter, view, and tune up to 50 COMM channels. In addition, you may add a label of up to six characters to help you remember the frequency usage.

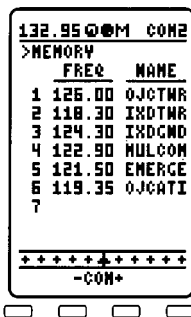


Figure 4-25



### To add a memory channel:

1. Turn on the **CRSR**.
2. Use the **▲** and **▼** softkeys to position the cursor over the desired location (figure 4-26). The new memory channel you add will precede the one the cursor is over.
3. Press the **ENT** softkey followed by the **ADD** softkey to add a new memory channel.
4. Use the numeric keypad keys to enter the channel frequency.
5. If the last one or more digits is a zero, you may press the **DEL** softkey to move the cursor to the **NAME** field.

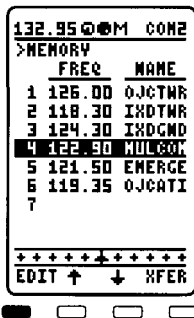


Figure 4-26

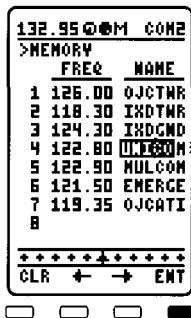


Figure 4-27

6. Use the keypad and softkeys to enter a six-character label, if desired (figure 4-27).
7. Press the **ENT** softkey to finish editing this memory channel. You may now use the **▲** and **▼** softkeys to move up and down the list of memory channels again.

You may use QuickTune® to tune these frequencies using the same procedure that was described in section 4.2.1.



**To delete a memory channel:**

1. Turn on the **CRSR**.
2. Use the **↑** and **↓** softkeys to position the cursor over the channel you wish to delete.
3. Press the **ENT** softkey to enter the editing mode.
4. Press the **DEL** softkey to delete the memory channel.
5. Press the **RTN** softkey to exit the editing mode. You may now use the **↑** and **↓** softkeys to move up and down the list of memory channels again.



**NOTE:** Addition and deletion of Memory channels may only be accomplished on the COM 2 page.

**4.3. THE COM 3 PAGE--COMM SCANNING**

The COM 3 page is for COMM scan operations. Like the COM 2 page did with QuickTune®, the COM 3 page uses the data base and the COMM transceiver together to give you some very powerful features.


Have you ever been on the ground near an airport, maybe for an air show, and wanted to scan all the local frequencies to hear about all of the action that's going on. If you have used another handheld VHF radio, you may have looked the frequencies up and entered them manually into memory channels, and scanned those. That process is a lot of work, especially if you want to turn around and do the same thing at another airport. KLX 100 has the nice feature of scanning all the published frequencies for any data base airport, and you can even select the ones that you want to lock out of the scan.

When the KLX 100 is scanning, it goes through the frequencies included in the scan, one by one, and only pauses when the receiver detects a signal. During this time, the left side of the Title Bar displays **SCAN** (figure 4-28), rather than the active frequency (like it usually displays).

SCAN	COM	COMM
>AIRPORT		HWCI
SCAN		
ATIS	128.35	
CLR	135.70	
GRND	121.80	
TWR	128.20	
UNIC	122.95	
CL B	119.00	
CL B	118.90	
↓CL B	124.70	
*****		
STOP -COM+		




Figure 4-28

When a signal is detected, you will hear the received audio (assuming the volume is properly adjusted), and the word **SCAN** is replaced with the received frequency. Once the signal has gone inactive for two seconds, KLX 100 will resume scanning until it detects another signal on one of the scan frequencies.

Remember how the COM 2 page had three formats, the **AIRPORT** format, the **NEAREST** format, and the **MEMORY** format? The COM 3 page has these three formats, plus a new one, the **RANGE** format. The **RANGE** format asks you to enter two frequencies: a lower limit and an upper limit. When it does a range scan, it starts at the first (lower) frequency and steps through all of the channels, until it reaches the second (higher) frequency, then starts over. You may also scan a range of weather channels. To do so, press the  key while on one of the scan frequency cursor fields.



**To scan COMM frequencies:**

1. Use the  key and the softkeys to select the COM 3 page.
2. The change field in the upper left corner of the COM 3 page determines what type of scan you will select. The possibilities are **AIRPORT**, **NEAREST**, **MEMORY**, and **RANGE**. These four formats are described in the previous paragraphs. If you wish to change the scan type, turn on the  (figure 4-29) and press the  softkey to change between the four options.

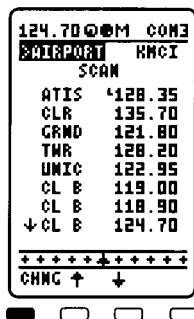




Figure 4-29

3. Press the  softkey to initiate scanning.
4. If you wish to halt the scanning, there are three things you can do. You may manually enter a new active COMM frequency from any page other than the COM pages (see section 2.4), you may reselect the COM 3 page and press the  softkey to stop scanning, or you may press the push-to-talk (**PTT**) button.

"Lock out" means that the KLX 100 will skip over that frequency when it does its scan. For example, if you are scanning all the frequencies for an airport which has ATIS (Airport Traffic Information Service), the scan will get stuck on ATIS, and never

resume scanning, because ATIS never goes away. The only format you can't use the lock out feature on is the **RANGE** format, since the **RANGE** format does not list individual frequencies.



**To lock out COMM frequencies from a scan:**

1. After you have selected the desired scan type (see step 2 in the procedure immediately above) other than **RANGE**, press the **CRSR** key to turn on the cursor if necessary.

2. Use the **↑** and **↓** softkeys to move the cursor to the frequency you wish to lock out (figure 4-30).

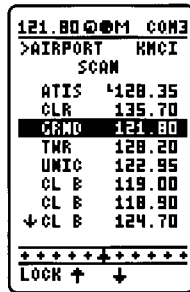


Figure 4-30

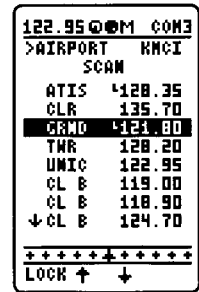


Figure 4-31

3. Press the **LOCK** softkey to lock the selected frequency. Notice that a small **L** appears to the left of the frequency (figure 4-31). Also notice that you may select a locked out frequency and press **LOCK** to unlock it.

4. Repeat the procedure for as many frequencies as you wish to lock out or unlock.



**NOTE:** All continuously broadcasting frequencies are initially locked out. Those frequencies can be unlocked, if you desire.

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## 5. FLIGHT PLANS

### 5.1. CREATING AND MODIFYING FLIGHT PLANS

Helpful things to remember about KLX 100 flight plans:

- The KLX 100 is capable of storing in its memory 29 flight plans plus an active flight plan.
- Each of the flight plans may contain up to 30 waypoints. The waypoints may consist of any combination of published airports or VORs from the data base or user defined waypoints.
- The flight plans are numbered 0 through 29 (FPL 0, FPL 1, . . . , FPL 29).
- The active flight plan is always FPL 0. You may create a flight plan in one of the flight plans numbered as FPL 1, FPL 2, etc. When one of these numbered flight plans is activated, it becomes FPL 0, the active flight plan. This Operator's Guide will refer to FPL 0 as the "active flight plan" and FPL 1 through FPL 29 as the "numbered flight plans." If desired, a flight plan can be created directly in the active flight plan. This avoids creating the flight plan in a numbered flight plan and then having to activate it. The disadvantage is that if a numbered flight plan is subsequently made active, the one programmed directly into FPL 0 will be lost, unless it is stored as a numbered FPL.
- Modifications may be made to FPL 0 without affecting the way it is stored as a numbered flight plan.
- Unless Direct To operation is being used, the active flight plan (FPL 0) must contain at least two waypoints. Otherwise, KLX 100 navigation will be flagged.



5.1.1. CREATING A FLIGHT PLAN

For a fun flight, let's create a flight plan from Sacramento (California) Executive Airport to Portland-Hillsboro (Oregon) Airport, generally following the Victor 23 airway. The waypoints making up the flight plan are: **KSAC** (Sacramento Executive), **RBL** (Red Bluff VOR), **FJS** (Fort Jones VOR), **OED** (Rogue Valley VOR), **EUG** (Eugene VOR), and **KHIO** (Portland-Hillsboro airport). A diagram of the flight plan is shown in figure 5-1.

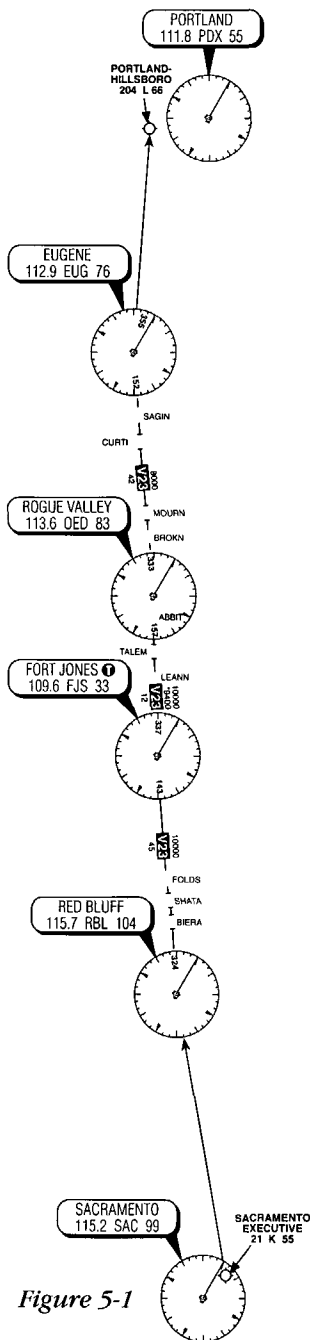


Figure 5-1



**To create a flight plan:**

1. If the flight plan (FPL) pages are not already selected, press the **PAGE** key until the FPL pages are displayed (figure 5-2)
2. Use the FPL **-** or **+** softkey to select the **FPLS** page. The flight plans may be viewed by number (by pressing the **NUM** softkey) or alphabetically by departure waypoint identifier (by pressing the **NAME** softkey).

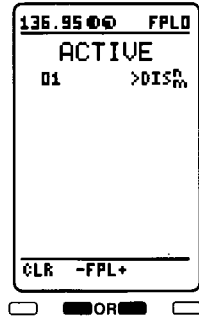


Figure 5-2

3. Press the **CRSR** key to turn on the cursor.
4. Use the **↑** and **↓** softkeys to select a flight plan page (preferably other than FPL 0) which does not contain a flight plan (figure 5-3). The **FPLS** page automatically puts the first empty flight plan on the second line. If there are more than 8 stored flight plans, and the cursor is off, you may press the **MORE** softkey to view the next page quickly. If all of the flight plan pages contain flight plans, refer to section 5.1.6, "Deleting Flight Plans."
5. Press the **ENT** softkey to select that specific numbered flight plan.

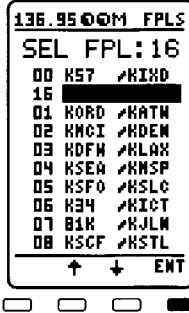


Figure 5-3

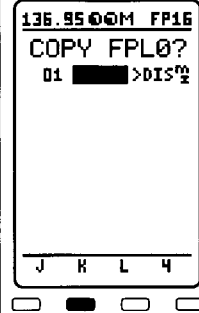


Figure 5-4

6. Turn on the **CRSR**.
7. Use the alphanumeric keypad keys (**JKL 4**) to select the first character of the departure waypoint identifier (figure 5-4), and then the appropriate softkey for the desired letter (**K**).



**NOTE:** The KLX 100 flight plan operation is designed so that the first waypoint in the flight plan should always be the departure point. Remember to enter the K, P, or C prefix for certain airports in the United States, Alaska (some, but not all cases), or Canada, respectively. See section 1.3.3, "ICAO Identifiers."

8. In the same way, select the desired letter or number for the rest of the characters of the waypoint identifier (figure 5-5).

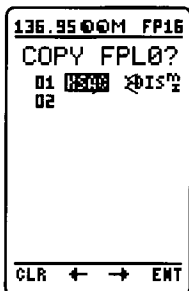


Figure 5-5

9. Press the **ENT** softkey. The waypoint page for the identifier just entered will be displayed on the screen (figure 5-6). If a mistake was made and the wrong waypoint identifier was entered, you may press the **CLR** softkey to begin again, or move the cursor to the waypoint identifier, name, or city, and change it as desired. See section 3.4, "The Waypoint (NAV 4) Page."

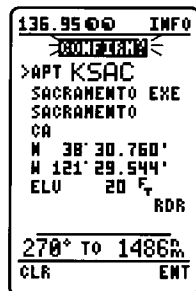


Figure 5-6

10. Press the **ENT** softkey again to approve the waypoint page being displayed. The cursor will move automatically to the second waypoint position (figure 5-7).

11. Use the same procedure to enter the rest of the waypoints in the flight plan (figure 5-8). If the flight plan consists of 10 or more waypoints, the waypoints will automatically scroll as necessary to allow entry of the next waypoint.

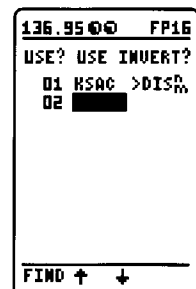


Figure 5-7

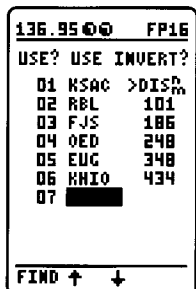


Figure 5-8

12. When all of the waypoints have been entered in the flight plan, the **↑** and **↓** softkeys move the cursor up and down and manually "scroll" through the way-

**NOTE:** If you are unsure of a waypoint identifier, you may press the **FIND** softkey while the cursor is on a blank spot in the flight plan. You may then select a waypoint by name or city (figure 5-9). See section 3.4, "The Waypoint (NAV 4) Page."

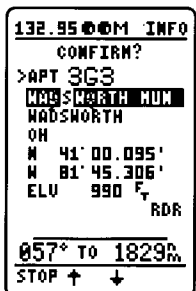





Figure 5-9

points making up this flight plan. This is useful if the flight plan contains 10 or more waypoints since not all of the waypoints can be displayed at one time. Press the  key and position the cursor over **USE?**. If there are more than 10 waypoints in the flight plan, the first nine waypoints will then be displayed followed by the last waypoint in the flight plan. Use the softkeys to move the cursor and manually scroll to see the missing intermediate waypoints.

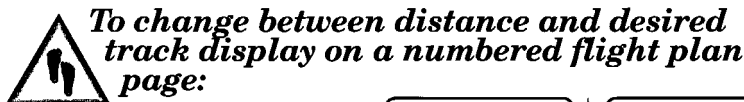
13. Turn off the . Additional flight plans may now be created in the same manner.




### 5.1.2. VIEWING DISTANCE AND DESIRED TRACK BETWEEN STORED FLIGHT PLAN WAYPOINTS

The stored flight plan (FPL 1-9) pages have a field to the right of each waypoint in the flight plan. This field may be used to display the cumulative distance (**DIS**) to each waypoint or the magnetic desired track (**DTK**) from the previous waypoint.

If you have more than 10 waypoints in the stored flight plan, you may wish to view flight data for waypoints which are not displayed on the screen. If this is the case, turn on the  and use the softkeys to scroll down the flight plan until the waypoint of interest is on the screen.

This display will default to the previously selected format at power-on. The area in the upper right hand corner of the screen is a change field.



1. Turn on the ; it will come up over the change field, which in this case is displaying distance (**DIS**) in nautical miles (figure 5-10).
2. Press the  softkey. The change field will change to magnetic desired track (**DTK**) (figure 5-11). An additional  press cycles back to **DIS**.

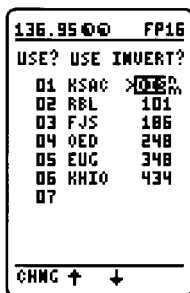


Figure 5-10

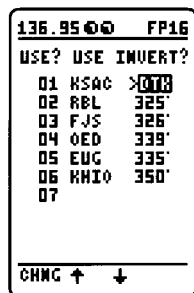


Figure 5-11

5.1.3. ACTIVATING A NUMBERED FLIGHT PLAN



*To activate one of the previously created numbered flight plans:*

1. Select the desired flight plan.
2. Turn on the **CRSR**. It will appear over **USE?** (figure 5-12). If you haven't left the numbered flight plan since creating this flight plan, use the softkeys to position the cursor over **USE?**.

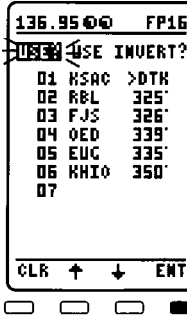


Figure 5-12

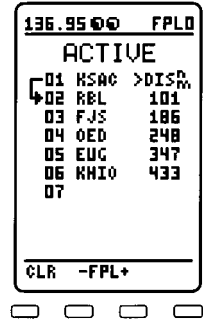


Figure 5-13

3. Press the **ENT** softkey to activate the flight plan in the order shown (figure 5-13). To activate the flight plan in inverse order (first waypoint becomes last and last waypoint becomes first), position the cursor over **USE INVERT?** before pressing **ENT**.

4. The selected flight plan is now displayed as FPL 0, the active flight plan. Any changes made to FPL 0 will not affect how this flight plan is stored as the numbered flight plan.

5.1.4. ADDING A WAYPOINT TO A FLIGHT PLAN

A waypoint may be added to any flight plan containing fewer than 30 waypoints.



*To add a waypoint to a flight plan:*

1. Turn on the **CRSR**.
2. Position the cursor over the waypoint identifier which you desire to follow the waypoint being added. Another way to think of this is to position the cursor over the location in the

flight plan you wish the new waypoint to be added. For example, if **RBL** is presently the second waypoint in the flight plan and you wish to insert **SAC** in the number 2 position in front of **RBL**, move the cursor over **RBL** (figure 5-14).

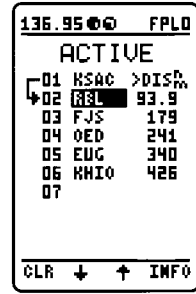


Figure 5-14

- Enter the first character of the waypoint being inserted. When the **STU** key is pressed, the existing waypoint in this position automatically jumps down to the next position. In this case, **RBL** automatically moves to waypoint 3 and **KHIO** changes to waypoint 7.

- Complete the waypoint entry operation (figure 5-15).

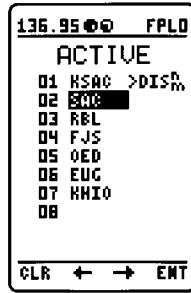


Figure 5-15

- Press the **ENT** softkey to display the waypoint page for the identifier just entered.

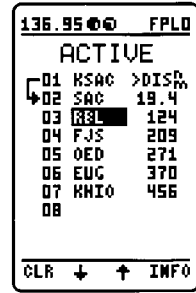


Figure 5-16

- Press **ENT** again to approve the waypoint page (figure 5-16).

- Turn off the **CRSR**.

### 5.1.5. DELETING A WAYPOINT FROM A FLIGHT PLAN



**To delete a waypoint from a flight plan:**

- Press **CRSR** to enable the cursor if it is not on already.
- Move the cursor over the waypoint you wish to delete (figure 5-17).

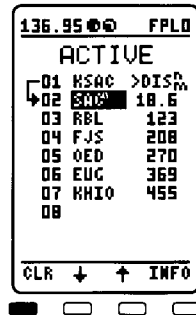


Figure 5-17

- Press the **CLR** softkey. The letters **DEL** (delete) will appear to the left of the identifier and a question mark will appear to the right of the identifier (figure 5-18). If a mistake was made and you do not wish to delete this waypoint, press **CLR** again.

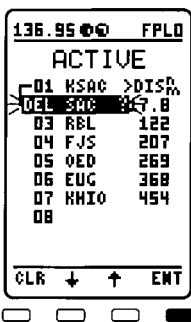


Figure 5-18

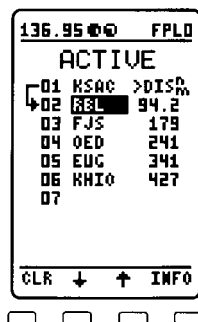


Figure 5-19

- Press **ENT** and the waypoint will be deleted from the flight plan. The other waypoints in the flight plan will be correctly repositioned (figure 5-19).
- Turn off the **CRSR**.

### 5.1.6. DELETING FLIGHT PLANS



**To delete a flight plan which is no longer required:**

- Select for display the flight plan (FPL 0, FPL 1, . . . , or FPL 29) which is to be cleared.
- Make sure that the cursor is turned off, and use the **CRSR** key if it is not.
- Press the **CLR** softkey. The word **DELETE?** will appear at the top of the page (figure 5-20). If a mistake was made and you do not wish to clear this flight plan, press **CLR** again.
- Press **ENT** to clear the flight plan (figure 5-21).

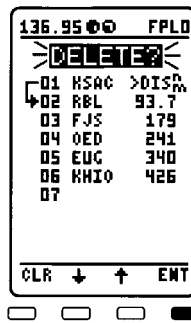


Figure 5-20

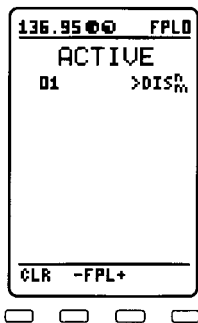


Figure 5-21

### 5.1.7. STORING FPL 0 AS A NUMBERED FLIGHT PLAN

The active flight plan may be loaded into a numbered flight plan so that it can be recalled for later use. This may be desirable, for example, if the active flight plan was originally created on the FPL 0 page and not as a numbered flight plan.



**To store the active flight plan as a numbered flight plan:**

1. Select a numbered flight plan page which does not contain any waypoints. If none exist, use the procedure described in section 5.1.6, "Deleting Flight Plans" to clear a flight plan which is no longer required.
2. Turn on the **CRSR**. It will appear over the blank first waypoint position.
3. Use the softkeys to position the cursor over **COPY FPL0?** (figure 5-22).
4. Press **ENT** to load the active flight plan into this numbered flight plan (figure 5-23).

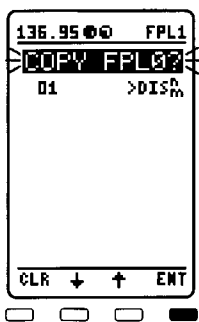


Figure 5-22

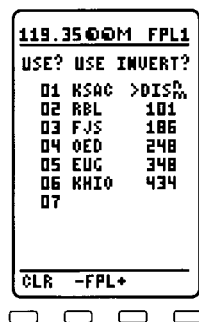


Figure 5-23

## 5.2. USING THE ACTIVE FLIGHT PLAN (FPL 0)

### 5.2.1. GENERAL PROCEDURES

Everything you have learned in this Operator's Guide thus far is applicable to using the KLX 100 for flight plan operation. The following rules and considerations apply for flight plan operation:

- Always verify that you are viewing the active flight plan page (FPL 0) and not one of the other flight plan pages.



- The active leg of the flight plan is designated with an arrow symbol. A leg is defined as the course line between a pair of waypoints (a “from” waypoint and a “to” waypoint). In figure 5-24 the head of the arrow is positioned to the left of and points to the active “to” waypoint. In figure 5-24, ICT (Wichita VOR) is the “to” waypoint. The tail of the arrow is positioned to the left of the “from” waypoint. EMP (Emporia VOR) is the “from” waypoint in figure 5-24. The arrow is not displayed unless the KLX 100 is actually receiving GPS signals suitable for navigation. If the Direct To waypoint is in FPL 0, the **⊞** symbol appears to the left of the active waypoint (figure 5-25). The arrow will not be displayed if Direct To navigation is occurring and the Direct To waypoint is not in FPL 0. If in doubt as to whether or not a Direct To operation to a non-flight plan waypoint is occurring, view the NAV 2 page. If the top line shows the **⊞** symbol instead of a “from” waypoint, then Direct To navigation is occurring. If it is desired to cancel the Direct To operation and operate from the active flight plan, press **⊞**, and then **ENT**.

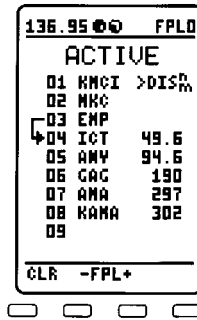


Figure 5-24

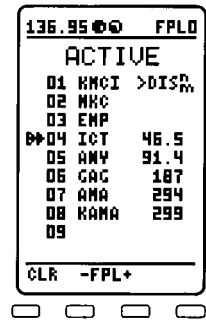


Figure 5-25

view the NAV 2 page. If the top line shows the **⊞** symbol instead of a “from” waypoint, then Direct To navigation is occurring. If it is desired to cancel the Direct To operation and operate from the active flight plan, press **⊞**, and then **ENT**.

- As flight plan waypoints are reached, the active leg symbol automatically shifts to the next leg.



*If the unit is in the simulator mode, it has been “tricked” into thinking it is receiving signals and therefore the leg symbol can be displayed.*

- If the flight plan contains more waypoints than can be displayed on the screen at one time, the page will automatically scroll as progress is made along the flight plan so that the active leg is always displayed.

- The last waypoint in the flight plan is always displayed at the bottom of the FPL 0 page, even if all of the waypoints in the flight plan can't be displayed on the page at one time. To view intermediate waypoints, turn the **CRSR** on and use the softkeys to manually scroll through all of the waypoints, as desired. If scrolling is performed all the way to the end of the flight plan, a blank waypoint position will exist so that a waypoint may be added to the end of the flight plan (figure 5-26).

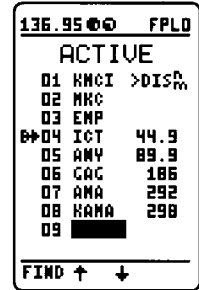


Figure 5-26

### 5.2.2. TURN ANTICIPATION AND WAYPOINT ALERTING

Prior to reaching a waypoint in the active flight plan, the KLX 100 provides navigation along a curved path segment to ensure a smooth transition between two adjacent legs in the flight plan. That is, the CDI or mini-HSI left/right deviation will be referenced to the dashed line in figure 5-27. This feature is called turn anticipation. The transition course is based upon the aircraft's actual groundspeed and the amount of course angle change between the two legs. The KLX 100 automatically sequences to the next leg after passing the midpoint in the transition segment.

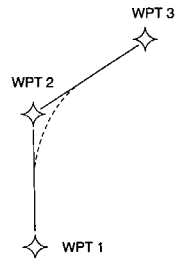


Figure 5-27

Approximately 20 seconds prior to the beginning of turn anticipation, the arrow preceding the active waypoint identifier will begin flashing on the FPL 0 page and on any Navigation page or waypoint page displaying the active waypoint identifier (figure 5-28). This is called "waypoint alerting". At the same time, the desired track "bug" on the mini-HSI starts flashing (figure 5-29).

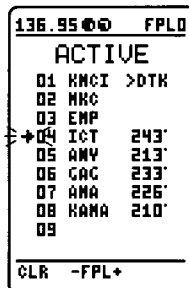


Figure 5-28

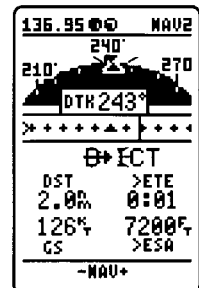


Figure 5-29

To utilize the turn anticipation feature, start the turn transition to the next leg in the flight plan at the very beginning of turn anticipation. The desired track (DTK) displayed on the NAV 1 and 2 pages also changes to the value for the next leg at the beginning of turn anticipation. Turn anticipation becomes inactive when the transition to the next leg has been made.

**5.2.3. VIEWING THE WAYPOINT PAGES FOR THE ACTIVE FLIGHT PLAN WAYPOINTS**

The waypoint pages for each of the waypoints in the active flight plan may be easily displayed by selecting the NAV 4 page, which defaults to display of the active waypoint information page (figure 5-30). See section 3.4 for more information on the NAV 4 page.

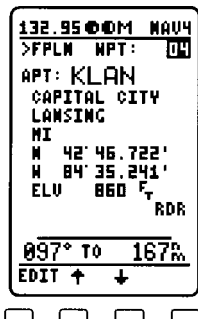


Figure 5-30

**5.2.4. COMBINING DIRECT TO AND FLIGHT PLAN OPERATION**

It is very common when using flight plan operation to use the Direct To function to proceed directly to a waypoint which exists in the active flight plan. For example, after takeoff, it is common to receive vectors in the terminal area and then be given a clearance Direct To the first point in the flight plan that was filed. The KLX 100 makes this kind of operation very easy to accomplish. Whenever you do a Direct To operation to a waypoint which is in the active flight plan (FPL 0), the system will provide navigation to the waypoint and then automatically resume navigation along the flight plan when the Direct To waypoint is reached. Waypoints which exist prior to the Direct To waypoint in the active flight plan are bypassed. Of course, the active flight plan will never be resumed if the Direct To operation is to a waypoint which is not in the active flight plan.

Any of the several methods previously described for initiating Direct To operation may be used, although the one below is the easiest for this application.



**To go Direct To a waypoint in the active flight plan (FPL 0):**

1. Select the FPL 0 page.
2. Turn on the **CRSR** and use the softkeys to position the cursor over the desired waypoint (figure 5-31).
3. Press **ENT**. The display will change to the Direct To Page (figure 5-32), with the identifier of the selected waypoint.

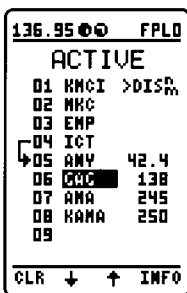


Figure 5-31

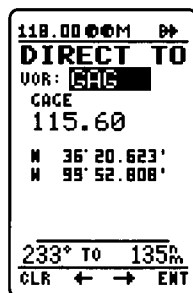


Figure 5-32

4. Press **ENT** to approve the Direct To. The FPL 0 page will be displayed (figure 5-33) reflecting the new active waypoint. You will see that the active waypoint is now preceded by an arrow only, instead of the symbol. This is because there is no "from" waypoint in the flight plan.

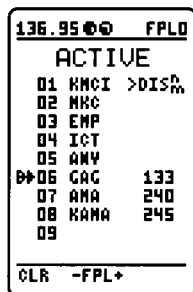


Figure 5-33

If it is desired to cancel the Direct To operation prior to reaching the Direct To waypoint in order to proceed along the flight plan leg, press **ENT**, then press **CLR**, then **ENT**.

**5.2.5. VIEWING DISTANCE, ETE, ETA, OR DESIRED TRACK TO FLIGHT PLAN WAYPOINTS**

The active flight plan (FPL 0) page has a data field to the right of each waypoint in the flight plan. This field may be used to display the cumulative distance (**DIS**) from the present position to each waypoint, the magnetic desired track (**DTK**) between each waypoint, the estimated time en route (**ETE**) and the estimated time of arrival (**ETA**, for which the time zone abbreviation is displayed).

If you have more than ten waypoints in FPL 0, you may wish to view flight data for waypoints which are not displayed on the screen. If this is the case, turn on the **CRSR** and use the softkeys to scroll down the flight plan until the waypoint of interest is on the screen.

This display will default to the previously selected presentation at power-on (figure 5-34). The area in the upper right hand area of the screen is a change field, which means that . . .



### *To change between distance, desired track, ETE and ETA on the FPL 0 page:*

1. Turn on the **CRSR**; it will come up over the change field, which in this case is displaying distance (**DIS**) in nautical miles (figure 5-34).
2. Press **CHNG**. Subsequent presses of the **CHNG** key will cycle through magnetic **DTK**, **ETE** in hours: minutes (figure 5-35), **ETA** in terms of the system time zone, then back to **DIS**.

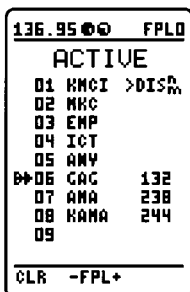


Figure 5-34

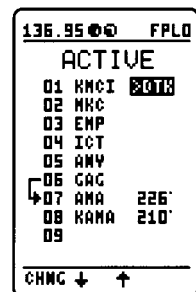


Figure 5-35

## 6. MENUS AND SETUPS

### 6.1. MAIN MENU

The Main Menu (figure 6-1) is a directory of all the initialization, status, setup, and auxillary functions of the KLX 100. Each time you use the **[PAGE]** key to go through the main page types, you will always see the Main Menu page after you see the Flight Plan pages. If you are operating on one of the setup pages, we suggest you finish your operation before changing over to another page to check navigation status because, upon returning to the Main Menu page, you will have to access the particular page you were working on before.

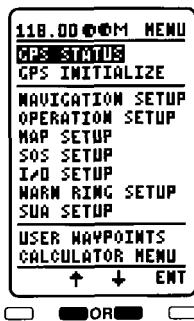


Figure 6-1

Operation of the Main Menu is very, very simple. When you first select this page, the cursor will automatically be on the screen and over the last used selection. The **[DOWN]** and **[UP]** softkeys move the cursor down and up the menu list, respectively, and the **[ENT]** softkey changes you to the page you have selected.

The only time you may want to turn the cursor off is if you wish to utilize the COMM tuning features. Press the **[CRSR]** key to remove the cursor from the screen, then press the **[ARC]** key to begin aviation band frequency entry or press the **[VWX]** key to begin weather frequency entry (if the KLX 100 has an Americas data base).

All of the pages available from the Main Menu include a softkey labeled **[MENU]**. You can press this softkey to return to the Main Menu.

### 6.2. GPS STATUS PAGE

The page you will probably use most often from the Main Menu is the GPS Status page (figure 6-2). The GPS Status page tells you the navigation status of the GPS receiver and the locations and status of the GPS satellites which it is tracking, and whether the KLX 100 is using its internal GPS antenna, or the external antenna.

The GPS receiver in the KLX 100 is capable of using signals from up to eight satellites to determine its position. A valid three-dimen-

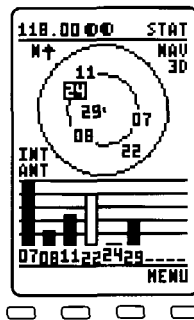


Figure 6-2

sional position may be determined using as few as four satellites, and a valid two-dimensional position may be determined using as few as three satellites and an approximate altitude entered by the user. However, four satellites (3D) or three satellites (2D) alone do not necessarily ensure that navigation can take place. The satellites must be positioned relative to your location such that sufficient "geometry" exists to determine an accurate position. The satellite constellation geometry (the relative positions of the satellites) is continually changing as each satellite "rises", travels across the sky, and eventually "sets" relative to your position. The GPS satellites are not in geosynchronous orbits positioned over the same spot on Earth at all times like some television communication satellites with which you may be familiar. Rather, the GPS satellites are in orbits that allow them to circle the Earth about two times each day.

The receiver status is displayed in the top right corner of this page. The possibilities for receiver status are:

<b>SELF LOC</b>	Self Locate Mode
<b>ACQ</b>	Acquisition
<b>NAV 2D</b>	Two-dimensional Navigation (GPS altitude unknown)
<b>NAV 3D</b>	Three-dimensional Navigation
<b>DEAD RKN</b>	Dead Reckoning
<b>POSN INV</b>	Position Invalid
<b>SIM</b>	Simulator Mode

- Self Locate mode may be initiated by the user, or by the GPS receiver itself. If you power the KLX 100 up greater than 60 miles away from where you last used it, or if the last usage was more than six months ago, and you don't have a very good idea at all what your approximate position is, you may select the Self Locate mode, so that the GPS receiver will just start scanning all the satellites in the GPS system (or constellation) to see which ones may be used for positioning and navigation. Self Locate mode also commences when the GPS receiver has used the date, time, and initial position you gave it for several minutes without successfully acquiring the actual GPS position.
- During the acquisition phase, the visible satellites are being acquired and data is obtained from them (see Appendix G, "GPS Primer").

- In two-dimensional navigation, only three satellites are being used for navigation, so it is relying on a user-entered altitude as its fourth "measurement". This type of navigation will typically not be as accurate as three-dimensional navigation, in which the receiver is using four or more satellites to determine your position.
- The Simulator mode is discussed more in the next section, section 6.3.

The two concentric rings with numbers on them are a pictorial guide to the locations of the GPS satellites which are currently in the sky. The characteristics of this picture are:

- True north is at the top of the outer circle, and likewise true east is at the right side of the outer circle.
- The center of the circles is straight above you in the sky.
- The outer circle represents the horizon.
- The inner circle represents 45° elevation above the horizon.

The numbers in this area are the ID numbers for specific satellites. In figure 6-3, satellite 29 is directly overhead. To see the location of satellite 22, face southeast and look halfway between the horizon and straight-up. Notice that satellite 24 is in reverse video. This means the KLX 100 GPS receiver is not tracking this satellite.

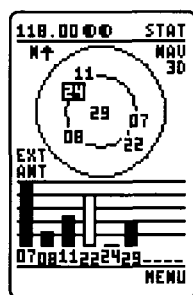


Figure 6-3

This display helps you determine ideal placement and orientation of the KLX 100 GPS antenna, whether you are using the built-in antenna, or the external patch antenna. For example, if you were flying north with the antenna suction-cupped to the left window (which would be facing west), and lost navigation capability, you could look at the GPS Status page, and might determine that a majority of the visible satellites are actually in the eastern portion of the sky. You could possibly move the external antenna to the right-side window and resume GPS navigation.

The bar graphs along the bottom of the GPS Status Page represent the received signal levels for each of the satellites that the GPS receiver is tracking. Notice that there can be up to eight bar graphs, one for each channel of the receiver. The satellite IDs are

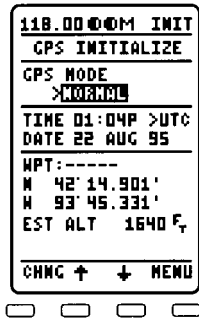


listed across the bottom of the bar graph. The taller the bar, the stronger the received signal from that satellite. In a case like mentioned in the last paragraph, where you move the antenna around the cockpit to get the best reception, you could use these bar graphs to determine how effective a certain antenna position is by how many satellites have high signal levels. If a bar graph is hollow (see satellite 22 in figure 6-3), that satellite has not collected enough data to be used for the GPS position solution.

For those of you who are interested in electronics and such things, the horizontal lines on the bar graph represent Signal-to-Noise Ratios (SNRs--pronounced "SNURS"--what a fun acronym to say!). If a satellite's bar reaches the top line, its SNR is 50 dB or greater. Each bar represents 5 dB, so if a bar reaches the bottom horizontal line, its SNR is only about 30 dB. If there is only a single line for a bar graph (see satellite 24 in figure 6-3), the satellite is not being tracked.

### 6.3. GPS INITIALIZE PAGE

The GPS Initialize page (figure 6-4) is accessed from the Main Menu and is used to set the mode of the GPS receiver, and to initialize the receiver with a best-guess at your time, date, and initial position. The time, date, and position aid the receiver in acquiring satellites more quickly, because knowing when and where it is allow it to know what satellites are visible in the sky and may best be used for positioning.



The GPS mode may be set to **NORMAL**, **SELF LOCATE**, or **SIMULATOR**. Normal and Self Locate modes will be described a little further down at the end of section 6.3.2.

Figure 6-4

#### 6.3.1. SIMULATOR MODE

The Simulator mode disables the GPS receiver, and lets you tell the KLX 100 where you want to be and how fast you want to move. The Simulator mode is very handy for getting acquainted with the KLX 100 navigation and data base functions without actually moving. Distances count down, waypoints sequence, and the deviation bar (D-bar) follows the progress of the simulated flight.



**To use the Simulator Mode:**

1. Turn on the . It should be positioned on the **GPS MODE** change field.
2. If the GPS mode is not already **SIMULATOR**, press the softkey until **SIMULATOR** is displayed.
3. Use the softkey to move the cursor to the **WPT:** field (figure 6-5).
4. Enter a waypoint to start the flight simulation from, using the normal waypoint entry method, or move the cursor to the latitude and longitude fields and enter a set of position coordinates.
5. Use the softkey to move the cursor to the **HDG** field. If desired, enter a heading for the aircraft to fly. You should know, however, that the KLX 100 navigation system will only use the heading temporarily, or if there is no active flight plan or Direct To waypoint. If there is an active flight plan or Direct To waypoint, it will eventually ignore the heading you enter and "fly" the desired flight course.
6. Move the cursor down again to the **GS** field, and enter the desired groundspeed (up to 999 knots) for the simulator to "fly".

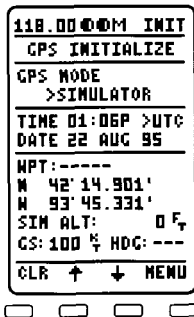


Figure 6-5

**i** **NOTE:** When KLX 100 is in the Simulator mode, the NAV 1 (moving map) page will flash the word **SIMULATOR** along the bottom of the map display area to let you know that you are using Simulator mode rather than actual GPS navigation.

### 6.3.2. *INITIALIZATION AND TIME TO FIRST FIX*

Since the KLX 100 stores its position and other required parameters in memory when power to the unit is removed, it is seldom necessary to aid the unit in reaching a navigation-ready condition, unless the KLX 100 is a long distance away from the location where it was last used. The time required from power on until the KLX 100 determines its present position and is therefore ready to navigate is called "time to first fix." The time to first fix is normally a few minutes or less. In order for the KLX 100 to reach a navigation-ready condition, it is necessary to meet the following conditions (for definitions of GPS terms, see Appendix G, "GPS Primer"):

1. The KLX 100's "almanac" data should be current. Almanac data is orbital information for all the satellites and is used for initial acquisition when the KLX 100 is first turned on. This data is stored in the KLX 100's non-volatile memory and is considered current for up to six months. Each satellite sends almanac data for all satellites. Since the KLX 100 routinely updates the almanac data during normal operation, the almanac data will become out of date only if the KLX 100 hasn't been used for the previous six months or longer. Collecting new almanac data takes place automatically if the data is more than six months old. If the almanac data is out of date and needs to be collected, the KLX 100 will take a few minutes to acquire your present position (usually about six (6) minutes, but not more than 15 minutes).
2. The KLX 100 must be located such that the GPS antenna has an unobstructed view of the sky so that required satellite signals are not being blocked. If you are in an aircraft, position it away from hangars or other obstructions if possible. If you are yoke-mounting KLX 100, chances are that the internal GPS antenna will not be sufficient, due to shading from the aircraft skin. We suggest you use the external patch antenna inside aircraft.
3. It is very helpful for the KLX 100 to have the correct time, date and position to be able to determine which satellites should be in view. This information is stored in the memory of the KLX 100 so it is not normally required to update it. In addition, once a satellite is being tracked, the KLX 100's system time is automatically updated to the correct time. If the KLX 100 has the correct time, date, and position, then the time to first fix will usually be less than two (2) minutes. If

this information is not correct, then the KLX 100 will start to look for any satellites in Self Locate mode. Eventually, the KLX 100 will find enough satellites to determine its position. This process usually takes about 10 minutes, but can take as long as 15 minutes. It is possible for you to update this information manually, which will allow the KLX 100 to reach a navigation-ready status much faster.



**To initialize the time and date:**

1. If the cursor is not on the screen, press the **CRSR** key and use the **↓** softkey to move it over the time zone field (figure 6-6).
2. If the time zone is incorrect, use the **CHNG** softkey to change time zones. The time zones and their abbreviations are listed in section 6.5.

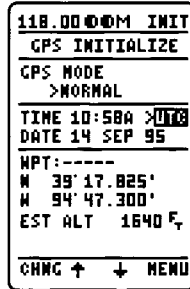


Figure 6-6

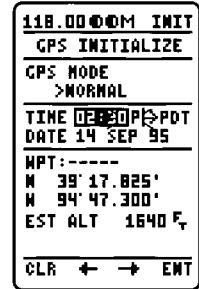


Figure 6-7

3. Use the **↑** softkey to position the cursor over the **TIME** field. If the time is incorrect, enter the numbers of the correct time using the phonepad keys (figure 6-7), and press the **ENT** softkey. The time may either be 24-hour time, or 12-hour time, as set on the Operation Setup page. If it is 12-hour time, you may need to put the cursor on the AM/PM (**A/P**) field and press the **CHNG** softkey.
4. Use the **↓** softkey to position the cursor over the **DATE** field. If the date is incorrect, use the phonepad keys to enter the numbers of the day of the month. After you enter the second digit, the cursor automatically moves to the month field (figure 6-8). Alternatively, you can use the **←** or **→** softkey to move the cursor around.
5. Use the **←** and **→** softkeys to change the displayed month. You will cycle through the months in order. Use the **ENT** softkey to move to the year field.

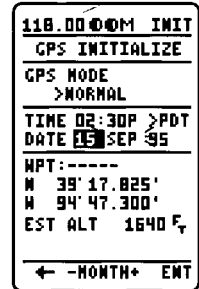


Figure 6-8

- Use the phonepad keys to enter the numbers for the year field. When you are done, press the **ENT** softkey to approve the date as entered.



**NOTE:** Once the KLX 100 is tracking at least one satellite, the time will automatically be updated by the GPS signals. If you try to enter a date and time manually, it will be ignored by the KLX 100.



**To initialize the position:**

- Make sure the GPS mode is **NORMAL**.
- If the cursor is not on the screen, press the **CRSR** key to bring it on the page over the **WPT** field.
- Enter the identifier for the airport where you are presently located or the identifier of a navaid or other airport which is close to your present position, using the normal waypoint entry method. Any waypoint in the data base which is within 60 miles is acceptable, but the closer the better. Remember, if you are entering an airport identifier that is all letters (no numbers), then it will begin with a "K" prefix in the contiguous USA, a "P" in Alaska (in some cases; in others, the prefix is not added), or a "C" in Canada. If there are numbers in the identifier then a prefix is not used. Outside the contiguous USA, Alaska, and Canada, use the airport identifiers as they are charted.

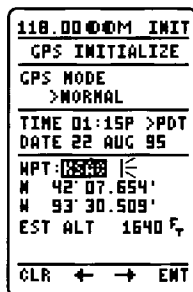



Figure 6-9

- Once you have entered the complete identifier (figure 6-9), press the **ENT** softkey. The identifier will be erased, and the lat/long of the waypoint is displayed.



**NOTE:** As an alternative, you can also enter the approximate latitude and longitude of your present position directly on the GPS INIT page instead of entering a waypoint.

5. If desired, you may enter your estimated altitude (**EST ALT**) at the bottom of the GPS Initialize page. This estimated altitude will be used to aid the GPS receiver in acquiring your position. The altitude is indicated altitude above mean sea level (MSL). Once the KLX 100 GPS receiver acquires a three-dimensional position, this altitude will be replaced with the derived GPS altitude. Move the cursor to the **EST ALT** field using the  softkey, and use the phonepad keys to enter the digits of the estimated altitude. If the GPS receiver gets to a point where it needs you to enter an altitude, the message **2D NAV, ENTER ALTITUDE ON GPS INIT PAGE** will activate.



**NOTE:** *If the KLX 100 is in the 2D NAV (two-dimensional navigation) mode, it means that the GPS receiver is still using the last known GPS altitude or the estimated altitude you entered on the GPS Initialize page. Be sure to update the estimated altitude every few minutes.*

6. Select the NAV 3 page. When the KLX 100 reaches the navigation-ready status, the NAV 3 page will display the present position. Verify that the latitude and longitude and the waypoint, radial, and distance display of present position are correct.

Earlier, we talked about the GPS modes of **NORMAL**, **SELF LOCATE**, and **SIMULATOR**, but only really talked about the **SIMULATOR** mode. In **NORMAL** GPS acquisition mode, the GPS receiver uses the initial position, date, and time information that you enter on this page. If the KLX 100 cannot acquire the expected satellites, KLX 100 will automatically enter the Self Locate mode, in which it ignores the initial position, date, and time, and just starts looking for satellites. If this happens, you may want to cycle power to the KLX 100 to give the GPS receiver a fresh start, especially if you applied power indoors. The **SELF LOCATE** selection on the GPS Initialize page allows you to manually put the GPS receiver in the Self Locate mode. You should seldom need to use this mode, and it is only in cases where you have no good idea of what the position and/or time are.



**NOTE:** *While the unit is in Self Locate mode, avoid transmitting on the KLX 100 COMM. Transmitting will delay the position acquisition process.*

## 6.4. NAVIGATION SETUP PAGE

The Navigation Setup page (figure 6-10) is just that--it configures some of the options for the navigation functions of KLX 100. When you select this page from the Main Menu, the cursor will automatically be on, and you may use the **↓** and **↑** softkeys to move the cursor up and down the page. The setups that are done on this page are the course deviation indicator (CDI) scale, the units of measure, and the nearest airport search criteria. In addition, you may manually enter the magnetic variation.



Figure 6-10

### 6.4.1. UNITS OF MEASURE AND CDI SCALE

The units of measure may be set to **NAUTICAL**, **STATUTE**, or **METRIC**. Change the selection using the **CHNG** softkey. Changing the units causes all measurements of distance, groundspeed, altitude, and runway length to be changed, according to table 6-1.

Table 6-1. Units of Measure Usage

	Distance	Grnd Speed	Alt	Rwy Len
<b>NAUTICAL</b>	Nautical Miles	Knots	Feet	Feet
<b>STATUTE</b>	Statute Miles	Miles/hour	Feet	Feet
<b>METRIC</b>	Kilometers	km/hour	Meters	Meters

Moving back up to the CDI scale field, the CDI scale is the crosstrack distance that represents full-scale (five dots left or right) deviation on the CDI. The choices are 5.0, 1.0, and 0.3 units, where the units are the selected distance units (nautical miles, statute miles, or kilometers). Assuming the units are nautical miles (nm), the usual choice is 5.0 nm, such that one dot of CDI left or right is 1.0 nm. The 1.0 (0.2 nm/dot) and 0.3 (0.06 nm/dot) scales may be used if you desire more precise tracking of your desired course.

If you are using something other than the 5.0 CDI scale, be sure to keep it in mind when you are viewing the CDI on the KLX 100 pages, so you don't accidentally think you are looking at the 5.0 scale.

### 6.4.2. NEAREST AIRPORT CRITERIA

The nine airports in the nearest list (see section 2.7.1) are the nine nearest airports which meet the criteria selected on the Navigation Setup page. The nearest airports may be viewed at any time by pressing the **NRST** key, then selecting **APT**. Nearest airport criteria help you make sure you get appropriate airports for the type of aircraft you are in. For example, you probably wouldn't want to land a turboprop at a 1500 foot long grass strip!



*To specify the nearest airport criteria:*

1. Move the cursor to the **RUNWAY LENGTH** field.
2. Using the phonepad keys, enter the desired number for the minimum runway length (figure 6-11) and press the **ENT** softkey. You may enter values from 1000 feet (305 meters) to 5000 feet (1524 meters). If you enter a number higher or lower than this range, KLX 100 automatically updates it to the maximum or minimum value, respectively.
3. Move the cursor to the **RUNWAY SURFACE** field.



Figure 6-11



Figure 6-12

4. Use the **CHNG** softkey to change back and forth between **HARD** and **HARD OR SOFT** (figure 6-12). Soft runway surfaces include turf, gravel, snow, and dirt.

For example, if the minimum runway criteria selected is 2200 feet in length and **HARD** surface, then only airports having a hard surface runway at least 2200 feet in length will be displayed in the nearest airport list.



### 6.4.3. MAGNETIC VARIATION

Normally, the KLX 100 automatically computes the local magnetic variation for your present position. Any bearing, radial, desired track, or track data is automatically converted to magnetic angles. When this is the case, the **MAG VAR** field displays **AUTO**. If you should happen to be operating outside the magnetic variation coverage area (74° North to 60° South), the KLX 100 will show the message **MAG VAR INVALID, NAV DATA REFERENCED TO TRUE NORTH**. If you desire to change the magnetic variation manually, you may do so at this point. You may also use manual magnetic variation when you are within the magnetic variation coverage area.



*To enter a manual magnetic variation:*

1. Move the cursor to the > symbol on the **MAG VAR** field.
2. Press the **CHNG** softkey to change from automatic to manual magnetic variation (figure 6-13).
3. Press the **↓** softkey to move the cursor to the **MAG VAR** angle field.
4. Press the **OFF** key for easterly magnetic variation, or the **ONV** key for westerly magnetic variation.



Figure 6-13



Figure 6-14

5. Using the keypad keys, enter the desired number for the magnetic variation (figure 6-14) and press the **ENT** softkey. The first number you enter is the tens digit of the variation, so be sure to enter a leading zero if the variation is less than 10 degrees.

If you wish to change the magnetic variation to a value of zero, the message **NAV DATA REFERENCED TO TRUE NORTH** will be displayed. If you manually change the magnetic variation to something other than zero, the message **NAV DATA REFERENCED TO USER DEFINED MAG VAR** will be displayed.

## 6.5. OPERATION SETUP PAGE


The Operation Setup page (figure 6-15) is accessed from the Main Menu and is where general characteristics of the KLX 100 operation are modified.



Figure 6-15

The **MODE** field determines if the GPS and COMM functions are both operational, or if one of them is purposely turned off to conserve power and battery life. The field may read **GPS/COMM**, **COMM ONLY**, or **GPS ONLY**.

Use the **CHNG** softkey to change modes. If the mode is **COMM ONLY**, the GPS receiver is disabled, but the flight simulator will still be operational. If the mode is **GPS ONLY**, the COM pages will appear normally, but the active frequency on the Title Bar will always be dashed out. In addition, if you attempt to transfer or scan COMM frequencies, you will receive a message reminding you that the GPS ONLY mode is active. Appendix B shows typical battery life figures for the three different operation modes.



**NOTE:** *If you only intend to use one of the KLX 100's functions, it is highly recommended that you select **GPS ONLY** or **COMM ONLY** mode, depending on your needs. This will substantially improve your battery life.*

The time displays on the KLX 100 may be either 24-hour time (where, for example, 2:30 P.M. is displayed as 14:30), or in 12-hour time, where 2:30 P.M. is displayed as 2:30P. You may press the **CHNG** softkey to change between these two modes.

The **TIME ZONE** field represents the time zone which KLX 100 uses to display the current time and estimated time of arrival (ETA). The change field shows the abbreviation for the time zone, and the name is displayed in full on the line below.

## Menus & Setups

The following are the time zones which the KLX 100 is capable of displaying:

<b>UTC</b>	Coordinated Universal Time (Zulu)
<b>GST</b>	Greenland Standard Time (UTC - 3)
<b>GDT</b>	Greenland Daylight Time (UTC - 2)
<b>ATS</b>	Atlantic Standard Time (UTC - 4)
<b>ATD</b>	Atlantic Daylight Time (UTC - 3)
<b>EST</b>	Eastern Standard Time (UTC - 5)
<b>EDT</b>	Eastern Daylight Time (UTC - 4)
<b>CST</b>	Central Standard Time (UTC - 6)
<b>CDT</b>	Central Daylight Time (UTC - 5)
<b>MST</b>	Mountain Standard Time (UTC - 7)
<b>MDT</b>	Mountain Daylight Time (UTC - 6)
<b>PST</b>	Pacific Standard Time (UTC - 8)
<b>PDT</b>	Pacific Daylight Time (UTC - 7)
<b>AKS</b>	Alaska Standard Time (UTC - 9)
<b>AKD</b>	Alaska Daylight Time (UTC - 8)
<b>HAS</b>	Hawaii Standard Time (UTC - 10)
<b>HAD</b>	Hawaii Daylight Time (UTC - 9)
<b>SST</b>	Samoa Standard Time (UTC - 11)
<b>SDT</b>	Samoa Daylight Time (UTC - 10)
<b>LCL</b>	Local Time Zone (user-defined)

The local time zone (**LCL**) is defined to be a certain time offset from Zulu (UTC). If LCL is selected, the second line of the time zone display area becomes as in figure 6-14.



### *To enter a local time zone offset:*

1. Move the cursor to the local time zone offset (figure 6-16) and press the **ENT** softkey.
2. Use the **CHG** softkey to change back and forth between + and -. The area west of the Prime Meridian and east of the International Date Line, which includes Western Europe, North and South America, has a negative offset from UTC. Eastern Europe, Eastern Africa, Asia, and Australia have a positive offset from UTC.



Figure 6-16

- Use the **→** softkey to move the cursor to the hours field (figure 6-17), and use the phonepad keys to enter the hours and minutes of offset. Note that most time zones are offset from UTC by whole hours. A very few locations in the world have offsets that are 30 minutes off from the rest of the world. If you enter four digits, the data entry process automatically stops. You may also press the **ENT** softkey to accept your entry.

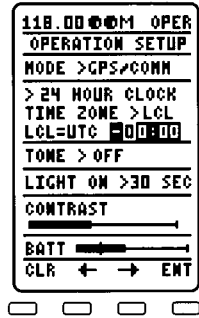




Figure 6-17

The **TONE** is the beep that KLX 100 makes when you press keys or when there is a new message for you to look at. The keypress beeps are helpful in giving you feedback that your keypress has been detected by the KLX 100. Likewise, the three beeps when a new message is present help to get your attention when you are not constantly looking at the KLX 100 display.

On the flip side, some people prefer not to hear the beeps, and turning off the tones preserves battery life.

The **TONE** field may be set so that the tones are heard on (1) keypresses and new messages (**KEYS/MSG**), (2) new messages only (**MSG ONLY**), or (3) not at all (**OFF**). With the cursor on this field, press the **CHNG** softkey to change modes.

The **LIGHT ON** field determines how long the display/keypad backlight will stay on after you press a key (if the backlight has been turned on with the **ON/OFF/LIGHT** switch on the left side of the unit. This time is also known as the "backlight timeout." Setting the backlight to timeout conserves valuable battery life. To change the timeout, place the cursor over this field, and press the **CHNG** softkey to change between the options: **5 MIN**, **2 MIN**, **1 MIN**, **45 SEC**, **30 SEC**, and **ALWAYS ON**. If the backlight times out, simply press any key to turn the backlight back on. You don't have to worry about what key you're pressing, because the first keypress turns on the backlight, but its normal function is ignored. We'd hate for you to accidentally delete a flight plan because you were in the dark and couldn't see the screen.

The **CONTRAST** bar graph may be adjusted for optimum viewing under the present environmental conditions. Place the cursor so it is over the word **CONTRAST** and use the  and  softkeys to adjust contrast up and down, respectively. Typically, if the bar graph is adjusted all the way to the left, the entire screen will be very light (figure 6-18), while if the bar graph is adjusted all the way to the right, the entire screen will darken, even those pixels (dots) of the LCD screen which are not "on".

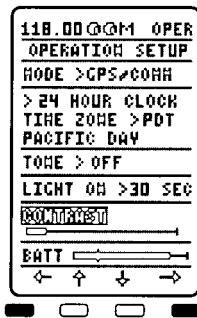


Figure 6-18

Factors which may warrant user adjustment of the contrast, include temperature and the lighting conditions. With all other factors equal, higher temperatures may call for adjusting the contrast to a lower level (further to the left), while colder temperatures may mean a higher contrast adjustment. If you are viewing the KLX 100 under intense direct sunlight (sun is shining onto the display), you may want to select lower contrast. If you are in dark or subdued lighting conditions or a condition where you are seeing reflected sunlight on the surface of the display (an example would be flying directly toward the sun, and seeing the reflection of your white T-shirt on the display), a higher contrast setting is desirable.

The **BATT** bar graph indicates the amount of battery voltage remaining in the eight AA cells, such that if the bar extends all the way to the right (figure 6-19), there are 12.0 volts (8 batteries x 1.5 volts per battery). Shortly after the bar graph dwindles all the way to the bottom, you will receive the **Low Battery** message on the Message page. Refer to the paragraphs on operation mode above for typical battery life times for different modes and usage patterns.

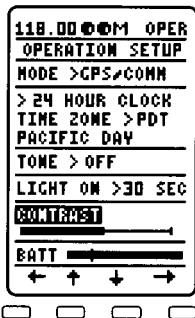




Figure 6-19

The vertical line on the battery bar graph is the voltage alert threshold. If the battery level falls below this point for more than 5 seconds, the message **VOLTAGE BELOW ALARM THRESHOLD** is displayed. To adjust the



**NOTE:** If rechargeable NiCad batteries are used, the Operation Setup page will not show full scale, even when the batteries are fully charged.

threshold, move the cursor to the **BATT** line. It will change to display **ALRT**, and you may use the  and  softkeys to change the level (figure 6-20). One use for this feature is that it will warn you if an external power adapter becomes disconnected. When the level is adjusted all the way to the left, the alert feature is disabled.

### 6.6. MAP SETUP PAGE

The Map Setup page (figure 6-21) is accessed from the Main menu and is used to what is displayed on the Navigation 1 (NAV 1) page moving map. Before you read this chapter, make sure you have read section 3.1, "The Moving Map Page". You also may want to refer back to section 3.1 while you read this section.

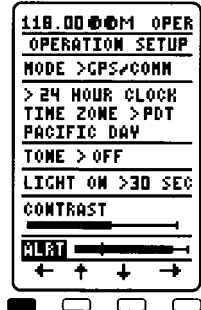




Figure 6-20

**NOTE:** *The Map Setup page may also be accessed directly from the moving map (NAV 1) page. To do so, press the  key, and then the  softkey.*

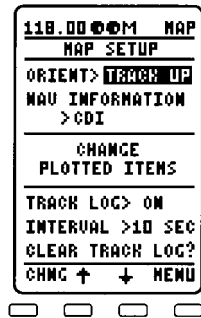



Figure 6-21



#### *To change the moving map setup:*

1. Make sure the cursor is on the screen. It should initially be over the map orientation (**ORIENT**) field.
2. To change the configuration you are after, look for the item below. They are in the same order they appear on the screen, from top to bottom. With the exception of some of the track log configuration, all setups are change fields, and you may go through the list of possibilities using the  softkey:

#### **Map Orientation (ORIENT)**

**NORTH UP**, **DTRK UP** (desired track up), **TRACK UP** (actual track up), or **PAN MODE**. Determines how the moving map will be oriented, depending on whether you like to have the map appear like a navigation chart (with North at the top), or if you like for the map to resemble what you see out the front window

(with actual track at the top). **PAN MODE** allows you to shift the displayed area so it is centered somewhere other than your present position.

**NAV Information**

**CDI, TRK/DTK, BRG/ETE, or NONE.** Determines whether a normal Course Deviation Indicator (**CDI**) is displayed across the bottom edge of the map, the magnetic desired track and actual track numbers are displayed in this area (**TRK/DTK**), the bearing to active waypoint and estimated time enroute (**BRG/ETE**), or if nothing appears in this area, leaving more room for the moving map (**NONE**).

**Change Plotted Items**

Select this to modify the items that are displayed on the moving map. To change the plotted items, move the cursor to this area and press the **ENT** softkey. When you do so, the KLX 100 display changes to another page (figure 6-22). The additional choices are as follows:

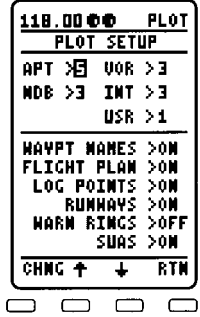


Figure 6-22

**Nearest Waypoints (APT, VOR, NDB, INT, USR)**

**0 through 9.** You may display the nearest airports, user-defined waypoints, VORs, NDBs, and intersections on the moving map page. However, it is possible to display so much information (some people call this *clutter*) on the moving map that it becomes difficult to decipher everything. For this reason, KLX 100 gives you the choice of how many, if any, of each waypoint type you want to have shown on the moving map. The maximum number of nearest waypoints is nine (9) of each type. Place the cursor on the desired field and press the **CHNG** softkey until you reach the desired number of nearest waypoints. If you choose not to display any of a certain type (VORs, for example), you could press the **CHNG** softkey until you reach the number zero (0) (figure 6-23).

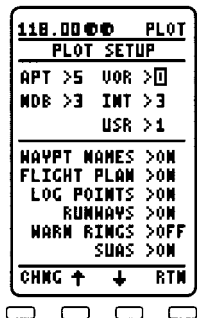


Figure 6-23

**Waypoint Names (WAYPT NAMES)**

**ON or OFF.** At some times it may be desirable to reduce clutter by removing waypoint names from the screen. This

removes waypoint names for any displayed active waypoint, flight plan waypoint, or nearest waypoints.

**Active Flight Plan (FLIGHT PLAN)**

**ON or OFF.** You may or may not want the active flight plan (FPL 0) waypoints to be displayed. In some cases, you may have a flight plan stored in FPL 0, but are navigating Direct To an unrelated waypoint. In a case like this you would probably choose **OFF**.

**Track Log Plotting (LOG POINTS)**

**ON or OFF.** The track log is a trail of where you have been, a kind of "trail of breadcrumbs." You may select **OFF** so that the track log is not displayed. This setting does not determine whether the KLX 100 is logging your position into memory; only if the track log is displayed on the NAV 1 page.

**Airport Runways (RUNWAYS)**

**ON or OFF.** The KLX 100 contains the runway diagrams for many of the airports in the data base. In addition to displaying these runway diagrams on the NAV 4 (Waypoint) page, they may be displayed on the moving map. When runways are selected for display, they will appear on the moving map anytime the map scale is 5 or less. When the map scale is 2, the runway numbers for the airport's longest runway are displayed. For map scales of 1 or less, the runway numbers for all runways are displayed.

**Warning Rings (WARN RINGS)**

**ON or OFF.** You may want to remove Warning Rings (see section 6.9 for a definition) from the moving map display. Even if you choose **OFF**, you will still receive the messages for **WARNING RING ALERT** and **INSIDE WARNING RING**.

**Special Use Airspaces (SUAS)**

**ON or OFF.** The special use airspace types listed in section 6.10 may be displayed on the NAV 1 page. The outer limits of airspaces appear on the moving map anytime the map scale is greater than 60. Inner rings of Class B and Class C airspaces appear anytime the map scale is 60 or less (figure 6-24).

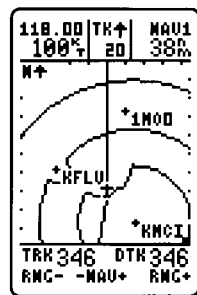


Figure 6-24



### Track Log Storing (TRACK LOG)

**ON** or **OFF**. This is where you select whether the track log is storing a history of where you have been. If you turn this **OFF**, the KLX 100 will not be able to remember where you have been by displaying the track log on the moving map.

### Track Log Interval (INTERVAL)

**1 SEC**, **2 SEC**, **5 SEC**, **10 SEC**, **30 SEC**, or **1 MIN**. The interval specifies how often the KLX 100 stores your position in the track log. The track log feature has room to store up to 2000 points where you have been. When it has reached 2000, each new point stored causes the earliest stored position to be erased from memory. Storing the position every second (**1 SEC**) produces a very nice drawing of where you have been, even on small range scales (figure 6-25). However, the 2000 points are used up in a little over 30 minutes, so if you wanted to see your trail from an hour ago, you'd be out of luck. For this reason, KLX 100 lets you stretch out the track log interval. For instance, an interval of one minute (**1 MIN**) means the track log can store your trail for the past 30 hours of operation. However, the definition of the trail gets less as the interval increases. Figure 6-26 shows the same flight path as figure 6-25, only the interval was **10 SEC** instead of **1 SEC**.

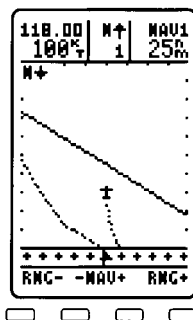


Figure 6-25

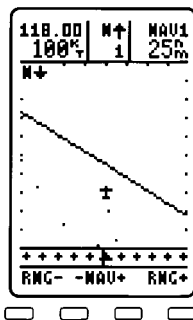


Figure 6-26

### Clear Track Log

Sometimes you just want to start from scratch on the track log. The old trail might be cluttering up the map, for example. To clear the track log, use the **CLR** softkey to move the cursor to the **CLEAR TRACK LOG?** field and press the **YES** softkey. This line will change to **ARE YOU SURE?** If your life insurance is paid up, hold your breath and press the **YES** softkey again to clear the track log.

### 6.7. SOS SETUP PAGE

The SOS Setup page (figure 6-27) is accessed from the Main Menu and is used to modify and listen to the SOS transmission.

We recommend that your recorded message be in the standard form of an SOS broadcast. This includes the aircraft type, registration (tail) number of, and color scheme. An example message would be "Archer November Papa Lima Alfa November Echo, white over red." When the KLX 100 assembles the entire message, it adds the last known latitude and longitude, and the time it was valid.



Figure 6-27

The complete message is of the form:

"Mayday, mayday, mayday; Archer November Papa Lima Alfa November Echo; white over red; north three eight degrees, five three point two seven minutes; west nine four degrees, four seven point two seven minutes at one eight five two Zulu."

The above message would indicate your position was N38°53.27' W94°47.27' at 1852 Z.



#### *To record your personalized SOS message:*

1. Move the cursor to the **RECORD MESSAGE** field.
2. Press the **REC** softkey. The page will change as in figure 6-28.
3. After you have rehearsed your message and cleared your throat, press the push-to-talk (PTT) button and speak clearly into the internal or external microphone, using a normal tone of voice. You may record up to five (5) seconds of audio for your personalized message. As you record, the bar graph will advance to the right, indicating the amount of time you have used.
4. Press the **RTN** softkey to return to the SOS Setup page.

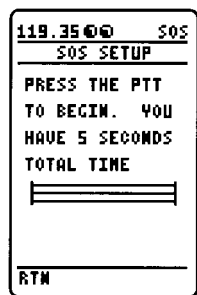




Figure 6-28

To listen to the personalized message, move the cursor to the **PLAY MESSAGE** field, and press the  softkey. You will hear only what you recorded. If you listen to it and think you could do better, go back and record it again.

To listen to the entire SOS message, including lat/long and time, move the cursor to the **PLAY FULL SOS** field and press the  softkey. You will hear on the speaker the same message that would be transmitted on the emergency frequency, were you to use the SOS Beacon feature.

The **REPEAT RATE** field is the interval at which the full SOS message is transmitted. For example, if the **REPEAT RATE** is 3 minutes, each repetition of the message will start three minutes after the last repetition began. Keep in mind that the more frequent the SOS transmission occurs, the shorter the battery life will be. The **REPEAT RATE** is set to 5 minutes at the factory,



**WARNING:** *The SOS Beacon feature is for emergency use only. Transmitting on the emergency frequency is serious business and not to be taken lightly. If you want to listen to or demonstrate the SOS message, always use the SOS Setup page.*

but may be modified to intervals from 3 to 99 minutes. Just place the cursor on this field and press the phonepad keys corresponding to the desired number of minutes.

121.50 megahertz (MHz) is the international standard for transmission of aviation emergency messages on the VHF air band. If for some reason it is desired to change the frequency to something other than 121.50 MHz, just place the cursor over the **EMERGENCY FREQ** field and press the phonepad keys corresponding to the desired numbers in the frequency.

### 6.8. I/O (INPUT/OUTPUT) SETUP PAGE

The I/O Setup Page (figure 6-29), accessed from the Main Menu, is where the KLX 100 electrical interfaces are configured and controlled.

KLX 100 has two serial ports, located on the six-pin connector on the right side of the KLX 100. Both ports use the RS-232 electrical standard, and are configurable for specific data formats depending on your usage of external equipment. Each port includes an RS-232 transmitter line and an RS-232 receiver line. The two ports share a single ground pin. The serial output connector pinout is shown in figure 6-30. Note that this is a view of the KLX 100 connector, not the data cable connector. If you wish to fabricate your own data cable, the Molex connector part number is 22-55-2062.

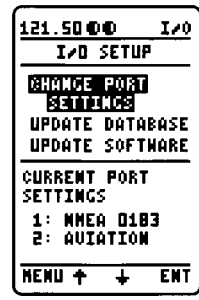


Figure 6-29

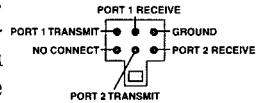


Figure 6-30

To connect the KLX 100 to a PC to update the data base or system software, use data cable, part number 050-03376-0000.

Each serial output port may be configured for one of the following formats:

- AVIATION** Used to interface to airborne moving map products, such as the ARGUS 3000/5000/7000 product line.
- NMEA 0183** (National Marine Electronics Association) Standard for many Personal Computer (PC) moving map programs, as well as interfacing to marine moving map products. The KLX 100 outputs approved sentences GPBOD, GPGGA, GPRMB and GPRMC of NMEA 0183 version 2.0.
- BENDIX/KING** A Bendix/King proprietary data format used for test purposes and future expansion.
- NO OUTPUT** No data is output on the serial port. If you are not using any peripheral moving map or other interfaced equipment, this setting is recommended, and it lengthens battery life.

The **CURRENT PORT SETTINGS** are displayed on the primary I/O Setup page (figure 6-29).



**To change the serial port settings:**

1. Make sure the **CRSR** is on, and use the **↑** and **↓** softkeys to move the cursor to the **CHANGE PORT SETTINGS** field.
2. Press the **ENT** softkey. The display will change to look like figure 6-31. The cursor will be on over the Port 1 **DATA TYPE**.
3. If you want to change Port 1, press the **CHNG** softkey until you see the desired format. If you want to change the configuration of Port 2, press the **↓** softkey, then the **CHNG** softkey for the desired result (figure 6-32).

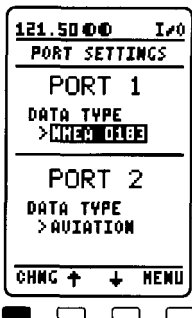


Figure 6-31



**NOTE:** Port 1 and Port 2 cannot both be set to the same data type (unless both are configured for **NO OUTPUT**). For example, if Port 2 is configured for **AVIATION**, then **AVIATION** will not be one of the options for Port 1 as you press the **CHNG** softkey repeatedly.

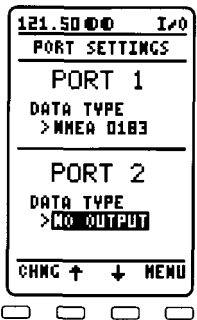


Figure 6-32

4. Press the **MENU** softkey to return to the primary I/O Setup page.

The other two functions of the I/O Setup Page are **UPDATE DATABASE** and **UPDATE SOFTWARE**. When you select either of these functions, KLX 100 automatically configures serial Port 1 for the proper data format, which happens to be different from the **AVIATION**, **NMEA 0183**, or **BENDIX/KING** formats.



**To update the KLX 100 data base:**

1. Plug the 9 pin female connector end of the interface cable into a COM serial port of the computer. If the computer has COM1 and COM2 serial ports, either may be used. Some computers use a 9 pin COM serial port connector while other computers use a 25 pin connector. If the computer being used has a 9 pin connector, the interface cable connector will plug directly into the computer's 9 pin connector. If the computer's COM serial port uses a 25 pin connector, use a 25 pin to 9 pin adapter to adapt the interface cable's connector to the computer's connector.
2. Plug the other end of the interface cable (6 conductor connector) into the "RS 232" data port on the right side of the KLX 100 (figure 6-33).

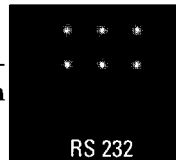


Figure 6-33

3. Insert the diskette into the computer's disk drive. Turn on the computer being used for the data base update. The program on the disk will automatically "boot" (load) and the computer screen will display "Ready" when the computer is ready to continue with the data base update operation.



**NOTE:** In some cases, the computer does not boot into the update program. If this is the case, go to a DOS prompt and type the disk drive letter followed by *pcloader* (like *b:pcloader*)

4. Turn on the KLX 100. select the Main Menu page and specifically the **I/O SETUP** item (figure 6-34). Press **ENT**.
5. Use the **↓** softkey to select **UPDATE DATA-BASE** (figure 6-35), and press **ENT**.

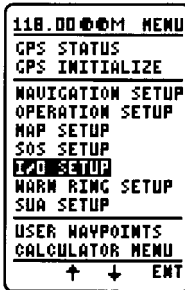


Figure 6-34

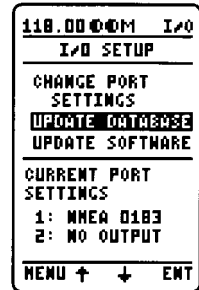


Figure 6-35

## Menus & Setups

6. The screen will look as in figure 6-36. Press the third softkey to begin the data base update process.
7. Once the data transfer has started, the screen will look like figure 6-37. The KLX 100 will automatically reset itself so that it may use the new data base information.

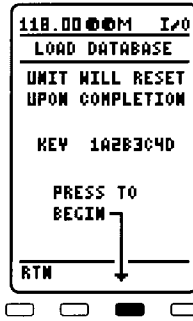


Figure 6-36

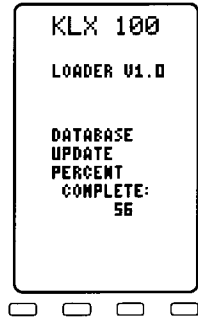


Figure 6-37



**NOTE:** In step 6, pressing **RTN** will terminate the update process and bring the display back to the original page shown in figure 6-35.

8. Remove the interface cable. Remove the disk from the computer. Turn off the computer.

The chances are small of having difficulty updating the data base but—

If you have a problem:

- First check that the interface cable is properly connected and that the computer is turned on. If there is a problem with the connection or the computer the KLX 100 will display **COMM CHANNEL TIMEOUT, CHECK CABLE** (figure 6-38). When the problem is corrected this prompt is removed and the update operation can continue from where it left off.
- If an internal test fails during the load, the KLX 100 will display **PGMFAIL**. If an internal test fails after the data has been loaded, the KLX 100 will display **VERERROR**. The **PGMFAIL** error could possibly be caused by low batteries. We suggest replacing the batteries and trying again. If this doesn't fix the error, write down any error messages to aid your AlliedSignal Service Center in identifying the problem.

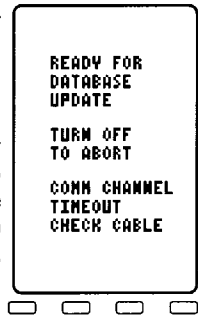


Figure 6-38

KLX 100 has provisions to update the software through the serial port.

### 6.9. WARNING RING SETUP PAGE

The Warning Ring Setup page (figure 6-39), accessed from the Main Menu, is used for defining up to eight rings around waypoints with a user-defined radius.


**NOTE:** The KLX 100 Warning Ring feature should not be used as the sole method of airspace avoidance. Be sure to use current charts for this purpose.

121.50000	WARM
WARNING RINGS	
KDSM	30.0 NM
KMCI	25.0 NM
KTUL	10.0 NM
KOJC	5.0 NM
----	----
----	----
----	----
----	----
CLR	↑ ↓ MENU



Figure 6-39


#### To create a Warning Ring:

1. When you first select this page, the cursor should be on the screen. Use the  softkey to move the cursor to the first open space for a new Warning Ring (figure 6-40).

121.50000	WARM
WARNING RINGS	
KDSM	30.0 NM
KMCI	25.0 NM
KTUL	10.0 NM
KOJC	5.0 NM
----	----
----	----
----	----
----	----
CLR	↑ ↓ MENU



Figure 6-40


2. To create our sample Warning Ring discussed above, press the  key followed by the **K** softkey.

121.50000	WARM
WARNING RINGS	
KDSM	30.0 NM
KMCI	25.0 NM
KTUL	10.0 NM
KOJC	5.0 NM
KOMA	----
----	----
----	----
----	----
CLR	← → ENT



Figure 6-41





3. Repeat step #2 for the letters **O** and **M**. The data base should automatically fill in the **A** at the end of the identifier (figure 6-41), as **KOMA** is the first identifier in alphabetical order that has the first three letters **KOM**.

4. Press the  softkey to approve **KOMA**. The cursor automatically moves to the radius field.

121.50000	WARM
WARNING RINGS	
KDSM	30.0 NM
KMCI	25.0 NM
KTUL	10.0 NM
KOJC	5.0 NM
KOMA	10.0 NM
----	----
----	----
----	----
CLR	← → ENT



Figure 6-42

5. Press , ,  to get a 10.0 NM radius for the Warning Ring (figure 6-42), and press the  softkey to store it.





**NOTE:** The radius is entered in terms of the current distance units as selected on the Nav Setup page (see section 6.4), up to a maximum of 50 nautical miles, or the equivalent of 50 nautical miles if the units are not nautical. In this case, we want nautical miles (NM).

Warning Rings may be displayed on the moving map (NAV 1) page (section 3.1), if they are selected on the Map Setup page (see section 6.6).

KLX 100 notifies you with messages when you are near or approaching a Warning Ring. The message for a Warning Ring alert will occur when the aircraft's position is at a point such that a projection of the aircraft's existing track over the ground is approximately 10 minutes from penetrating the outer boundary. It will also occur if the aircraft is within approximately two nautical miles of a Warning Ring even if the aircraft's projected track over the ground won't actually penetrate the area (figure 6-43).



Figure 6-43

A typical message would be:

**Warning Ring Alert  
KOMA 10.0 NM**

If you are actually inside the boundaries of a Warning Ring, the message will read:

**Inside Warning Ring  
KOMA 10.0 NM**

### 6.10. SUA SETUP

The SUA Setup page (figure 6-44), accessed from the Main Menu, is used for enabling and disabling the special use airspace (SUA) alerting and selecting the vertical buffer and types of airspace that will be displayed and for which alerting will be given. The types of SUA areas stored in the data base and the abbreviations used to denote these areas are the following:

Class B Airspace	<b>CL B</b>
Class C Airspace	<b>CL C</b>
Control Area (used outside USA)	<b>CTA</b>
Terminal Area (used outside USA)	<b>TMA</b>
Military Operations Area	<b>MOA</b>
Training Area	<b>TRNG</b>
Warning Area	<b>WARN</b>
Caution Area	<b>CAUT</b>
Alert Area	<b>ALRT</b>
Danger Area	<b>DNGR</b>
Prohibited Area	<b>PROH</b>
Restricted Area	<b>REST</b>
Terminal Radar Service Area	<b>TRSA</b>

The KLX 100 will normally alert you prior to entering one of these areas with a message prompt. When the Message page is viewed it will display **AIRSPACE ALERT** and will also display the name and type of the special use airspace (figure 6-45).

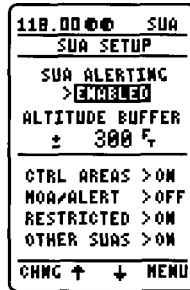


Figure 6-44

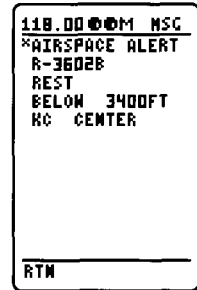


Figure 6-45



**NOTE:** In addition to the message page messages that alert you to special use airspace, the KLX 100 can also display the five nearest areas of SUA. It will even give you the direction and distance to the nearest edge of the SUA. See section 2.7.3 for more details.



The SUA alert feature is three dimensional. The SUA areas are stored in the KLX 100 data base with regard to altitude when the actual SUA altitude limitations are charted in terms of mean sea level (MSL). Therefore, if you are flying either above or below an SUA area you won't be inconvenienced with nuisance alert messages. However, if the actual lower limit of an SUA is charted in terms of an altitude above ground level (AGL), then it is stored in the KLX 100 as all altitudes below the upper limit of the SUA. If the actual upper limit of an SUA is charted in terms of AGL, it is stored in the KLX 100 as "UNLIMITED". The KLX 100 uses its GPS-derived altitude to determine if you are inside the vertical limits of the airspace.

The message prompt for a special use airspace alert will occur when the aircraft's position is at a point such that a projection of the aircraft's existing track over the ground is approximately 10 minutes from penetrating the outer boundary of one of these areas. It will also occur if the aircraft is within approximately two nautical miles of one of these areas even if the aircraft's projected track over the ground won't actually penetrate the SUA area (refer to figure 6-43). If one of the SUA areas is penetrated, another message will state: **INSIDE SUA**.

Airspace alerting is given to the outer lateral boundaries for Class B, Class C, CTA, and TMA airspace. The inner rings and sectors, however, are displayed on the NAV 1 (moving map) page.






### *To enable (or disable) SUA alerting:*

1. Select the SUA Setup page from the Main Menu. The cursor will initially be over the **SUA ALERTING** field, and will display **ENABLED** or **DISABLED**. Press the  softkey to change between the two options.
2. Press the  softkey to move the cursor to the **ALTITUDE BUFFER** field. You may select a vertical buffer in order to provide an additional layer of protection from inadvertently entering an SUA. You may select a buffer of between 300 feet and 60,000 feet.



**NOTE:** The vertical buffer serves to "stretch" the SUA area in both directions (up and down) by the selected buffer altitude. For example, let's say you have selected a buffer of 1,000 feet and the actual SUA area exists from 5,000 feet MSL to 12,000 feet MSL. In this case you will receive SUA alert messages if you fly at any altitude between 4,000 and 13,000 feet MSL.

3. You may individually select or deselect certain types of SUAs for alerting, display on the map, and inclusion on the nearest SUA list. Use the  and  softkeys to move the cursor to the desired type, and press the  softkey to toggle that type on or off. **Prohibited areas may not be disabled.** The different types are:

- CTRL AREAS:** Class B, Class C, Control Areas, Terminal Areas, Terminal Radar Service Areas
- RESTRICTED:** Restricted Areas
- MOA/ALERT:** Military Operations Areas, Alert Areas
- OTHER SUA:** Warning Areas, Danger Areas, Caution Areas, Training Areas



**CAUTION:** It is the pilot's responsibility to avoid those areas of special use airspace where ATC clearance to penetrate is required but has not been obtained. The KLX 100's special use airspace alert is only a tool to assist the pilot and should never be relied upon as the sole means of avoiding these areas.

### 6.11. USER WAYPOINTS PAGE

The User Waypoints page is accessed from the Main Menu, and is a directory of all the user-defined waypoints in the memory.



User-defined waypoints are created using the  key (see section 2.5). If you haven't saved any user waypoints, the page will appear as in figure 6-46, and your only choice is to press the  softkey to go back to the Main Menu.



Figure 6-46

When there are user-defined waypoints in storage, the page will look like figure 6-47. They are listed in alphanumeric order (0,1, . . . ,9,A,B, . . . ,Z).

Sometimes, the user waypoint list can be quite long. Here are some special tips for getting around:

- Use the **↑** and **↓** softkeys to move the cursor up and down the list manually.
- When the cursor is off, the middle softkeys show **-USER+**. Press the **↑** softkey to skip ahead an entire page. Press the **↓** softkey to skip backward an entire page.
- If you want to skip to the user waypoints whose names begin with a certain letter or number, you may press the phonepad key containing that character, then press the corresponding softkey. If you wanted to see the waypoints starting with **Z**, you would press the **[Z]** key and then the **Z** softkey.

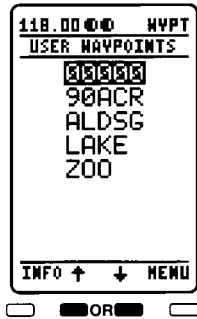


Figure 6-47

Once you have found a user-defined waypoint you are interested in, highlight it with the cursor (figure 6-48) and press the **INFO** softkey. The screen will change to a page looking very much like the page the waypoint was created on (the page you see when you press the **SAVE** key), except the cursor will be on the **DELETE?** field (figure 6-49).

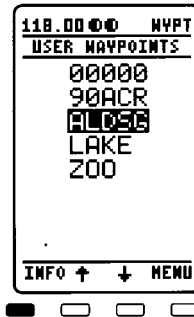


Figure 6-48

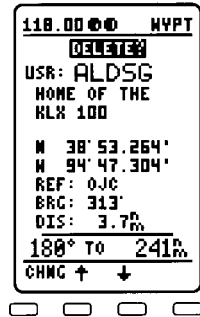


Figure 6-49

This page is used to view or change the user-defined waypoint, and you may completely delete the waypoint. To delete the waypoint, just press the **ENT** softkey while the cursor is on **DELETE?**. It will change to a flashing **CONFIRM DELETE?**. Press **ENT** again to confirm the deletion.

You can also change the name, comments, or position of the user-defined waypoint. Use the **↑** and **↓** softkeys to move the cursor to the field you wish to change, then enter the desired data. See section 2.5 for more information on creating and modifying user-defined waypoints.

## 6.12 CALCULATOR PAGES

The calculator pages perform a variety of functions, including trip planning, calculation of density altitude, true airspeed, winds aloft, sunrise/sunset times, and the use of timers. Data entered on the Calculator pages has no effect on navigation data provided on any of the other KLX 100 pages. You may perform trip calculations without disturbing ongoing navigation.




When you select **CALCULATOR MENU** from the Main Menu, a page as in figure 6-50 is displayed. Use the  and  softkeys to select the desired choice, and then press the  softkey.



Figure 6-50



**NOTE:** The Trip Planning page relies on pilot enterable inputs for groundspeed, fuel flow, and fuel reserve requirements. These pages can not utilize inputs from fuel flow or air data sensors.

### 6.12.1 TRIP PLANNING PAGE

The Trip Planning page is convenient both on the ground before you begin your flight, and in the air. This page performs distance, bearing, and time calculations, advisory fuel planning, and computes enroute safe altitude (ESA) for a theoretical route of flight. This page allows you to do distance, bearing, and time calculations that might otherwise require a chart, ruler, and pocket calculator.

The first step in doing a trip calculation is to enter the desired route of flight. The KLX 100 will perform these calculations either from waypoint to waypoint (for in-flight calculations, your present position can be one of the waypoints), or for one of your flight plans (active or stored).



**To enter a route of flight on the Trip Planning page:**

1. When you first select this page from the Main Menu, the cursor should already be on the screen over a change field that says **WPT** (waypoint to waypoint) or **FPL** (flight plan). If you desire to make a calculation for a flight plan, skip down to For a flight plan calculation below.

**For a waypoint to waypoint calculation:**

2. Make sure this change field reads **WPT** (figure 6-51). If it doesn't, press the **CHNG** softkey once.
3. Press the **↓** softkey to move the cursor to the from (**FR**) waypoint for the calculation.
4. Use the phonepad keys followed by the desired softkey to enter the desired identifier for the "from" (departure) waypoint (figure 6-52) and press **ENT**.

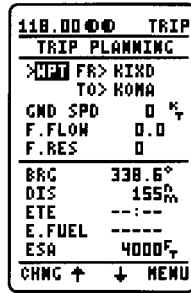


Figure 6-51

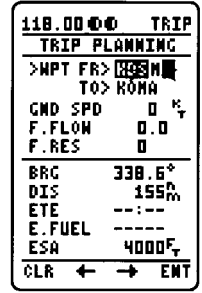


Figure 6-52

5. Press the **↓** softkey to move the cursor to the **TO** waypoint for the calculation.



**NOTE:** On either of the two waypoint fields on this page, you can select your present position (**P.POS.**) (figure 6-53). To do this, press **CHNG** while the cursor is on the desired waypoint field. If one of the waypoint fields reads **P.POS.** and you desire to enter a waypoint, press the **CHNG** softkey to do so.

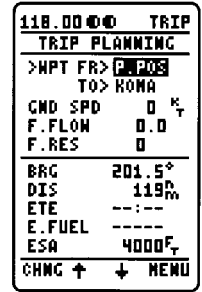


Figure 6-53

- With the cursor over the "to" (destination) waypoint, enter the desired identifier and press **ENT**. When you have completed entry of the **FR** and **TO** waypoints, the correct magnetic bearing (**BRG**) in degrees, distance (**DIS**) in the selected distance units, and the enroute safe altitude (**ESA**, for a definition see section 3.2) are displayed on the bottom half of the page (figure 6-54).

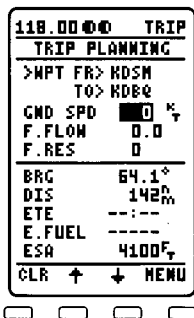


Figure 6-54

**For a flight plan calculation:**

- Make sure this change field reads **FPL**. If it doesn't, press the **CHNG** softkey once.
- Press the **↵** softkey to move the cursor to the flight plan number for the calculation.
- Press the phonepad keys with the desired numbers to enter the flight plan number (0 through 29), and press the **ENT** softkey. After you select a flight plan, the first and last waypoints of the flight plan will be displayed (if there is a flight plan stored under that number). Since there are typically multiple legs in a flight plan, the bearing (**BRG**) field is always dashed for a flight plan. However, the total distance (all legs) in the selected distance units, and the enroute safe altitude (**ESA**, for a definition see section 4.2) are displayed on the bottom half of the page (figure 6-55).

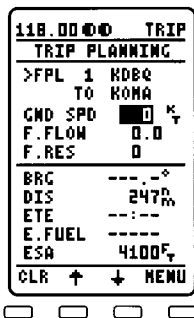


Figure 6-55

Once you have entered the desired route of flight for a trip calculation, the next step is to enter the estimated groundspeed and fuel flow for the flight. Remember that the trip calculations do not use the actual groundspeed of the aircraft as computed by the KLX 100 GPS receiver.

To use the fuel planning feature, you need to have a good idea what the typical fuel flow rate for your aircraft is. This information can often be found for given cruise power settings in a "performance" section of the Pilot's Operating Handbook for the aircraft. The units for fuel are not specified on this page, but the units of time are always hours. This means that you can use gallons per hour, pounds per hour, kilograms per hour, etc.





**To calculate ETE and fuel requirements on the Trip Planning page:**

1. Press the **ENT** softkey to move the cursor to the estimated ground speed (**GND SPD**) field. The groundspeed will be in the units specified on the Nav Setup page.
2. Press the keypad keys with the desired numbers to enter the three digits of the estimated groundspeed, and press the **ENT** softkey. When you have done this, the correct estimated time enroute (**ETE**) will be displayed on the bottom half of the page (figure 6-56).

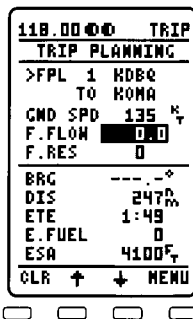


Figure 6-56

3. The cursor should move to the fuel flow rate (**F.FLOW**) field. Use the keypad keys to enter the desired value (figure 6-57). Remember that this can be in any units you desire (as long as it's per hour), but the same fuel units must carry through the calculations. Press the **ENT** softkey.

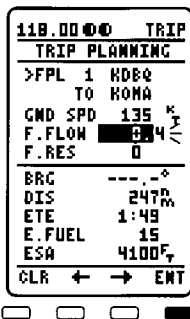


Figure 6-57

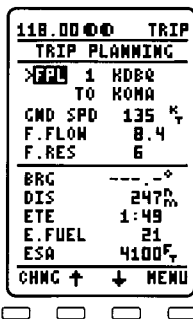


Figure 6-58

4. The cursor should move to the fuel reserve requirement (**F.RES**) field. Enter the desired value. Typical reserve needs are 30 minutes or more depending on VFR/IFR and day/night conditions. Press the **ENT** softkey. The calculation of estimated fuel required (**E.FUEL**) appears on the bottom half of the page (figure 6-58).

**6.12.2 DENSITY ALTITUDE & TAS PAGE**

This page is used to determine pressure altitude, density altitude, and the true airspeed (TAS) of the aircraft.



**To calculate pressure altitude, density altitude, and true airspeed (TAS):**

1. Enter the altitude indicated on the aircraft's altimeter (**IND ALT**) to the nearest hundred feet or 10 meters.
2. Press the softkey to move the cursor to the **BARO** field. If you wish to change the baro setting units between inches of mercury ("), millibars (mB), and hectopascals (hP), move the cursor to the units field and press the softkey. Enter the current altimeter setting. The correct pressure altitude (**PRS ALT**) is now displayed in the bottom area of the page (figure 6-59).

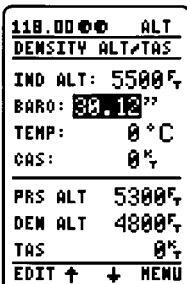


Figure 6-59

3. Press the softkey to move the cursor to the **TEMP** field. If you wish to change the temperature units between degrees Celsius (°C) and degrees Fahrenheit (°F), move the cursor to the units field and press the softkey. Enter the current temperature (figure 6-60). It is suggested that you use the temperature read from an outside air temperature gauge. However, for maximum accuracy of the density altitude calculation, the static air temperature should be entered. This is the temperature of air without the effect of heating due to the aircraft's movement through the air. For the airspeeds of most piston aircraft, the difference between static air temperature and the observed air temperature (or "total air temperature") is negligible. The correct density altitude (**DEN ALT**) is now displayed in the bottom area of the page.

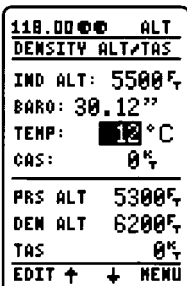



Figure 6-60

- Press the  softkey to move the cursor to the **CAS** (calibrated airspeed) field. Enter the aircraft's calibrated airspeed (figure 6-61). If the calibrated airspeed isn't known, use the indicated airspeed. For most aircraft, the difference between the calibrated airspeed and the indicated airspeed is small at cruise airspeeds. The correct true airspeed (**TAS**) is now displayed in the bottom area of the page.

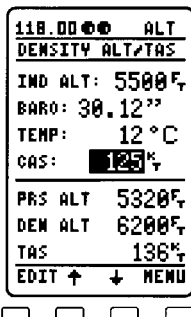



Figure 6-61

### 6.12.3 WINDS ALOFT PAGE

This page is used to determine the present wind direction and speed. In addition, the headwind or tailwind component of the wind is displayed.



**To calculate the winds aloft and head/tail-wind:**

- Enter the aircraft's true airspeed (**TAS**). If the Density Altitude/TAS page was previously used to calculate true airspeed, it will already be displayed.
- Press the  softkey to move the cursor to the heading (**HDG**) field. Enter the current magnetic heading (figure 6-62). The wind direction (in degrees true) and speed, and the headwind or tailwind component of the wind are now displayed in the bottom area of the page.

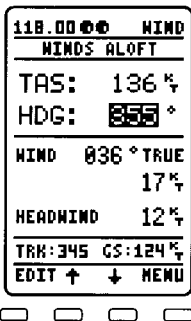


Figure 6-62



**NOTE:** The wind calculations are only correct when you have entered the correct aircraft heading and true airspeed. Make sure to re-enter new values if you change airspeed or heading.

### 6.12.4 SUNRISE/SUNSET PAGE

This page is used to determine the times of sunrise and sunset for any waypoint in the published or user data base.



#### *To calculate the sunrise/sunset times:*

1. The first time the Sunrise/Sunset page is selected after the KLX 100 is turned on, the waypoint identifier defaults to the current destination, the date defaults to the current date, and the time zone defaults to the system time zone. Each of these three items may, however, be changed. The sunrise and sunset times are displayed at the bottom of the page.



**NOTE:** The time zone initially displayed is the system time zone. This is the same as the one on the Operation Setup page. Note that the time zone displayed may not be appropriate for the waypoint shown. For example, the waypoint shown could be **KLAX** and the time zone may be Eastern Standard Time (EST). Make sure you select the appropriate time zone for the displayed waypoint.

2. If desired, select another waypoint identifier using the phonepad keys. Press **ENT** to approve the waypoint entry. (figure 6-63).

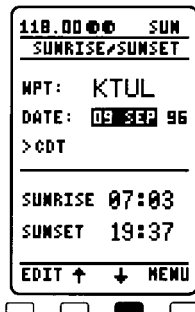


Figure 6-63

3. Press the **↓** softkey to move the cursor to the date field. If desired, enter another date using the phonepad keys.

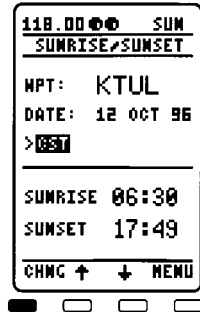


Figure 6-64

4. Press the **↓** softkey to move the cursor to the time zone field. If desired, select another time zone by repeatedly pressing the **CHNG** softkey. The sunrise and sunset times for the selected waypoint, date, and time zone are now displayed (figure 6-64).



**NOTE:** *If you are lucky enough to be in a latitude extreme enough that the sun doesn't set, or unlucky enough to be where the sun doesn't rise, the KLX 100 will display **NEVER** for the sunrise/sunset times.*

### 6.12.5 TIMERS PAGE

This page may be used to set a timed alarm. Instances where you might want to use it include as a reminder to switch between left and right fuel tanks, or maybe just to remind you to eat lunch! The top of the Timers page shows the current time in the system time zone. The alarm may be set by either of two methods: entering the time of day you wish the alarm to activate, or the time interval from present time (i.e. twenty minutes from now). The bottom of the page normally displays the elapsed time since the KLX 100 was turned on. However, you may move the cursor to the elapsed time field and press the **CLR** softkey to reset the elapsed timer to zero.



#### **To set the alarm:**

1. If necessary, change the system time zone to the desired one, using the **CHNG** softkey.
2. To set the alarm to activate at a certain time, move the cursor to the **AT:** field. Use the phonepad keys to select the desired time (figure 6-65). Notice that after you enter it, the interval from present time to alarm time is updated on the following line.
3. To set the alarm to activate in a certain length of time, move the cursor to the **IN:** field and select the desired hours and minutes.
4. When the alarm goes off, the KLX 100 will display the message **TIMER EXPIRED**.

118.0000	TMR
TIMERS	
09:56	>CDT
ALARM	
AT	10:55
IN	00:59
ELAPSED	
00:09:58	
EDIT	↑ ↓ MENU

Figure 6-65

## APPENDIX A - NAVIGATION TERMS

**Actual Track (TK, TRK)**--Compass direction of motion over Earth.

**Bearing (BRG)**--The compass direction from the present position to a waypoint.

**Cross Track Correction (XTK)**--Distance you are off the desired course, displayed as "FLY L 2.3 NM".

**Desired Track (DTK)**--Compass course between the 'from' and 'to' waypoints, or between the point where a 'direct-to' was initiated, and the active direct-to waypoint.

**Distance to Waypoint (DIS)**--Distance from the present position to the active waypoint.

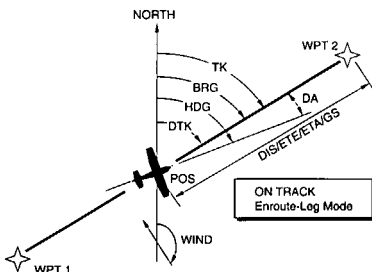
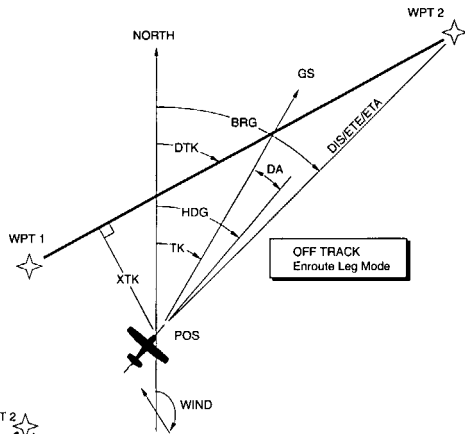
**Drift Angle (DA)**--Difference between the aircraft's heading and its actual track. Caused by a crosswind and also known as 'crab angle'.

**Estimated Time Enroute (ETE)**--Time to go to active waypoint.

**Estimated Time of Arrival (ETA)**--The time of day of your arrival at active waypoint or another waypoint in the flight plan.

**Groundspeed (GS)**--The velocity you are moving over Earth.

**Waypoint (WPT)**--A point on the surface of the earth. Can be an airport, VOR, or user-defined waypoint.



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**APPENDIX B - ALKALINE BATTERY LIFE**

USE PROFILE	OPERATION MODE		
	GPS ONLY	COMM ONLY	GPS/ COMM
GPS ONLY Mode	18:00	—	—
5% TX, 70% RX, 25% STBY <sup>1</sup>	—	4:00 TX <sup>4</sup> 6:45 Tot	3:15 TX <sup>4</sup> 5:15 Tot
20% TX, 20% RX, 60% STBY <sup>2</sup>	—	2:30 TX <sup>4</sup> 5:30 Tot	2:15 TX <sup>4</sup> 4:15 Tot
SOS Beacon every 3 minutes <sup>3</sup>	—	—	2:00 TX <sup>4</sup> (40 cycles)

All times in (hours:minutes). Times are based on having the back-light, tones, and I/O ports turned off, midlevel volume adjustment, and the batteries at room temperature.

NiCad batteries have a shorter life than Alkalines since most NiCads have inherently less capacity.

**NOTES:**

<sup>1</sup>This example use profile means that out of every average minute, the KLX 100 COMM transmits for 3 seconds, receives audio for 42 seconds, and is standing by for 15 seconds.

<sup>2</sup>This example use profile means that out of every average minute, the KLX 100 COMM transmits for 12 seconds, receives audio for 12 seconds, and is standing by for 36 seconds.

<sup>3</sup>This example use profile utilizes the SOS Beacon feature, starting with fresh batteries. The **REPEAT RATE** for this example was set to **3 MIN** on the SOS Setup page. In this case, the KLX 100 transmits the SOS message for approximately 30 seconds, then waits 2.5 minutes before it starts transmitting the SOS message again. Use of a longer **REPEAT RATE** will prolong the life, but probably won't increase the total number of cycles.

<sup>4</sup>When alkaline batteries are used in the KLX 100 and you are using the COMM transmitter, the KLX 100 will continue to operate for quite some time after the batteries drop below the level necessary to transmit. For this reason, two times are specified: the time until the COMM loses the ability to transmit (*TX*), and the total time until the KLX 100 unit shuts off (*Tot*).

Battery Life  
Appendix B



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## APPENDIX C - MESSAGE PAGE MESSAGES

**2D NAV, ENTER ALTITUDE ON GPS INIT PAGE** — This message is displayed when the GPS receiver needs a user-entered altitude to determine the present position.

### **AIRSPACE ALERT**

[Name of special use airspace]

[Type of airspace]

[Altitude boundaries]

[Responsible ATC facility] — This message appears when the estimated time to enter the lateral limits of a special use airspace (SUA) is approximately 10 minutes or when the distance from the lateral limits of a special airspace is less than two nautical miles. See section 6.10.

**BATTERIES TOO LOW TO TRANSMIT** — This message appears when the battery voltage drops below a certain level. This voltage level is sufficient to run the GPS features, and for the COMM to receive signals, but insufficient for COMM transmit.

**BATTERY SENSOR ERROR** — This message appears if there is an error in the circuit which measures the battery level. You may still use the KLX 100, but disregard the battery level indicator on the Operation Setup page. We recommend having your KLX 100 serviced to correct the problem.

**CHECK DATE AND TIME ON GPS INIT PAGE** — This message appears if the KLX 100 suspects the date and time on the GPS Initialize page may be incorrect. View the GPS INIT page to ensure the date is correct and the time is within 10 minutes of current time. This message is most commonly seen after changing batteries. We suggest turning on the KLX 100 immediately after changing the batteries so the clock will automatically be updated.

**COMM SYSTEM FAILURE** — This message appears if the communication transceiver is unable to function. Service from an authorized AlliedSignal service center is strongly recommended.

**DATA BASE ERROR: PUBL DATA NOT USABLE** — This message appears if the data base fails an internal test when the KLX 100 is turned on.

## MESSAGES (Cont'd)

**DATA BASE OUTDATED, ALL DATA MUST BE CONFIRMED BEFORE USE** — This message appears when the data base is out of date as a result of a date and time entered on the GPS INIT page or as a result of a pilot-entered date being overridden by a date from the GPS receiver.

**HIGH TEMP: ###C** — This message appears if the temperature inside the KLX 100 exceeds 70° Centigrade, and the number corresponds to the actual internal temperature. This condition is generally caused by frequent and lengthy COMM transmit operations. You should attempt to reduce the amount of transmit activity.

### INSIDE SUA

[Name of special use airspace]

[Type of airspace]

[Altitude boundaries]

[Responsible ATC facility] — (Inside Special Use Airspace)  
This message appears when the present position is inside the lateral limits of a special use airspace (SUA). See section 6.10.

### INSIDE WARNING RING

[WPT] ##.# NM — This message appears when the present position is inside the boundary of a Warning Ring. The identifier for the reference waypoint ([WPT]) and the radius around that waypoint (##.#), in the currently selected distance units, which define the Warning Ring are shown.

**LOW BATTERIES** — This message is effective when the AA batteries need to be replaced or recharged.

**MAG VAR INVALID, NAV DATA REFERENCED TO TRUE NORTH** — This message appears when the magnetic variation is invalid due to operation outside of the data base magnetic variation area (North 74° latitude to South 60° latitude) without having a pilot-entered magnetic variation on the Nav Setup page. See section 6.4.3.

**NAV DATA REFERENCED TO TRUE NORTH** — This message appears when a user-defined magnetic variation of 0 degrees is being used for navigation data.

**NAV DATA REFERENCED TO USER DEFINED MAG VAR** — This message appears when a user-defined magnetic variation other than 0 degrees is being used for navigation data.

**MESSAGES (Cont'd)**

**NO USER MESSAGE RECORDED** — This message appears if you are on the SOS Setup page and attempt to play all or part of the SOS Beacon message, and there is no recorded user message. See section 6.7.

**OTHER WPTS DELETED** — (Other waypoints deleted) This message is displayed whenever more than 10 waypoints used in a flight plan (possibly including the active waypoint) have been deleted.

**POSITION OF \_\_\_\_\_ HAS CHANGED** — This message appears when either the latitude or the longitude of a waypoint used in a flight plan or the active waypoint has changed by more than .33 minutes as a result of updating the data base.

**POSITIONS OF OTHER WPTS HAVE CHANGED** — This message appears when the above message “Position of \_\_\_\_\_ has Changed” would be effective for more than ten waypoints..

**SATELLITE COVERAGE INADEQUATE FOR NAV** — This message is displayed when the GPS receiver cannot see enough satellites to calculate a position.

**SELF TEST ERROR XXXX** — This message appears if there is a failure during the KLX 100 self-test at unit turn-on. This message will include text describing the nature of the error(s) which will aid service personnel in identifying the failure.

**TEMPERATURE SENSOR ERROR** — This message appears if the temperature measurement circuitry inside the KLX 100 fails. You may still operate the KLX 100, but be cautious about excessive COMM transmit operations. We recommend having your KLX 100 serviced to correct the problem.

**TRANSMIT CUT OFF DUE TO LOW BATTERIES** — This message appears if, during a KLX 100 COMM transmission, the battery voltage drops below a certain level, causing the transmitter to shut off.

**UNIT IN GPS ONLY MODE, TO ENABLE COMM SEE OPERATION SETUP PAGE** — This message appears if the KLX 100 is in GPS ONLY mode (in which the COMM transceiver is disabled), and an attempt is made to transfer a frequency to the COMM. Change the mode to COMM ONLY or GPS/COMM on the Operation Setup page to utilize the transceiver.

**USER DATA LOST** — This message appears when the KLX 100 determines that some internal failure has occurred which has caused user data to be lost.

**USER DATA MODIFIED** — This message appears after turn-on when the KLX 100 determines that one or more user configuration items is no longer valid. This typically only occurs after a software update or a data base update. An example would be if you created a Warning Ring defined around a waypoint in the Americas data base, then updated to an Atlantic data base. Since the waypoint position is no longer in the data base, the Warning Ring would be deleted.

**VOICE CHIP ERROR** — This message appears if the voice storage chip in the KLX 100 has failed. The result will be that the SOS Beacon feature will not play back any part of the SOS message (neither the position nor your personalized message). We recommend having your KLX 100 serviced to correct the problem.

**VOLTAGE BELOW ALARM THRESHOLD** -- This message appears when the battery voltage falls below the threshold set on the Operation Setup page for more than 5 seconds. One condition when this message may be displayed is while utilizing one of the external power adapters, and the adapter connection comes loose.

#### **WARNING RING ALERT**

**[WPT] ##.# NM** — This message appears when the estimated time to enter a Warning Ring area is approximately 10 minutes or when the distance from a Warning Ring is less than two nautical miles. The identifier for the reference waypoint ([WPT]) and the radius around that waypoint (##.#), in the currently selected distance units, which define the Warning Ring are shown.

**WPT \_\_\_\_ DELETED** -- This message appears when a waypoint used in a flight plan, or the active waypoint, no longer exists as a result of updating the data base. The blank space is filled in with the waypoint identifier. The waypoint is deleted from flight plans in which it was used.

**APPENDIX D - ABBREVIATIONS**

**STATE ABBREVIATIONS**

<u><b>ABBREVIATION</b></u>	<u><b>STATE</b></u>
AK	Alaska
AL	Alabama
AR	Arkansas
AZ	Arizona
CA	California
CO	Colorado
CT	Connecticut
DC	District of Columbia
DE	Delaware
FL	Florida
GA	Georgia
IA	Iowa
ID	Idaho
IL	Illinois
IN	Indiana
KS	Kansas
KY	Kentucky
LA	Louisiana
MA	Massachusetts
MD	Maryland
ME	Maine
MI	Michigan
MN	Minnesota
MO	Missouri
MS	Mississippi
MT	Montana
NC	North Carolina
ND	North Dakota
NE	Nebraska
NH	New Hampshire
NJ	New Jersey
NM	New Mexico
NV	Nevada
NY	New York
OH	Ohio
OK	Oklahoma

Abbreviations  
Appendix D

**STATE ABBREVIATIONS (Cont'd)**

OR	Oregon
PA	Pennsylvania
RI	Rhode Island
SC	South Carolina
SD	South Dakota
TN	Tennessee
TX	Texas
UT	Utah
VA	Virginia
VT	Vermont
WA	Washington
WI	Wisconsin
WV	West Virginia
WY	Wyoming

**CANADIAN PROVINCE ABBREVIATIONS**

<b><u>ABBREVIATION</u></b>	<b><u>PROVINCE</u></b>
AB	Alberta
BC	British Columbia
MB	Manitoba
NB	New Brunswick
NF	Newfoundland
NS	Nova Scotia
NW	Northwest Territory
ON	Ontario
PE	Prince Edward Island
PQ	Quebec
SK	Saskatchewan
YK	Yukon

**COUNTRY ABBREVIATIONS**

<b><u>ABBREVIATION</u></b>	<b><u>COUNTRY</u></b>
AFG	Afghanistan
AGO	Angola
AIA	Anguilla Isl.
ALB	Albania
ANT	Antarctica
	Antilles/Aruba

**COUNTRY ABBREVIATIONS (Cont'd)**

ARE	United Arab Emirates
ARG	Argentina
ASM	American/Western Samoa
ATG	Antigua/Barbuda
AUS	Australia
AUT	Austria
BDI	Burundi
BEL	Belgium
BEN	Benin
BFA	Burkina Faso
BGD	Bangladesh
BGR	Bulgaria
BHR	Bahrain
BHS	Bahamas
BHU	Bhutan
BLZ	Belize
BMU	Bermuda
BOL	Bolivia
BOS	Bosnia/Herzegovia
BRA	Brazil
BRB	Barbados
BRN	Brunei
BWA	Botswana
CAF	Central African Republic
CHE	Switzerland
CHL	Chile/Easter Isl.
CHN	China
CIV	Ivory Coast
CMR	Cameroon
CNR	Canary Islands
COG	Congo
COK	Cook Islands
COL	Colombia/San Andres
CRI	Costa Rica
CRO	Croatia
CSK	Czechoslovakia
CUB	Cuba
CYM	Cayman Islands
CYP	Cypruss
DEU	Germany

Abbreviations  
Appendix D



**COUNTRY ABBREVIATIONS (Cont'd)**

DJI	Djibouti
DMA	Dominica
DNK	Denmark
DOM	Dominican Republic
DZA	Algeria
ECU	Ecuador
EGY	Egypt
ERI	Eritrea
ESP	Spain
ETH	Ethiopia
FIN	Finland
FJI	Fiji/Tonga
FLK	Falkland Islands
FRA	France
GAB	Gabon
GBR	United Kingdom
GHA	Ghana
GIB	Gibraltar
GIN	Guinea
GLP	Guadeloupe/Martinique
GMB	Gambia
GNB	Guinea-Bissau
GNQ	Equatorial Guinea
GPV	Cape Verde
GRC	Greece
GRD	Grenada
GRL	Greenland
GTM	Guatemala
GUF	French Guiana
GUY	Guyana
HKG	Hong Kong
HND	Honduras
HTI	Haiti
HUN	Hungary
IDN	Indonesia
IND	India
IOT	British Indian Ocean Territory
IRL	Ireland
IRN	Iran
IRQ	Iraq

**COUNTRY ABBREVIATIONS (Cont'd)**

ISL	Iceland
ISR	Israel
ITA	Italy
JAM	Jamaica
JOR	Jordan
JPN	Japan/Okinawa
JTN	Johnston Island
KEN	Kenya
KHM	Cambodia/Kampuchea
KIR	Kiribati/Tuvalu/Phoenix I./Line I.
KNA	St. Kitts/Nevis
KOR	Korea
KWT	Kuwait
LAO	Laos
LAT	Latvia
LBN	Lebanon
LBR	Liberia
LBY	Libya/SPA Jamahiriya
LCA	St. Lucia
LKA	Sri Lanka
LSO	Lesotho
LUX	Luxembourg
MAR	Morocco
MCD	Macedonia
MDG	Madagascar/Comoros/Mayotte I./Reunion
MDV	Maldives
MEL	Melilla
MEX	Mexico
MHL	Marshall Island
MID	Midway Island
MLI	Mali
MLT	Malta
MNP	Mariana Islands
MOL	Moldova
MOZ	Mozambique
MRT	Mauritania
MSR	Monserrat Isl.
MUS	Mauritius
MWI	Malawi
MYR	Myanmar

**COUNTRY ABBREVIATIONS (Cont'd)**

MYS	Malaysia
NAM	Namibia
NCL	New Caledonia
NER	Niger
NGA	Nigeria
NIC	Nicaragua
NIU	Niue Island
NLD	Netherlands
NOR	Norway
NPL	Nepal
NRU	Nauru
NZL	New Zealand
OMN	Oman
PAK	Pakistan
PAN	Panama
PCI	Caroline Island/Micronesia
PER	Peru
PHL	Philippines
PNG	Papua New Guinea
POL	Poland
PRI	Puerto Rico
PRK	Korea (Dem. Peoples Republic)
PRT	Portugal/Azores/Madeira Isl.
PRY	Paraguay
PYF	French Polynesia/Society Isl./Tuamotu
QAT	Qatar
ROM	Romania
RWA	Rwanda
SAU	Saudi Arabia
SDN	Sudan
SEN	Senegal
SGP	Singapore
SHN	Ascension Island/St. Helena
SLB	Solomon Islands
SLE	Sierra Leone
SLO	Slovenia
SLV	El Salvador
SOM	Somalia
SPM	St. Pierre/Miquelon
STP	Sao Tome/Principe

**COUNTRY ABBREVIATIONS (Cont'd)**

SUR	Suriname
SVK	Slovakia
SWE	Sweden
SWZ	Swaziland
SYC	Seychelles
SYR	Syria
TCA	Turks and Caicos Islands
TCD	Chad
TGO	Togo
THA	Thailand
TTO	Trinidad/Tobago
TUN	Tunisia
TUR	Turkey
TWN	Taiwan
TZA	Tanzania
UGA	Uganda
URY	Uruguay
VCT	St. Vincent
VEN	Venezuela
VGB	Virgin Islands (U.K.)
VIR	Virgin Islands (U.S.)
VNM	Vietnam
VUT	Vanautu
WAK	Wake Island
WLF	Wallis/Futuna Islands
XJ1	Kazakhstan/Kyrgyzstan
XJ2	Armenia/Georgia
XJ3	Ukraine/Moldova
XJ4	Estonia/Russia
XJ5	Belarus/Latvia/Lithuania/Russia
XJ6	Kazakhstan/Russia
XJ7	Kazakhstan/Tajikistan/Turkmenistan/ Uzbekistan
XJJ	Azerbaijan
XJR	Russia
YEM	Yemen (Arab Republic)
YUG	Yugoslavia
ZAF	South Africa
ZAM	Zambia
ZAR	Zaire
ZWE	Zimbabwe

**OTHER ABBREVIATIONS**

2D	Two-dimensional
3D	Three-dimensional
ACQ	Acquisition
AKD	Alaska Daylight Time
AKS	Alaska Standard Time
ALRT	Alert Area
ALT	Altitude
APT	Airport
ATD	Atlantic Daylight Time
ATS	Atlantic Standard Time
BATT	Battery
BRG	Bearing
CAUT	Caution Area
CDT	Central Daylight Time
CHNG	Change
CL B	Class B
CL C	Class C
CLR	Clear
COM	Communication
COMM	Communication
CRSR	Cursor
CST	Central Standard Time
CTA	Control Area
CTR	Center (ARTCC)
CTRL	Control
DB	Data base
DEL	Delete
DEGRD	Degraded navigation
DIS	Distance
DNGR	Danger Area
DRT	Dirt
DT	Desired track
DTK	Desired track
DTRK	Desired track
E	East
E.FUEL	Estimated Fuel
EDT	Eastern Daylight Time
ELV	Elevation
ENT	Enter
EPEH	Estimated position error, horizontal
EPEV	Estimated position error, vertical

**OTHER ABBREVIATIONS (Cont'd)**

ESA	En route safe altitude
EST	Eastern Standard Time
ETA	Estimated time of arrival
ETE	Estimated time en route
F.FLOW	Fuel flow
F.RES	Fuel reserve
FPL	Flight plan
FPLN	Flight plan
FREQ	Frequency
FR	From
FSS	Flight Service Station
GDT	Greenland Daylight Time
GND SPD	Groundspeed
GPS	Global Positioning System
GRV	Gravel
GS	Groundspeed
GST	Greenland Standard Time
HAD	Hawaii Daylight Time
HAS	Hawaii Standard Time
HRD	Hard
I/O	Input/Output
IDENT	Identifier
IDX	Index
INIT	Initialization
INT	Intersection
INVRT	Invert
KH	Kilometers/Hour
KM	Kilometers
KT	Knots
L	Left
LCL	Local time zone
LGHT	Lighting
M	Message
M	Meters
MAG VAR	Magnetic variation
MH	Miles/Hour (statute)
MI	Miles (statute)
MIN	Minute
MDT	Mountain Daylight Time
MOA	Military Operations Area

**OTHER ABBREVIATIONS (Cont'd)**

MSG	Message
MST	Mountain Standard Time
N	North
NAV	Navigation
NDB	Non-directional Beacon
NM	Nautical miles
NMEA	National Marine Electronics Association
NRST	Nearest
NUM	Number
P.POS	Present position
PROH	Prohibited Area
PC LGHT	Pilot-controlled lighting
PDT	Pacific Daylight Time
POS	Position
PRES POSN	Present Position
PST	Pacific Standard Time
PT LGHT	Part-time lighting
PTT	Push-to-talk
R	Receive
RAD	Radial
RCVR	Receiver
RDR	Radar
REC	Record
REF	Reference
RES	Reserve fuel
REST	Restricted Area
RF	Radio frequency
RNG	Range
RTN	Return
RX	Receive
S	South
SDT	Samoa Daylight Time
SEC	Second
SEL	Select
SELF LOC	Self Locate
SET	Setup
SFT	Soft
SIM	Simulator
SNW	Snow
SPD	Speed

**OTHER ABBREVIATIONS (Cont'd)**

SQL	Squelch
SST	Samoa Standard Time
STAT	Status
STOR	Store
SUA	Special Use Airspace
T	Transmit
TK	Actual track
TMA	Terminal Area
TOT	Total
TRF	Turf
TRK	Actual track
TRNG	Training Area
TRSA	Terminal Radar Service Area
TX	Transmit
TXING	Transmitting
USR	User-defined waypoint
UTC	Coordinated Universal Time (Zulu)
V	VOR waypoint
VHF	Very high frequency
VOL	Volume
VOR	VHF Omni-directional Ranging
W	West
WARN	Warning Area
WAYPT	Waypoint
WPT	Waypoint
WX	Weather
WYPT	Waypoint
XFER	Transfer
Z	Zulu time



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**APPENDIX E - WX STATIONS--USA NOAA**

<u>LOCATION</u>	<u>CHANNEL</u>	<u>LOCATION</u>	<u>CHANNEL</u>
<b>Alabama</b>		<b>California</b>	
Anniston	3	Bakersfield (DT)	1
Birmingham	1	Coachella (DT)	2
Demopolis/Linden	3	Eureka	2
Dozier	1	Fresno	2
Florence	3	Lindsay	1
Huntsville	2	Los Angeles	1
Louisville	3	Monterey	1
Mobile	1	Pt. Arena/Ukiah	1
Montgomery	2	Redding (DT)	1
Tuscaloosa	2	Sacramento	2
<b>Alaska</b>		San Diego	2
Anchorage	1	San Francisco	1
Cordova	1	San Luis Obispo	1
Craig	2	Santa Barbara	2
Fairbanks	1	<b>Colorado</b>	
Haines	2	Alamosa (DT)	3
Homer	2	Colorado Springs	3
Juneau	1	Denver	1
Ketchikan	1	Fort Collins	5
Kodiak	1	Grand Junction	1
Nome	1	Greeley	2
Petersburg	1	Mead/Longmount	3
Seward	1	Pueblo	2
Sitka	1	Sterling	2
Valdez	1	<b>Connecticut</b>	
Wrangell	2	Hartford	3
Yakutat	2	Meriden	2
<b>Arizona</b>		New London	1
Flagstaff	2	<b>Delaware</b>	
Phoenix	1	Lewes	1
Porter Mountain	2	<b>District of Columbia</b>	
Tucson	2	Washington, D.C.	1
<b>Arkansas</b>		<b>Florida</b>	
Fayetteville	3	Belle Glade	2
Fort Smith	1	Daytona Beach	2
Gurdon	3	Fort Myers	3
Jonesboro	1	Gainesville	3
Little Rock	1	Inverness	2
Mountain View	2	Jacksonville	1
Star-City	2	Key West	2
Texarkana	1	Melbourne	1

**WX Stations--USA NOAA(Cont'd)**

<u>LOCATION</u>	<u>CHANNEL</u>	<u>LOCATION</u>	<u>CHANNEL</u>
<b>Florida, cont.</b>		*Marion	5
Miami	1	Monticello	3
Orlando	3	South Bend	2
Panama City	1	Terre Haute	2
Pensacola	2	<b>Iowa</b>	
Sebring	6	Cedar Rapids	3
Tallahassee	2	Des Moines	1
Tampa	1	Dubuque (DT)	2
West Palm Beach	3	Sioux City	3
<b>Georgia</b>		Waterloo	1
Athens	2	<b>Kansas</b>	
Atlanta	1	Chanute	2
Augusta	1	Colby/Goodland	3
*Baxley	7	Concordia	1
Chatsworth	2	Dodge City	3
Columbus	2	Ellsworth	2
Macon	3	Topeka	3
Pelham	1	Wichita	1
Savannah	2	<b>Kentucky</b>	
*Valdosta	6	Ashland	1
Waycross	3	Bowling Green	2
Waynesboro	4	Covington	1
<b>Idaho</b>		Elizabethtown (LP)	1
Boise	1	Hazard	3
Lewiston (DT)	1	Lexington	2
Pocatello	1	Louisville	3
Twin Falls	2	Mayfield	3
<b>Illinois</b>		Paintsville	7
Champaign	1	Pikeville (LP)	2
Chicago	1	Somerset	1
Marion	4	<b>Louisiana</b>	
Peoria	3	Alexandria	3
Rock Island/Moline	1	Baton Rouge	2
Rockford	3	Buras	2
Springfield	2	Lafayette	1
<b>Indiana</b>		Lake Charles	2
*Bloomington	2	Monroe	1
Evansville	1	Morgan City	3
Fort Wayne	1	New Orleans	1
Indianapolis	1	Shreveport	2

**WX Stations--USA NOAA(Cont'd)**

<u>LOCATION</u>	<u>CHANNEL</u>	<u>LOCATION</u>	<u>CHANNEL</u>
<b>Maine</b>		<b>Mississippi</b>	
*Caribou	7	Booneville	1
*Dresden	3	Bude	1
Ellsworth	2	Columbia (LP)	2
Falmouth	1	Gulfport	2
		Hattiesburg	3
<b>Maryland</b>		Inverness	1
Baltimore	2	Jackson	2
Hagerstown	3	Meridian	1
Salisbury	3	Oxford	2
<b>Massachusetts</b>		<b>Missouri</b>	
Boston	3	Camdenton	1
Camp Edwards/ Hyannis	1	Columbia	2
Worcester	1	Hannibal	3
		Hermitage	5
<b>Michigan</b>		Joplin/Carthage	1
Alpena	1	Kansas City	1
Detroit	1	Sikeston	2
Flint	3	Springfield	2
Grand Rapids	1	St. Joseph	2
Hesperia	3	St. Louis	1
Houghton	2	<b>Montana</b>	
Marquette	1	Billings	1
*Onondaga	2	Butte	1
Oshtemo	3	Glasgow	2
Sault Ste. Marie	1	Great Falls	1
Traverse City	2	Havre/Squaw Butte (DT)	2
<b>Minnesota</b>		Helena	2
Bemidji	4	Kalispell	1
Detroit Lakes	2	Miles City	2
Duluth	1	Missoula	2
International Falls	1	<b>Nebraska</b>	
Mankato	2	Bassette	3
Minneapolis/ St. Paul	1	Grand Island	2
Rochester	3	Holdrege	3
St. Cloud (DT)	3	Lincoln	3
Thief River Falls	1	Merriman	2
Wilmer (DT)	3	Norfolk	1
		North Platte	1
		Omaha	2
		Scotsbluff	1

**WX Stations-- USA NOAA(Cont'd)**

<u>LOCATION</u>	<u>CHANNEL</u>	<u>LOCATION</u>	<u>CHANNEL</u>
<b>Nevada</b>		<b>North Dakota</b>	
Elko	1	Bismark	3
Ely/Cave Mountain	2	Dickinson	2
Las Vegas/ Boulder City	1	Fargo	3
Reno	1	Jamestown	1
Winnemucca	2	Minot	2
<b>New Hampshire</b>		Petersburg	2
Concord	2	Williston	1
<b>New Jersey</b>		<b>Ohio</b>	
Atlantic City	2	Akron	2
<b>New Mexico</b>		Bridgeport	7
Albuquerque	2	Caldwell	3
Carlsbad	3	Cleveland	1
Clovis	3	Columbus	1
Des Moines	1	Dayton	3
Farmington	3	Lima	2
Hobbs/Maljamar	2	Sandusky	2
Las Cruces	2	Toledo	1
Ruidoso	1	<b>Oklahoma</b>	
Santa Fe	1	Clinton	3
<b>New York</b>		Enid	3
Albany	1	Lawton	1
Binghamton	3	McAlester	3
Buffalo	1	Oklahoma City	2
Elmira	2	Ponca City	5
Kingston	3	Tulsa	1
New York City	1	<b>Oregon</b>	
*Riverhead	3	Astoria	2
Rochester	2	Brookings	1
Stamford	2	Coos Bay	2
Syracuse	1	Eugene	2
Watertown	3	Klamath Falls	1
<b>North Carolina</b>		Medford	2
Ashville	2	Newport	1
Cape Hatteras	3	Pendleton	2
Charlotte	3	Portland/Estacada	1
Fayetteville	3	Roseburg	1
New Bern	2	Salem	3
Raleigh/Durham	1		
Rocky Mount	3		
Wilmington	1		
Winston Salem	2		

**WX Stations--USA NOAA(Cont'd)**

**LOCATION                      CHANNEL**

**Pennsylvania**

Allentown	2
Clearfield	1
Erie	2
Harrisburg	1
Johnstown	2
Philadelphia	3
Pittsburgh	1
State College	3
*Towanda	1
*Wellsboro	3
Wilkes-Barre	1
Williamsport	2

**Puerto Rico**

Maricao	1
San Juan	2

**Rhode Island**

Providence	2
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**South Carolina**

Beaufort	3
Charleston	1
Columbia	2
Conway/ Myrtle Beach	2
Cross	3
Florence	1
Greenville	1
Sumter (LP)	3

**South Dakota**

Aberdeen	3
Huron	1
Pierre	2
Rapid City	1
Sioux Falls	2

**Tennessee**

Bristol	1
Chattanooga	1
Cookeville	2
Jackson	1
Knoxville	3
Memphis	3

**LOCATION                      CHANNEL**

**Tennessee, cont.**

Nashville	1
Shelbyville	3
Waverly	2

**Texas**

Abilene	2
Amarillo	1
Austin	2
Beaumont	3
Big Spring	3
Brownsville	1
Byran	1
Corpus Christi	1
Dallas	2
Del Rio (DT)	2
El Paso	3
Fort Worth	1
Galveston	1
Houston	2
Laredo	2
Lubbock	2
Lufkin	1
Odessa/Midland	2
Paris	1
Pharr	2
San Angelo	1
San Antonio	1
Sherman	3
Tyler	3
Victoria	2
Waco	3
Wichita Falls	3

**U.S. Virgin Islands**

*St. Thomas	3
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**Utah**

Logan	2
Milford/Cedar City	2
Navajo Mountain	1
Salt Lake City	1
Vernal	2

**WX Stations--USA NOAA (Cont'd)**

<u>LOCATION</u>	<u>CHANNEL</u>	<u>LOCATION</u>	<u>CHANNEL</u>
<b>Vermont</b>		<b>Wisconsin</b>	
Burlington	2	Adams	2
*Marlboro	4	Green Bay	1
Windsor	3	La Crosse (DT)	1
<b>Virginia</b>		Madison	1
Heathsville	2	Menomonie	2
*Lynchburg	1	Milwaukee	2
Norfolk	1	*Park Falls	6
Richmond	3	Sister Bay	4
Roanoke	3	Wausau	3
Washington, D.C./		<b>West Virginia</b>	
Manassas	1	Beckley	1
<b>Washington</b>		Charleston	2
Neah Bay	1	Clarksburg	1
Olympia	3	Gilbert	3
Seattle	1	Hinton	4
Spokane	2	Moorefield	2
Wenatchee	3	Spencer	6
Yakima	1	Sutton	5
		<b>Wyoming</b>	
		Casper Mountain	1
		Cheyenne	3
		Lander	3
		Sheridan (DT)	3

**NOTES (Source: NOAA) :**

1. Stations marked with an asterisk (\*) are funded by private interest groups.
2. Stations marked LP are low-powered experimental repeater stations serving a very limited local area.
3. Stations marked DT operate less than 24 hours/day; however, hours are extended when possible during severe weather.
4. Occasionally the frequency of an existing or planned station must be changed because of unexpected radio frequency interference with adjacent NOAA Weather Radio stations and/or with the other government or commercial operators within the area.

## WX Stations--Environment Canada

**LOCATION                      CHANNEL**

**Alberta**

Calgary	2
Crowsnest	1
Edmonton East	2
Edson/Clarke Lake	2
Grand Prairie	2
Grand Prairie 2	3
Highvale	3
Lethbridge	2
Looma/Edmonton	3
Medicine Hat	1
Peace River	3
Red Deer	1
Whitecourt	1

**British Columbia**

Aldergrove	1
Alert Bay	1
Bowen Island	3
Campbell River	2
Castlegar	1
Commanche Mtn/ Vernon	3
Cranbrook/ Kimberly	2
Kelowna	1
Mount Helmcken	3
Mt Tuam/ Saltspring	2
Prince George	2
Summerland/ Penticton	3

**Manitoba**

Kenton/Brandon	1
Portage/Haywood	2
Riding Mountain/ Dauphin	1
Riverton/ Lake Manitoba	2
St. Norbert/ Winnipeg	1

**LOCATION                      CHANNEL**

**New Brunswick**

Bethel/St. John	3
Crabbe Mountain	1
Dalhousie	1
Miscou Island	1
Moncton	1
Poplar Hill/ Fredricton	3
St. Isidore	2
Scotch Mountain	2

**Newfoundland**

Birchy Lake	2
Botwood	1
Brent's Cove/ La Scie	2
Codroy Pond/ Pt Aux Basques	2
Conche	1
Gander	2
Hermitage	1
Kenmount Hill/ St. John's	2
Marystown	2
Mount Margaret	1
Port Rexton	1
Portland Creek/ Daniels Harbor	2
Rose Blanche	1
St. Anthony	2
Trepassey	1
Watson Brook/ Cornerbrook	1

**Northwest Territories**

Inuvik	2
Yellowknife	2



**WX Stations--Environment Canada (Cont'd)****LOCATION      CHANNEL****Nova Scotia**

Aylesford	1
Baker's Settlement/ Bridgewater	2
Ben Eoin	3
Cape North	1
Cheticamp	3
Geizer's Hill/ Halifax	1
Hebron/Yarmouth	1
New Tusket	1
Melrose	2
Nuttby Mountain	1
Oak Park/ George's Bank	3
River Denys	1
Sable Island	9
Shelburne	1
Victoria Junction/ Sydney	2

**Ontario**

Beardmore/ Lake Nipigone	3
Blue Mountain/ Collingwood	2
Fort Frances	3
Goderich	3
Kenora/Hilly Lake	3
Kingston/ Portsmouth	3
Kitchener/ Waterloo	1
Lindsay/Omene	2
Little Current/ Manitoulin	3
London/Belmont	3
Moose Creek/ Sandriham	1
Mount Forest	2
North Bay	3
Orillia/Muskoka	3
Ottawa	2

**LOCATION      CHANNEL****Ontario, cont.**

Peterborough/ Harwood	1
Port Elgin	1
Pukaskwa Park	1
Red Rock	3
Sarnia/Oil Springs	2
Sault Ste. Marie	2
Sudbury	2
Thorold/ St. Catharine's	3
Tip Top Mountain/ Montreal River	3
Thunder Bay	3
Toronto	3
Windsor	3

**Prince Edward Island**

Bear River	2
Hazelgrove/ Charlottetown	2
O'Leary/ Summerside	3

**Quebec**

Blanc Sablon	2
Chibougamou/ Mont Bourbau	1
Drummondville	1
Fleurimont/ Sherbrooke	3
Harrington Harbor	1
Kegaska	3
La Touque	3
Magdalene Isl.	1
Megantic	1
Mingan	2
Mont Belair/Quebec	1
Mont Carmel/ Trois Rivieres	2
Mont Royal/ Montreal	1
Mont Tremblent	3

**WX Stations--Environment Canada(Cont'd)**

<u>LOCATION</u>	<u>CHANNEL</u>
<b>Quebec, cont.</b>	
Mont Valin/ Chicoutimi	1
Mt. Grand Fonds/ La Malabie	3
Pointe Noire/ Sept Iles	1
Rimouski	1
Riviere Au Renard	3
Rouyn/Abijevis	2
St. Cleophas/ Mont Joli	2
Ste. Marguerite/ Beauce	1
Val D'or/ Lithium Mines	3
Ville Marie/ Mont Bruno	1
<b>Saskatchewan</b>	
Lumsden/Regina	1
Regina Beach	2
Saskatoon	1
Swift Current	1
Midale	2
Stranraer	2
North Battleford	3
Prince Albert	2
Yorkton	1
Lanigan	2

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## APPENDIX F - QUESTIONS AND ANSWERS


- Q:** What kinds of batteries can I use and which ones are recommended?
- A:** You can use any kind of AA batteries: Alkaline, rechargeable Alkaline, rechargeable Nickel Cadmium (NiCad), or high-energy Lithium. Alkaline cells are recommended. If you use NiCads, we recommend a rating of at least 600 mA-hr (milliamp-hours).
- Q:** How do I get the longest life from a set of batteries?
- A:** Several factors affect the KLX 100 battery life. Use the following tips to get the most out of your batteries:
- Use batteries from the list of recommended brands on the included sheet, "Important Notice Regarding Battery Life".
  - If possible, use the **GPS ONLY** or **COMM ONLY** modes on the Operation Setup page.
  - If you are using the COMM, minimize the amount of transmitting you do.
  - Turn the **TONE** feature **OFF** on the Operation Setup page.
  - Avoid using the display backlight. If you can't avoid this, use a short backlight time out (**BACKLIGHT TIME**) like **30 SEC** or **45 SEC** on the Operation Setup page. This way, the display backlight will be on when you need it, and off when you don't need it.
  - Configure both I/O ports for **NO OUTPUT** on the I/O Setup page.
- Q:** Why can't I transmit when the Operation Setup page shows I still have some battery power left?
- A:** Transmitting requires a large amount of energy. Particularly when using alkaline batteries, the transmitter cannot operate with batteries at low levels, even though the batteries may have enough power left to run the GPS receiver and/or the COMM receiver.

**Q:** Sometimes my batteries run down even when I use my cigarette lighter adapter.

**A:** Cigarette lighters are often unreliable connections. In order to make sure you are running off of external power and not the batteries-

- Ensure the green LED is lit on the cigarette lighter power adapter.
- Check the battery scale on the Operation Setup page, it should read full scale.
- Set the voltage monitor to give you a message if external power is lost. See section 6.5.

**Q:** Why do I have to turn the KLX 100 off, instead of just removing the batteries, or unplugging the power cable?

**A:** When you turn off the KLX 100 by holding the  button for 3 seconds, the KLX 100 saves all of the changes you have made to the user data (including flight plans, user-defined waypoints, setup preferences, and page configurations) since the time the KLX 100 was turned on. When the KLX 100 unexpectedly loses power, this new user data is lost.

**Q:** Why does the message page say **CHECK DATE AND TIME ON GPS INIT PAGE** after I change the batteries?

**A:** The KLX 100 has an internal clock which keeps track of the current date and time so that the GPS receiver knows what satellites to look for when it is first turned on. The internal clock is powered by the AA batteries. When the batteries are removed, the clock stops running. On power-up after a battery change, the KLX 100 updates the internal clock to the time when the unit was last turned off. If the KLX 100 was last turned off more than 10 minutes before, it's a good idea to reset the time and possibly the date so they are correct. The best way to avoid the need to reset the time and date is to do the following: When the batteries get low, turn the KLX 100

off, immediately change the batteries, then turn the KLX 100 on again.

**Q:** Will the power adapters operate the KLX 100 without drawing current out of the AA batteries?

**A:** Yes, both the AC power adapter and the aircraft/automobile power adapter supply enough power to run the KLX 100 without any power from the batteries. However, the power adapters will not trickle-charge the AA batteries.

**Q:** Can I connect the KLX 100 to one of the COMM antennas on my aircraft?

**A:** Yes. In fact, doing this will substantially improve your KLX 100's transmit and receive range. Use the available aircraft antenna adapter (part number 071-01443-0001), and see section 4, page 4-4 for more information. Installation of adapter may require FAA or other approval.

**Q:** Can I put a GPS antenna on my aircraft and use it with my KLX 100?

**A:** Yes. You may use certain GPS antennas on top of the aircraft. Installation of antennas may require FAA or other approval. Doing so will require a GPS RF cable adapter. Order part number 155-02858-0000.

**Q:** Can I connect the KLX 100 to a moving map display or a laptop computer?

**A:** Yes, both. Many popular aviation moving map products are compatible with the KLX 100's **AVIATION** output, and many personal computer (PC) moving map products are compatible with the KLX 100's **NMEA 0183** output. The types of electrical outputs are selected on the I/O Setup page (see section 6.8). We suggest you verify compatibility before purchasing a moving map product. The interconnection to an installed moving map display may require FAA or other approval.

- Q:** Can I use the GPS altitude in place of my aircraft's pressure altimeter?
- A:** No. The GPS altitude is normally incorrect by up to 300 feet or more, which is not the kind of accuracy you want to have for altitude. Pressure altimeters have an accuracy of approximately 40 feet at low altitudes (if the barometric pressure setting is exactly correct).
- Q:** Is the GPS receiver affected when I transmit on the KLX 100 COMM radio?
- A:** The transmitter produces strong signals that can interfere with the GPS reception. It is not unusual for the GPS receiver to temporarily lose its lock on the position for a few seconds. Once the COMM transmission is over, the GPS receiver generally takes only a few seconds to regain a position.
- Q:** How can I minimize the time it takes to get a GPS position?
- A:** Here are some tips:
- Make sure the GPS antenna is “sunny side up” (pointing straight up) and has a clear view of the sky.
  - Make sure the date, time, and initial position are correct on the GPS Initialize page.
  - If the unit is turned on while the antenna is shaded it may go into self locate mode. To improve your time to first fix, you may wish to cycle power once the antenna is in the clear.
- Q:** What do “EPEH” and “EPEV” mean?
- A:** EPEH stands for estimated position error, horizontal. EPEV stands for estimated position error, vertical. GPS navigation is very precise, but susceptible to some errors, most notably due to Selective Availability (SA), which is imposed by the U.S. Department of Defense

(DoD). SA reduces the accuracy to no better than 100 meters. These estimated errors are calculated such that the actual error will be less than the EPE 95% of the time.

**Q:** Can I buy my KLX 100 with one data base, and switch to the other?

**A:** Yes. Americas, Atlantic, and Pacific data bases are available for the KLX 100, and you may use an "IBM-compatible" personal computer to quickly update the data base. See section 1.3 for descriptions of the data base contents and coverage areas, and see section 6.8 for the data base update procedure.

**Q:** How do the COM pages behave when the KLX 100 is in the **GPS ONLY** mode?

**A:** To save battery power, it is possible to put the KLX 100 in **GPS ONLY** mode or **COMM ONLY** mode on the Operation Setup page. When the KLX 100 is in the **GPS ONLY** mode, the active frequency display on the Title Bar and COM 1 pages are dashed out, but the COM 2 and 3 pages appear to operate normally. If you attempt to transfer a frequency or scan frequencies, you will receive a message reminding you that you are in **GPS ONLY** mode.

**Q:** Can the KLX 100 be used for IFR navigation?

**A:** No. Only certain GPS systems which are permanently installed in the aircraft may be used for IFR navigation. AlliedSignal offers a number of Bendix/King and Global Wulfsberg products which are certified for Enroute, Terminal, and Non-precision Approach IFR navigation.



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## **APPENDIX G— GPS PRIMER**

### **BACKGROUND**

The Global Positioning System (GPS) is a satellite-based navigation system that was originally conceived and implemented by the United States Department of Defense (DoD). The system is, however, available to all civilian users free of charge. GPS provides extremely precise position, velocity, and time information.

The satellites are not geosynchronous, as is the case with many weather and television satellites. That is, each satellite is not above a fixed spot on the Earth all the time, but rather is continuously moving across the sky. In fact, each satellite completely orbits the Earth two times per day.

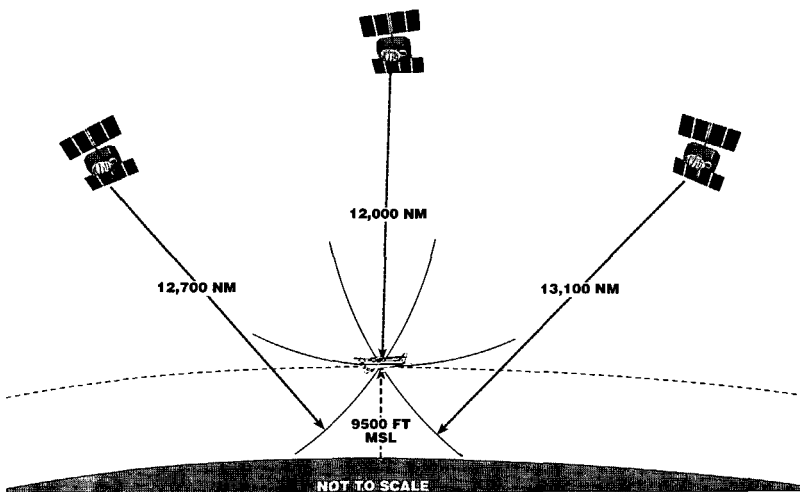
The Department of Defense imposes an intentional accuracy degradation of the GPS system. This degradation is known as Selective Availability (SA). When SA is active, only U.S. military users have access to full GPS accuracy. For civilian users, position accuracy is degraded to no worse than 100 meters. At the time of this writing, Selective Availability is on (and therefore accuracy is degraded) nearly 100% of the time.

### **GPS POSITION DETERMINING CONCEPT**

The technique used to determine position is fundamentally very simple. The complicated part is accounting for and correcting all the possible errors in the position.

The GPS receiver is able to determine the time it takes a radio signal to travel from the satellite to the GPS antenna. Since this radio signal travels at the speed of light (approximately 186,000 statute miles per second), the time delay can very easily be used to determine the receiver's distance from a given satellite. If measurements are taken from four satellites (or three satellites and an input from an aircraft altimeter), the receiver can identify its position very precisely.

For example, the GPS receiver might determine that it is exactly 12,000 miles from satellite A, 12,700 miles from satellite B, and 13,100 miles from satellite C. At the same time, the aircraft's encoding altimeter might be indicating an altitude of 9,500 feet MSL. There is only one point in space that satisfies these four measurements.



## GPS DATA SIGNALS

Two of the primary types of signals that the GPS satellites broadcast are almanac and ephemeris data. These signals enable the GPS receiver to quickly lock on to the satellites in view. Otherwise, the receiver would have to look for each of the 24 satellites to determine which ones could be used.

Almanac data is very crude data which describes the approximate orbital position of the satellites. Each of the 24 satellites transmits the almanac data for all satellites, so a GPS receiver has only to listen to one satellite in order to know which satellites are “visible” (in the sky) at that particular time. Almanac data is good for about six months, so when you turn the receiver off, then back on a month later, it will know what satellites to look for.

Ephemeris data is very precise data which each satellite transmits to tell the GPS receiver exactly where it is and what its orbital parameters will be for about the next four hours. Each satellite transmits its own unique ephemeris data.

## GPS SYSTEM SEGMENTS

The GPS system is composed of three segments: the Space Segment, the Control Segment, and the User Segment.

The Space Segment consists of the 24 NAVSTAR satellites which orbit the earth at an altitude of 10,898 nautical miles. The satellite orbits are very precisely planned so that the entire surface of the earth may use the GPS system 24 hours a day, every day. There are almost always more than six satellites in view from anywhere on Earth.

The Control Segment consists of a network of ground-based monitoring and control stations. The Master Control Station is located in Colorado Springs, Colorado. All satellite data which is collected by the other ground stations is assimilated and analyzed at Colorado Springs. Based on these analyses, ephemeris updates (such as system clock corrections) are sent (uplinked) to the satellites through radio transmitters at the ground stations. These ground stations are located at Kwajalein (west of Hawaii in the central Pacific Ocean), Diego Garcia (in the Indian Ocean), and Ascension (in the south Atlantic Ocean).

As an owner of a GPS system, you can now claim to be a certified member of the GPS User Segment! GPS has many users and uses, and more are being dreamed up all the time. Not only are aircraft using GPS navigation, so are military systems and personnel, boaters, hikers, and surveyors. Personal automobiles and transport trucks use Intelligent Transportation Systems, or ITS, to find their destinations, and track their movements. Some biologists attach GPS receivers to animals to monitor their movement and migration patterns. Geologists even use GPS to track the movement of glaciers and to analyze plate tectonics (movements of the Earth's crust). What an exciting new technology as we move into the 21st Century!

## **KLX 100 8-CHANNEL RECEIVER**

The KLX 100 GPS receiver has eight parallel channels, which means each channel can continuously track a satellite, for continuous tracking of up to eight GPS satellites. The parallel receiver design has several advantages:

- Excellent performance during high dynamic conditions (high velocity and/or acceleration).
- Improved position acquisition time (also known as time-to-first-fix) over single-channel designs.
- Improved position accuracy.

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
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## WELCOME

Welcome to the World's first handheld GPS/COMM! The Bendix/King KLX 100 from AlliedSignal will introduce you not only to some very innovative new GPS (Global Positioning System) features like the Mini-HSI, but also some ingenious ways of making GPS and COMM work together in ways you probably only dreamed of, like the new SOS Beacon feature!

As a new KLX 100 user, you can approach this Operator's Guide in several ways. If you want to learn about the KLX 100's navigation features, we suggest you turn to page iii and go through **GETTING YOUR BEARINGS**, which will introduce you to the primary KLX 100 features in the context of a simulated flight. If you want to take your KLX 100 outside and begin immediately to acquire GPS satellites, turn to page xi and go through **GPS INITIALIZATION**. If, on the other hand, you wish to learn more gradually, turn to chapter 1, **SYSTEM DESCRIPTION**, and start reading through the chapters in sequence.

Whichever type of user you are, you will find this Operator's Guide to be a good reference when you have specific questions. If you are new to using GPS, we invite your attention to Appendix G, "GPS Primer" for some basics of the powerful GPS satellite navigation system.

## ABOUT THIS GUIDE

This Operator's Guide will be of great help to you. It is written in plain, simple English and it assumes you are not an experienced user of GPS or other type of long range navigation equipment. If you are experienced, so much the better. This Operator's Guide also includes hundreds of sample screen figures and other illustrations to make your learning easier.

This guide is designed to fit easily in an aircraft or auto glove box, or in the seat pocket.

A "whisker" border is used on some of the figures in this Guide to indicate that the data inside the border is flashing.



There are many step-by-step procedures listed throughout this Guide. They are marked with a "footstep" icon:



There is an index of these step-by-step procedures located on page xii of this Guide.



**NOTE:** Throughout the book, there are numerous shaded boxes like this with special points of interest. Some, like this, are "NOTE:"s, and are marked with an "i" icon (i stands for "information").



**CAUTION:** More serious comments are "CAUTION:"s, and are marked with a black-on-white "!" icon.



**WARNING:** Pay close attention to the "WARNING:"s. They indicate matters of safety or regulations, and are marked with a white-on-black "!" icon.

# GETTING YOUR BEARINGS

This section will take you through an example flight using the navigation and communication features of the KLX 100 GPS/COMM. All this from the comfort of your own living room!

This section will not go into specifics on the exact content and use of each KLX 100 feature and page, there are six more sections for that. This is just for you to get "off the ground" so you can get outside and start using it with real-life GPS satellite signals.

**i** ***NOTE:** This simulated flight assumes that you have just taken the KLX 100 out of its box and installed the included batteries (battery installation is described in section 1.1.2). If you have already used the KLX 100, some of the procedures and screen graphics may be slightly different.*

Naturally, the first step is to turn on the KLX 100 unit:

1. Press the **ON/OFF LIGHT** button momentarily to turn on KLX 100 power. You may or may not hear some audio from the COMM receiver. The turn-on page (figure i-1) is displayed for about five seconds, followed by a page which shows you the software and data base versions (figure i-2).



Figure i-1

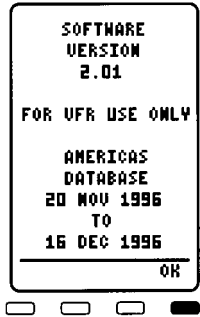


Figure i-2

2. Press the **OK** softkey to approve the Version page. The display will change to the GPS Status page (figure i-3). This page shows the locations of the GPS satellites in the sky, along with bar graphs to show the signal strengths of each individual satellite (see section 6.2 for more information on the GPS Status page). The GPS Status page should show **ACQ** indicating the GPS receiver is acquiring satellites. Where we're

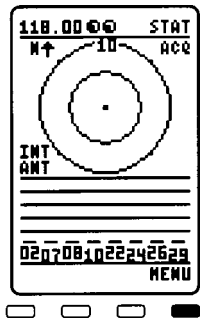
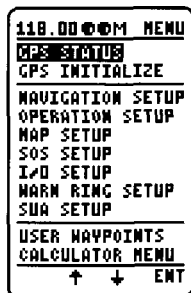


Figure i-3

going, we don't *need* satellites, since we'll be using the Simulator mode.

The GPS Status page is known as a **MENU** page, since it is accessed from the Main Menu. To see the Main Menu, press the **MENU** softkey on the GPS Status page (figure i-4). Notice that **MENU** is shown in the upper right corner of the screen. The **MENU** pages are used to customize KLX 100 features, and do things like trip planning and maintaining user defined waypoints.



There are four main page types, of which **MENU** is one. The four are:

<b>NAV</b>	Navigation (1-4). See chapter 3.
<b>COM</b>	Communication (1-3). See chapter 4.
<b>FPL</b>	Flight Plan (0-29). See chapter 5.
<b>MENU</b>	Menus/Setups. See chapter 6.

Figure i-4

where the three or four letter abbreviation at left is shown in the top right corner of the screen. For the **NAV**, **COM**, and **FPL** pages, the abbreviation is followed by a page number (the range of page numbers for each page type is shown in parentheses above).

We will now put the GPS in the Simulator mode and start moving:

- From the Main Menu, press the **↓** softkey until the cursor (an area of reverse video) is over the **GPS INITIALIZE** line and press the **ENT** softkey.
- The current **GPS MODE** should be **NORMAL**. Press the **CHNG** softkey twice to change to the **SIMULATOR** mode (figure i-5).
- Press the **↓** softkey about 5 times to move the cursor to the **WPT** field (the initial position, and the departure point for the simulated trip).
- We'll make our trip from New Century AirCenter in Olathe, Kansas (home of AlliedSignal Commercial Avionics Systems' Flight Operations) to Independence

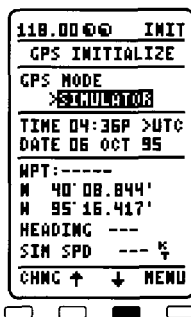


Figure i-5

Municipal Airport in Independence, Kansas. The identifier for New Century AirCenter is **KIXD**, which we will enter in the **WPT** field.

**i** **NOTE:** This procedure assumes you are using an Americas data base. If you are using an Atlantic data base, try simulating a flight from London (identifier EGLL) to Birmingham (identifier EGBB). If you are using a Pacific data base, try simulating a flight from Sydney (YSSY) to Newcastle (YWLM).

- 5. To enter the first character (**K**), press the **[JKL 4]** key. Notice that the softkeys are now labeled **J, K, L, 4** (figure i-6).

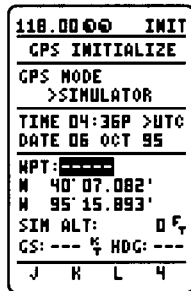


Figure i-6

- 6. Press the **K** softkey to select a **K** for the first character of the identifier.

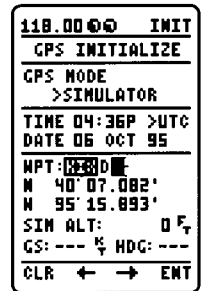


Figure i-7

- 7. Repeat steps 5 and 6 to enter **I** and **X**. The **D** should be filled in by the data base (figure i-7).

- 8. Press the **[ENT]** softkey to approve the entry of **KIXD**.

- 9. Press the **[↑]** softkey until the cursor is on the **GS** field. This is the groundspeed you will be traveling on the simulated flight.

- 10. Press the **[ABC 1]**, **[DEF 2]**, and **[MNO 5]** keys to enter a simulated speed of 125 knots (figure i-8).

- 11. Press the **[ENT]** softkey to approve the ground-speed.

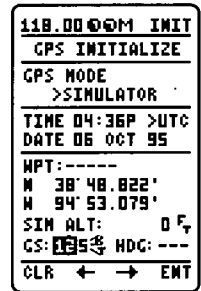


Figure i-8



Now press the **PAGE** key to change to the Navigation (NAV) 1 page, the moving map (figure i-9). You should be able to see a “trail of crumbs” behind you as you move along.

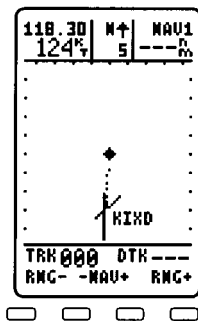


Figure i-9

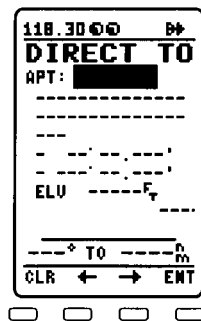


Figure i-10

We're now ready to proceed Direct To Independence:

1. Press the **DIR** (Direct To) key (figure i-10).
2. Enter the identifier for Independence Municipal (**KIDP**) in the same manner you entered **KIXD** for the departure point (figure i-11).
3. Press the **ENT** softkey to start navigation Direct To Independence.

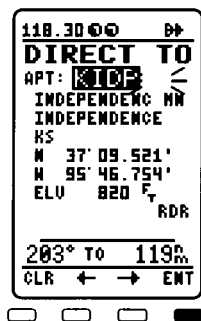


Figure i-11

The display should automatically go back to the moving map page (figure i-12). Notice that north is at the top of the map, and our flight will take us to the southwest. Press the **RNG+** softkey to zoom the map out until you have the 60 NM scale (figure i-13). Map scale is displayed the top center of the NAV 1 page. Notice that the nearby airports, navaids and SUAs are displayed on the moving map.

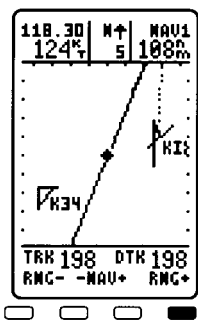


Figure i-12

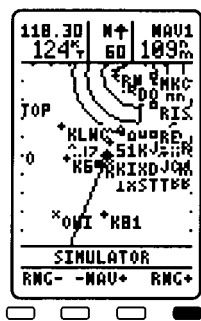


Figure i-13

Press the **RNG+** softkey some more until the destination (**KIDP**) is displayed on the moving map. Kind of hard to read? With all the nearest airports and other objects on the screen, the map gets