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Honeywell

Pilot's Guide KLN 94

Bendix/King®
GPS Navigation System

ORS 01, 02 and 03





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KLN 94 Pilot's Guide

006-18207-0000
Operational Revision Status
ORS 01, 02 and 03
July 2002

The **ORS** level is annunciated on the Turn-on page each time power is applied to the KLN 94 (see figure 3-3). Features limited to specific ORS levels are so designated in the text of this manual. The operational differences between ORS levels are described below.

ORS 02: Operational characteristics are similar to ORS 01 with the exception of the following primary differences:

(1) Enhanced waypoint scanning on the Nav 4 map page encircles the waypoint whose identifier is contained in the waypoint scan field. In addition, pressing the ENT button brings up the waypoint page for the selected waypoint. See section 3.11.4.11.

(2) Procedure turns and holding patterns associated with approaches, DPs, and STARs are displayed on the map. See section 3.11.4.12.

(3) New airport map icons now distinguish between airports having hard surface runways vs. soft surface runways and show the orientation of the longest runway if available. See section 3.11.4.7.

(4) New highway map icons are used for the Atlantic International and Pacific International databases. See section 3.11.4.7.

(5) There is a new message that appears if the database card is removed while the KLN 94 is operational. See Appendix B.

(6) The default value for intersections has been changed from 2NM to OFF on the SET 7 page.

(7) A software problem was fixed which now allows updating of the Aeronautical database with a computer via diskettes or the Internet. See sections 2.4.1 and 2.4.2.

(8) The Database page has been modified to display the region for the Land database. See section 3.2.

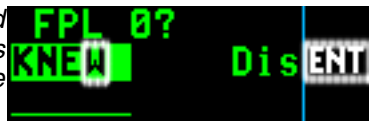
(9) Approaches which have the format of "RNAV # 18L" can now be accomodated. The "#" is a letter or number that designates there is more than one approach of a given type (i.e. RNAV) to the same runway. This format has been adopted by the FAA and other international aviation agencies.

Example 1: There could be RNAV Y 18L and RNAV Z 18L approaches at the same airport.
Example 2: There could be RNAV 1 09L and RNAV 2 09L approaches at the same airport

ORS 03: Operational characteristics are similar to ORS 02 with the exception that Special Use Airspace inner rings may be displayed on the Nav 4 map page. See section 3.11.4.4.

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NOTE: *A white border is used around data on some of the figures in this Pilot's Guide to indicate that the data inside the border is flashing.*



WARNING: The KLN 94 displays GPS-derived altitude on the AUX 1 page. Due to many factors, GPS altitude may typically be several hundred feet in error. Do not use the GPS-derived altitude for navigation.

IMPORTANT: *Special installation procedures must be followed in order for the KLN 94 to be certified for IFR En route, Terminal and Non-precision Approach use. If these procedures are followed, the KLN 94 can be used for IFR use. Consult the aircraft's KLN 94 Flight Manual Supplement for the operating limitations of this unit.*

IMPORTANT: *The KLN 94 has two software configuration numbers, one for the boot software and one for the application software. It may be useful for you to obtain these software configuration numbers to aid maintenance personnel if service is required on your KLN 94. The boot software configuration number is displayed on a label located on the KLN 94's top cover. The bottom of the label reads "BOOT SOFTWARE MOD" followed by the four digit configuration number. The application software configuration number is available on the top line of the Auxiliary (AUX) 14 page. It reads "SW REVISION" followed by a four digit configuration number. These software configuration numbers should have been recorded in the aircraft's logbook at the time of KLN 94 installation or time of a later software update.*

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Revision History and Instructions

Manual KLN 94 Pilot's Guide

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Part Number 006-18207-0000

This revision incorprates software changes for ORS 03.

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Revision History and Instructions

Manual KLN 94 Pilot's Guide

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This revision incorprates software changes for ORS 02.

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INTRODUCTION

Congratulations for choosing the Bendix/King KLN 94 GPS! Celestial navigation will now be a way of life for you. The phenomenal accuracy of GPS, along with the KLN 94's user-friendly operation and color graphics display will make flying a delight. Not only will the KLN 94 help you to navigate more easily and more accurately, its trip planning features, air data calculations, and other useful features will make you feel like you're flying with a true flight management system.

In addition, KLN 94 may be IFR approved for En route, Terminal, and Non-precision Approach operations. We think you'll find that having an abundance of navigational data (not to mention a moving map!) available to you will make non-precision approaches more precise and more enjoyable.

This Pilot'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 Pilot's Guide also includes hundreds of sample screen figures and other illustrations to make your learning easier. It is designed so that you can start at the front and progress in the order presented; however, you may want to skip around and learn things in your own order. Also, on page iv, there is an index of frequently used procedures which will help you find the page that describes how to do exactly what you want to do. There are also several appendices in the back of the manual that you may find useful from time to time.

If you are an experienced KLN 89B user, Appendix G outlines the KLN 94's new features and operational enhancements.

Be sure to keep this Pilot's Guide handy with you in the airplane. It is designed to fit easily in the glove box, or in the seat pocket.

One last thing. Don't get so involved in learning to use the KLN 94 that you forget to fly the airplane. Be careful, and remember to keep a close eye out for other aircraft.

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KLN 94 SNEAK PREVIEW

If you absolutely can't wait to use your KLN 94 until you've read this Pilot's Guide, this section is for you. This short section will teach you just enough to get going and then learn by doing. This operational preview assumes the KLN 94 has been properly installed, the unit was previously operational in the same general geographical location, and that no peripheral equipment interfaced with the KLN 94 (such as external HSI's, CDI's, autopilots, moving map display, etc.) is to be used at this time. If you are using this operational preview in flight, do so only in good VFR conditions and only with an alternate means of navigation available to cross-check position.

1. Turn the unit on by pressing the On/Off/Brightness knob (the small knob in lower left hand corner). After the screen changes to full color, rotate the knob to adjust the display brightness to the desired level.

2. For about 50 seconds the Power On Page is displayed while the unit runs a self-test. (If the unit is in the Take-Home mode a Take-Home page is displayed. Press the ENT button to acknowledge the Take-Home mode). Afterwards, the Self-test Page is displayed. If the KLN 94 is receiving an altitude from an encoding altimeter, the present indicated altitude will be displayed on line 2. The bottom line should display **Pass** with the cursor over a flashing **Ok?**. Press the ENT button to approve the Self-test Page.

3. The Initialization Page will now be displayed. If the date and time are incorrect by more than 10 minutes, refer to section 3.2 of this Pilot's Guide. The right side of the screen should show the identifier of the nearest airport to the initial position, along with a radial and distance from that airport waypoint. Press ENT with the cursor flashing over **Ok?** to approve the Initialization Page.

4. If your KLN 94 has been configured for VFR use only, the VFR page will now be displayed to notify you of the VFR limitation. Press ENT to approve this page.

5. The Database Page is now displayed showing the date the database expires or the date it expired. Press ENT to acknowledge the information displayed on this page.

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6. Use the right outer knob to turn to the NAV page type. Watch the page bar at the very bottom of the screen. As the outer knob is turned the selected page type becomes reverse video (white letters on a blue background). Turn until NAV is selected. Then use the right inner knob to select the NAV 2 page if not already there. The NAV 2 page shows your present position relative to a nearby VOR. It may take a couple minutes for the GPS receiver to "wake-up" and determine a position. Verify that this position is correct before proceeding.

7. Press the [D▸] button. A page with the words **DIRECT TO:** is now displayed on the screen.

In step 8 you will enter the ICAO identifier of the airport. The identifier will have a "K" prefix for a Continental U.S. airport, a "C" prefix for a Canadian airport, or a "P" prefix (in some cases) for an Alaskan airport if the identifier is all letters. For example, LAX becomes KLAX. For these countries if the identifier contains any numbers, there is no prefix. For example, TX04 is entered TX04. For other areas of the world the airport identifier should be entered identically to how it is charted.

8. Rotate the right inner knob until the first character of the airport identifier is displayed. Turn the right outer knob one step clockwise to move the flashing segment to the second character position. Rotate the right inner knob to select the second character of the identifier. Use this procedure to enter the complete airport identifier.

9. Press [ENT]. The display will change to a page showing the identifier, name, city, and state/country of the airport just entered. Confirm that the correct airport is displayed. Press [ENT] a second time to approve the airport data.

10. A Navigation page (specifically the NAV 1 page) is now on the screen. The left side of the display (blue background) shows distance, groundspeed, desired track (DTK is the course to be flown), and actual track (TK is the actual course the aircraft is currently tracking over the ground). The large middle section of the display shows the active waypoint, a course deviation indicator (CDI), bearing to the waypoint, and estimated time en route (ETE). Beneath the CDI are located a digital display of the deviation and the CDI scale.

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HOW-TO INDEX

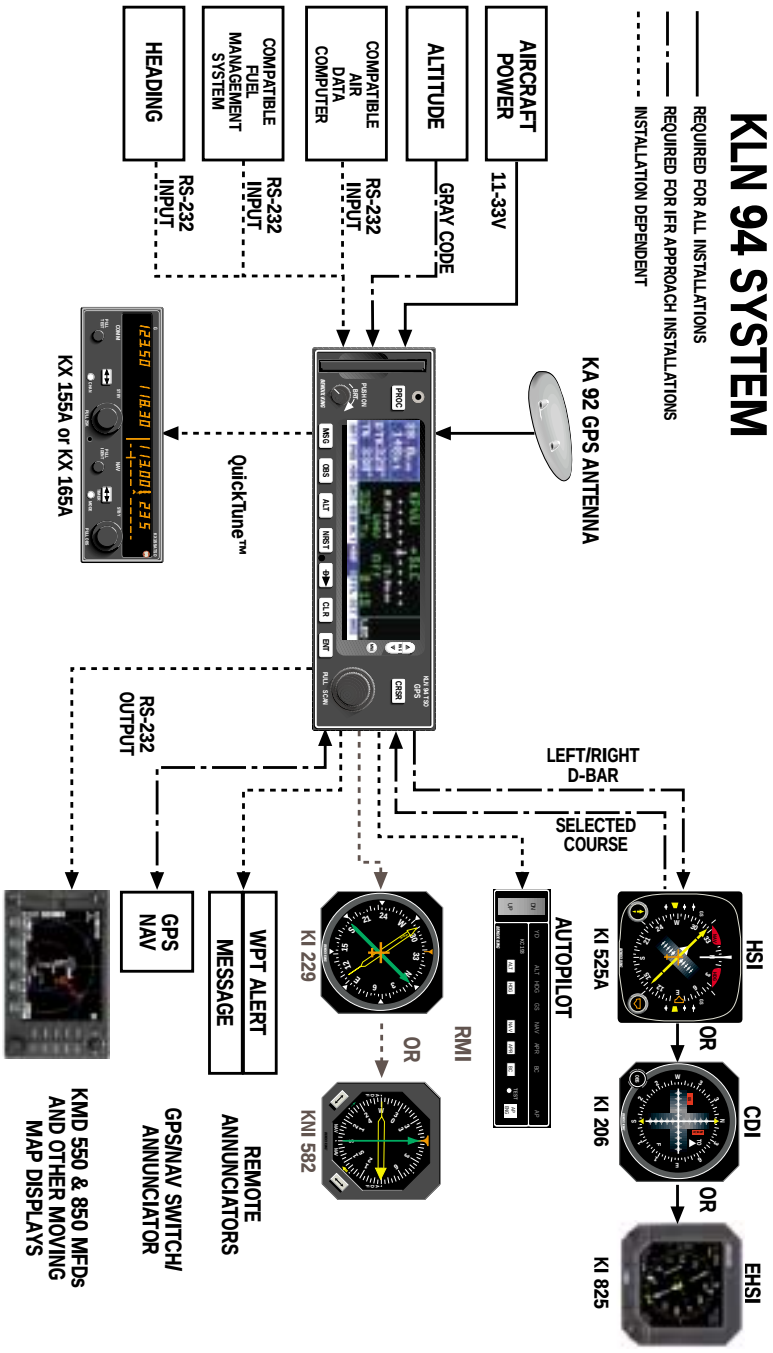
This index will help you quickly find important procedures at a glance. The list is alphabetized by action words.

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Set the date on the SET 2 page	5.15
Set the time on the SET 2 page	5.15
Specify the nearest airport criteria	3.9.1.1
Store the active flight plan as a numbered flight plan	4.1.7
Turn on and initialize the KLN 94	3.2
Update the KLN 94 database by computer	2.4.1
Use altitude alerting	5.3
Use VNAV on a Direct To	5.2
View a message	3.5
View the waypoints in the flight plan that are not the active waypoint.	4.2.3
View VNAV status	5.2

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1. KLN 94 SYSTEM COMPONENTS

A basic KLN 94 system consists of a panel mounted KLN 94 GPS and a KA 92 GPS antenna. An altitude input is required to obtain full navigation and operational capabilities. Additional system components may be added or interfaced to the KLN 94 which increase its features and capabilities. Some of these optional components include an external course deviation indicator (CDI) or horizontal situation indicator (HSI), autopilot, and external annunciators. Typically, an altitude input and an external indicator are required for IFR approach certification.

The KLN 94 panel mounted unit contains the GPS sensor, the navigation computer, a color LCD Display, and all controls required to operate the unit. It also includes the database card which slides into the left side of the front panel.

The KA 92 GPS "patch" antenna is available for use with the KLN 94. It is designed to always be mounted on the top of the aircraft.

The KLN 94 has analog outputs to drive the left-right deviation bar of most mechanical CDI's and HSI's. In addition, the NAV mode of the Bendix/King KAP 140, KFC 150, KAP 150, KAP 150H, KAP 100, KFC 200, KAP 200, KFC 225, KFC 250, KFC 275, KFC 300, and KFC 325 flight control systems may be coupled to the KLN 94. ORS 03 and higher KLN 94 units have a DC roll steering output capable of interfacing with all KFC 225 and some versions of KAP 140 flight control systems. Many other autopilots may also be coupled to the KLN 94. Actual autopilot performance and capability when coupled to the KLN 94 may vary significantly from one autopilot model to another.

Altitude may be provided to the KLN 94 from an encoding altimeter or blind encoder. Altitude is used as an aid in position determination when not enough satellites are in view.

Depending on where the KLN 94 is mounted in the instrument panel, some IFR installations may require remote annunciators to be mounted in the aircraft panel in order to indicate the status of certain KLN 94 functions. En route and terminal IFR certifications require annunciators for message (MSG) and waypoint alert (WPT). Non-precision approach certifications may also require an annunciator to display when the approach mode is armed or active.

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Each KLN 94 system includes a configuration module which is attached to the KLN 94 mounting rack. The module allows the KLN 94 to be configured for the unique characteristics of your equipment installation. Parameters that are set by the configuration module include:

- Whether the KLN 94 may be used for IFR operations or not, and if it may be used for non-precision approach IFR operations.
- Whether or not the altitude alert function in enabled. See section 5.3.
- Whether or not an external fuel management system is interfaced to the KLN 94. See section 5.13.
- Whether or not an external air data computer is interfaced to the KLN 94. See section 5.14.
- The conditions for the aircraft bus voltage alert to activate. See section 5.7.
- Whether there are Communication and Navigation radios interfaced with the QuickTune™ feature which allows tuning of the radio from the KLN 94. See section 3.15.

The configuration information is stored both in the module and in the KLN 94 internal memory. If the KLN 94 detects a difference between the configuration stored in the module and the configuration stored in the internal memory (which should only occur following the exchange of a KLN 94), the configuration information will automatically be updated to the configuration specified in the configuration module.

If an error is detected in the configuration data, a warning page stating Configuration Mem Error will be displayed during the KLN 94 start-up sequence, and the configuration memory will be set to arbitrary default values. See an authorized Honeywell Service center to correct the configuration memory error.

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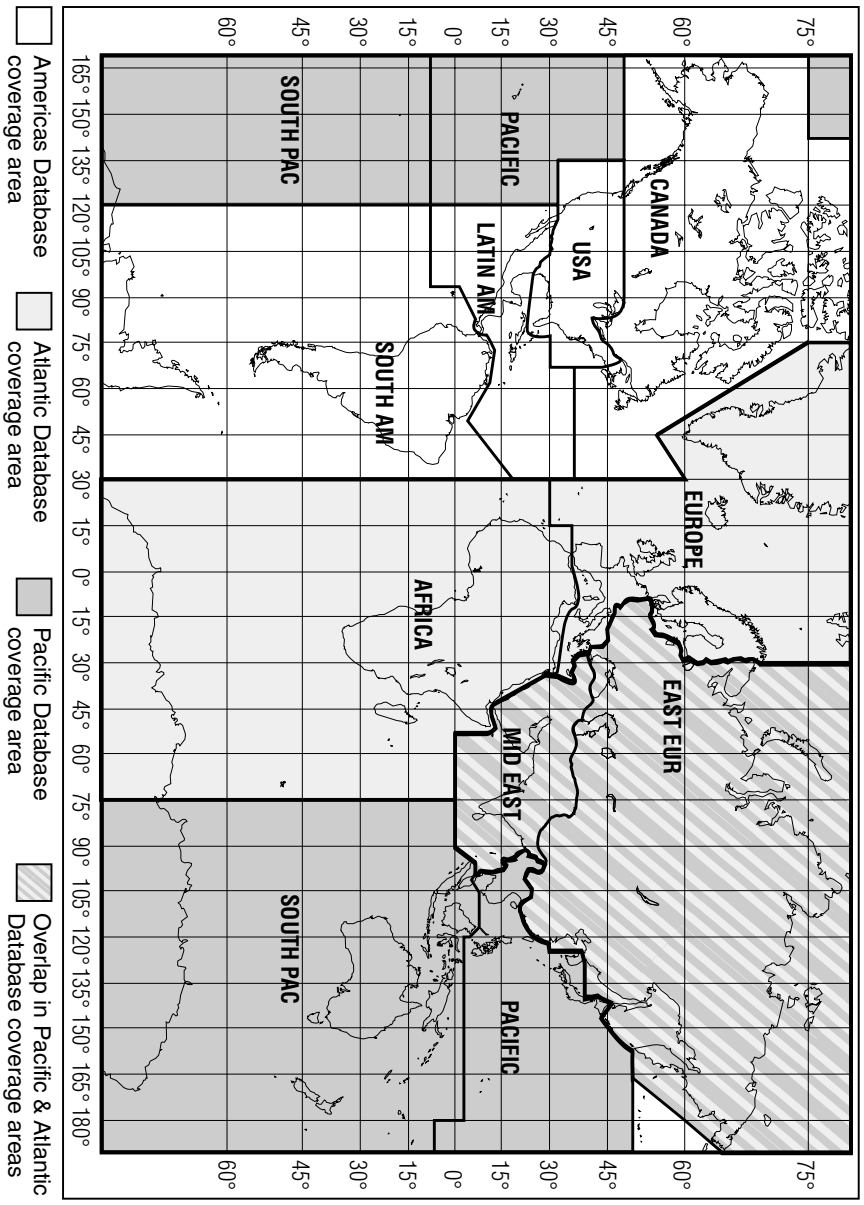


Figure 2-1 KLN 94 Database Geographical Region

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2. DATABASE

2.1. FUNCTIONS OF THE DATABASE

The database provides four 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 database automatically looks up and displays the latitude and longitude associated with the identifier. It should be obvious that the database saves a lot of tedious latitude/longitude entry and also greatly reduces the potential for data input mistakes.

The second function of the database 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 tower frequency, or the airport elevation? Just turn the knobs and display the information right on the screen.

Thirdly, the KLN 94 database stores the waypoints in their proper sequence that comprise most approaches, arrival procedures, and departure procedures. This allows you to select an approach, STAR, and DP by name as a whole, rather than entering them waypoint by waypoint.

And last but not least, the database furnishes the aeronautical and land data that is displayed on the color moving map display. It is a great aid in providing situational awareness to the pilot.

2.2. DATABASE CONTENTS AND COVERAGE AREAS

There are three database coverage areas available for the KLN 94. They are referred to as the "Americas" database, the "Atlantic International" database, and the "Pacific International" database.

The International Civil Aviation Organization (ICAO) and Aeronautical Radio, Inc. (ARINC) break the world into the ten geographic regions shown in figure 2-1. The KLN 94 Americas database contains aeronautical information for the group of ICAO regions consisting of Canada, USA, Latin America, and South America. The KLN 94 Atlantic International database provides information for the ICAO regions Europe, Africa, East Europe, and Mid East. Likewise, the Pacific International database contains information for East Europe, Mid East, Pacific, and South Pacific.

The KLN 94 database contains three types of data - aeronautical, cartographic (land), and user. Only the aeronautical data is sourced from Jeppesen Sanderson, Inc. It includes information for airports, navigational aids, navigational procedures (approaches, STARs, and DPs), and other aviation specific data. The cartographic data includes land items such as roads and rivers that can be displayed on the moving map display. User data is the list of waypoints created by the pilot.

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The following is a listing of the KLN 94 database contents:

AERONAUTICAL DATA

AIRPORTS

Identifier
Name
City, State or Country
Use type (if heliports, military, or private)
Latitude and Longitude
Elevation
Runway numbers, lengths, surfaces, and lighting
Fuel availability
Approach types available (precision, non-precision, or none)
Radar approach/departure environment
Time difference relative to UTC.
Airport Communication & Approach frequencies:
- ATIS
- Clearance delivery
- Tower
- Ground control
- Unicom
- Multicom
- Approach (IFR)
- Departure (IFR)
- Class B, Class C, TRSA, CTA, TMA (VFR)
- Center (when used for approach)
- Arrival
- Radar
- Director
- AWOS (automatic weather observing station)
- ASOS (automatic surface observation system)
- AAS (aeronautical advisory service)
- AFIS (aerodrome flight information service)
- ATF (aerodrome traffic frequency)
- CTAF (common traffic advisory frequency)
- RDO (radio frequency)
- MF (mandatory frequency)
- Ramp control
- PCL (pilot-controlled lighting)
- GCO (ground communication outlet)
- ILS & LOC type approach

VORs

Identifier
Name
Frequency
Latitude and Longitude
Magnetic variation

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NDBs (En Route and Terminal)
Identifier
Name
Frequency
Latitude and Longitude
(Note - Outer Compass Locators may be stored as an NDB by their NDB identifier or as an intersection by their intersection name)

DMEs associated with ILS/LOC type approaches – Stored with Intersections by the approach identifier (e.g. IJFK)
Identifier
Latitude and Longitude

Intersections (low altitude, high altitude, DP/STAR, approach, and outer markers). Also includes DMEs associated with ILS/LOC type approaches.
See DMEs
Identifier
Latitude and Longitude

DP/STAR/Approach Procedures
All compatible pilot-nav DP/STAR procedures
All compatible non-precision and precision approaches. Includes all public GPS-only approaches. Only those non-precision approaches designated on the Airport 8 page with "GPS" may be used to actually execute an approach with the KLN 94.

Miscellaneous
Air Route Traffic Control Center (ARTCC and FIR) frequencies
Flight Service Stations (location of points of communication and associated frequencies)
Minimum Safe Altitudes
Special Use Airspace (SUA) boundaries-Outer and inner* rIngs (Prohibited, Restricted, Alert, Class B, Class C, CTA, TMA, TRSA, Caution, Danger, MOA, Training, Warning)
**ORS 01 and 2 have outer rings only.*

LAND DATA
Lakes, rivers, oceans
Roads
Population areas (cities, towns)
Railroads
Political boundaries
Obstacles (towers)

500 USER DEFINED WAYPOINTS
Identifier
Latitude and Longitude

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2.3. ICAO IDENTIFIERS

Waypoints are stored in the KLN 94 database 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 NOS 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 Orlando Executive Airport is KORL while the VOR identifier is ORL. The prefix letter for Canada is "C" and for Alaska is "P".

***NOTE**: There are several exceptions in Alaska. In many cases, airports with three letter identifiers receive the prefix "P", but there are many that don't. The most reliable method of determining an Alaska airport identifier is to look it up from the airport name or city. See section 3.8.3, "Selecting Waypoints by Name or City".*

Incidentally, you can program the KLN 94 to default to a certain letter (such as "K") when you are entering a waypoint identifier. See section 3.4.2, "Data Entry" to learn about this handy feature.

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, 70R5, 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 KLN 94 database is identical to how it is charted.

2.4. UPDATING THE DATABASE

The information stored in the database would eventually become obsolete if there wasn't some means to update it. For example, new airports open, navaids can move or change frequency, communication frequencies can change, new roads are built, and on and on.

***NOTE**: By FAA regulation, you are required to have a current navigation database in order to use the KLN 94 for a non-precision approach.*

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A KLN 94 data card plugs into the left side of the KLN 94 front panel. The land data resides full time in the data card. The KLN 94 accesses the land data directly from the data card. The land data can only be updated by inserting a new data card. New land data is generally available from Honeywell about once a year.

The aeronautical data is initially contained in the data card. However, this data is then downloaded automatically into an another memory area internal to the KLN 94. The aeronautical data may be updated by inserting a new data card or by using a personal computer (PC) to update the internal memory directly through the data port on the front of the KLN 94. New aeronautical data is available from Honeywell every 28 days.

The user data is kept in a separate area of internal memory and is not affected by updating of the aeronautical or land database.

The aeronautical database is designed so that there are three ways for the user to keep the database current. The first method of database update is to remove the old data card and insert a current card. This method involves returning the old card to Honeywell.

The second and third methods involve electronically updating the database by using an IBM-compatible personal computer to update the internal memory directly via an interface cable that plugs into the data port on the front of the KLN 94. Method two utilizes Honeywell supplied 3.5-inch diskettes with the PC. The diskettes are not returned to Honeywell. Method three allows for acquiring the update data from the Internet.

Every 28 days, Honeywell receives new NavData™ information from Jeppesen Sanderson. This information is processed and downloaded onto both diskettes and database cards. It is also made available to Internet subscribers. Honeywell makes these three types of update services available to you in a choice of several subscription or random update programs. See section 2.6 for details on these programs.

***NOTE**: Honeywell sends the update so that it arrives prior to the next effective date. The new update may be installed any time prior to the effective date and the KLN 94 will use the previous data up to the effective date and automatically begin using the new data on the effective date.*

WARNING: The accuracy of the database information is only assured if it is used before the end of the effectivity period. Use of out of date database information is done entirely at the user's own risk.

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2.4.1. COMPUTER UPDATING OF THE DATABASE USING DISKETTES (ORS 02 AND HIGHER UNITS ONLY)

Update information is sent to you on 3.5" disks. In order to use the update program you must have access to a computer having a disk drive capable utilizing 3.5-inch 1.44 megabyte high density diskettes. This computer also needs to have an available COM 1 or COM 2 serial port. If you wish to perform updates in the cockpit, an optional PC Interface kit must be used. Included in the kit is an interface cable that plugs into both the computer and into the data loader jack located on the KLN 94 front panel.

CAUTION: The database must be updated only while the aircraft is on the ground. The KLN 94 does not perform any navigation function while the database is being updated. Since a database update takes approximately 8 minutes it is a good idea to turn off all electrical equipment on the aircraft except for the KLN 94 to avoid running down the aircraft battery.

NOTE*: The diskettes sent to you can only be used to update one KLN 94, 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 KLN 94 being used is uploaded to the diskettes. These diskettes may be used in this specific KLN 94 an unlimited number of times which could be required if you switch back and forth between the Americas, Atlantic, and Pacific databases during one update cycle. These diskettes may not, however, be used to update other KLN 94s. This update protection ensures that Jeppesen Sanderson is properly compensated for the use of their NavData™.*

To update the KLN 94 database by computer using diskettes:

1. Plug the 9 pin female connector end of the interface cable into a COM serial port of the computer. If the computer has COM 1 and COM 2 serial ports, either may be used.
2. If you are using the PC interface kit in the cockpit, plug the other end of the interface cable (3 conductor male connector) into the data loader jack that is located on the upper left corner of the KLN 94 front panel.
3. Insert the diskette into the computer's disk drive. Turn on the computer being used for the database 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 database update operation.

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4. Turn on the KLN 94. Press ENT as required to approve the Self Test, Initialization, and Database pages. Use the right outer knob to select the Setup (SET) type pages and the right inner knob to select the SET 3 page (figure 2-2).



Figure 2-2

5. Press CRSR. **Update Pub DB**? will now be flashing as in figure 2-3.

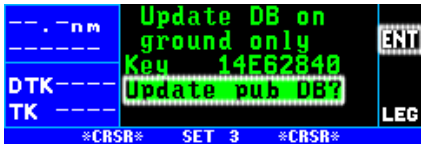


Figure 2-3

6. Press ENT. The estimated load time in minutes is now displayed (figure 2-4).



Figure 2-4

***NOTE**: In step 6, repeatedly pressing CLR will terminate the update process and bring the display back to the original SET 3 page shown in figure 2-2.*

7. Press ENT to acknowledge the estimated load time and begin the erasing of the existing database. The unit will now display **Erasing database**. After the database has been erased, the loading of the new data automatically begins. As the new data is being loaded, the percentage of transfer is displayed (figure 2-5).



Figure 2-5

8. The KLN 94 will indicate when the database update is complete as shown in figure 2-6. You may either turn the KLN 94 off at this point or press ENT to restart the KLN 94.



Figure 2-6

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

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The chances are small of having difficulty updating the database 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 KLN 94 will display **Data Loader Not Ready**. 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 after the data has been loaded, the KLN 94 will display **Checksum Error, Database Invalid**. Press ENT to acknowledge. The KLN 94 will then display **Database Update Failed, Retry?** Use the right outer knob to position the cursor over the desired choice and press ENT.
- There are other error messages that may be displayed. If you have a problem that you can't resolve, write down any error messages to aid your Honeywell Service Center in identifying the problem.

2.4.2 COMPUTER UPDATING OF THE DATABASE USING THE INTERNET (ORS 02 AND HIGHER UNITS ONLY)

Updates from the Internet can be obtained directly by logging onto the Honeywell Internet site: *www.gpsdatabase.com* and following the instructions provided for setting up an account and for doing the update. You may also call the following telephone numbers to set up an account:

(800) 247-0230

(913) 712-3145

2.4.3 CARD EXCHANGE UPDATING OF THE DATABASE

Having the front-loading data card makes KLN 94 very easy to update the database by exchanging cards.

Enclose the expired database card in the mailer that the new card was sent to you in. A return shipping label is included in the mailer. Please affix this label to the outside of the mailer. Also, peel off the protective backing from the adhesive on the end flap of the mailer. Press the flap against the adhesive to seal the container.

Please return the expired card promptly by mailing immediately at any mailbox. No postage is required if mailed from within the U.S. Users will be billed for cards not returned and no additional cards will be sent until either the expired card or payment for the expired card is received.

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2.5. USER DEFINED DATABASE

In addition to the aeronautical and land databases, you may create up to 500 other user-defined waypoints. Section 5.4, "Creating User-defined waypoints" describes this further.

The KLN 94 contains an internal lithium battery that is used to "keep-alive" the user-defined database as well as flight plans. This battery has a typical life of three to five years. It is highly recommended that the battery be replaced every three years at an authorized Honeywell Service Center.

2.6. DATABASE UPDATE SERVICE OPTIONS

The following tear-out page can be used for ordering Americas, Atlantic International, and Pacific International database update services from Honeywell. The forms may be mailed or FAXed for your convenience.

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BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 121 OLATHE, KANSAS

POSTAGE WILL BE PAID BY ADDRESSEE

HONEYWELL INTERNATIONAL INC.
M D66 - NAVIGATION SERVICES
23500 W. 105 STREET
OLATHE, KS 66061

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

Fold here

Tape here

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KLN 94 Database Update Service Order Form
Consult Pricing Sheet (006-08794-0007) for Service Prices

Honeywell offers several update service options to suit your requirements. Please select the service desired, then fill out and mail this order form. Credit card orders may be faxed.
Database updates are also available at www.gpsdatabase.com

Note: Updates are current for 28 days after effective date on diskette. If you select any service other than the complete 13-time service, your KLN 94 will begin alerting you after 28 days that your data base is out of date.

Check One:

☐ **Card Format**

☐ **Diskette Format**
(Laptop Computer Required. See section 2 of KLN 94 Pilot's Guide for details.)

Check Requested Data Base:

☐ **Americas Database**

☐ **Atlantic International Database**

☐ **Pacific International Database**

Check One:

☐ **Complete Update Service**. Provides 13 updates–one every 28 days for one year.

☐ **Six-time Update Service**. Provides six updates–one every 56 days for one year.

☐ **Four-time Update Service**. Provides four updates–one during each quarter for one year.

☐ **Single Update**. Provides one update upon receipt of order.

Honeywell

Please set up the service under:

Name: _____
Company: _____
Address: _____
City: _____
State: _____ Zip Code: _____
Country: _____
Telephone: (____) _____
FAX: (____) _____
Aircraft Make: _____
Aircraft Model: _____

Method of Payment

☐ Check/Money order enclosed

☐ Wire Transfer:
Chase Manhattan Bank, NY
Acct #910-2-538734

☐ MasterCard/VISADiscover/AMEX

Number _____
Expires _____
Signature _____

Include sales tax for your state.

Send to:

Honeywell
Mail Drop #66 - Navigation Services
23500 W. 105th Street
Olathe KS 66061
Phone: 913.712.3145 Fax: 913.712.3904
Toll Free: 800.247.0230
E-mail: nav.database@honeywell.com
www.gpsdatabase.com

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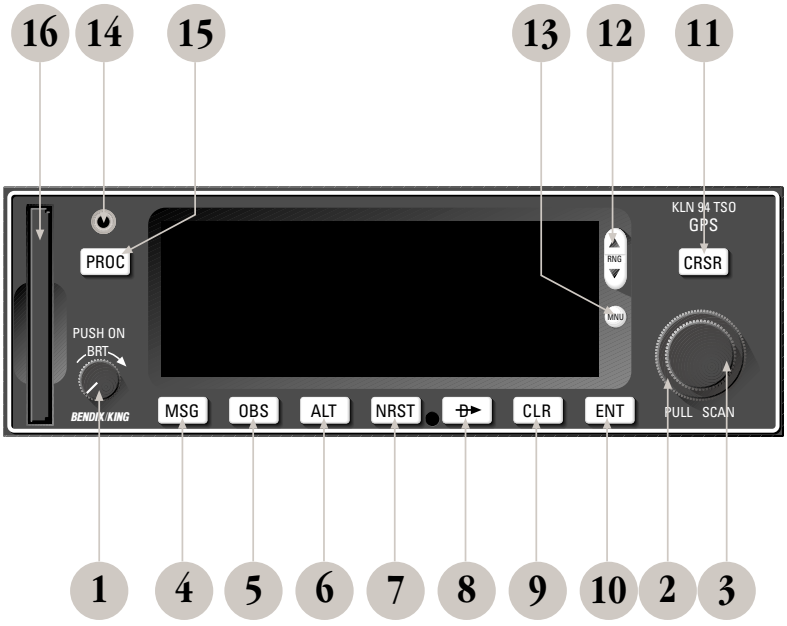


Figure 3-1 KLN 94 Controls

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1. **On/Off/Brightness knob** – Used to turn the unit on and off and adjust display brightness.
2. **Right outer knob** – When the cursor is off, used to select the page type (e.g. APT, NAV, FPL, etc.). When the cursor is on, used to move the cursor from one position to another on the display.
3. **Right inner knob** – When the cursor is off, used to select the specific page number for a page type (e.g. APT 1, APT 2, APT 3, etc.). When the cursor is on, used to select alphanumerics or other applicable data for the field the cursor is on.
4. **Message button** – Used to view messages.
5. **OBS button** – Used to select between LEG mode and OBS modes
6. **Altitude button** – Used to select the two Altitude pages where baro settings are made and VNAV operation is set up.
7. **Nearest butto**n – Used to bring up a menu of nearest functions (Airports, VORs, NDBs, Intersections, etc.) that may be selected.
8. **Direct To button** – Used to initiate Direct To operation.
9. **Clear button** – Used to delete data from a data field. Also used to back up to a previous step in some instances such as selecting approaches/STARs/DPs
10. **Enter button** – Used to approve or acknowledge data.
11. **Cursor button** – Used to turn the cursor on and off.
12. **Range button** – Used to change the map scale if the map page (Nav 4) page is being displayed. Used to select the map page if it is not already on the map page.
13. **Menu button** – Used to display the map menu if the map page (Nav 4) page is being displayed. The map menu is used to initiate changing what is displayed on the map as well as select the map orientation. Used to select the map page if it is not already on the map page.
14. **Data loader jack** – Used when updating the Aeronautical database from a computer.
15. **Procedure butto**n – Used to initiate the loading of approaches, arrival procedures, and departure procedures. Also used to activate vector–to–final (VTF) for approaches when an approach with "Vectors" has been loaded into the active flight plan.
16. **Data card** – Contains the KLN 94 database.

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3. BASIC GPS OPERATION

This is the first of four chapters specifically dealing with operating the KLN 94. In this chapter you will learn the basic operation of the front panel controls and then how to perform Direct To navigation (navigating from your present position direct to your desired location).

3.1. COVERAGE AREA

The KLN 94 was designed to provide worldwide navigation coverage from North 74° latitude to South 60° Latitude (figure 3-2). Outside this area, magnetic variation must be manually entered as discussed in section 4.10, "Operation Outside the Primary Coverage Area". See section 2.2 for the database geographical regions.

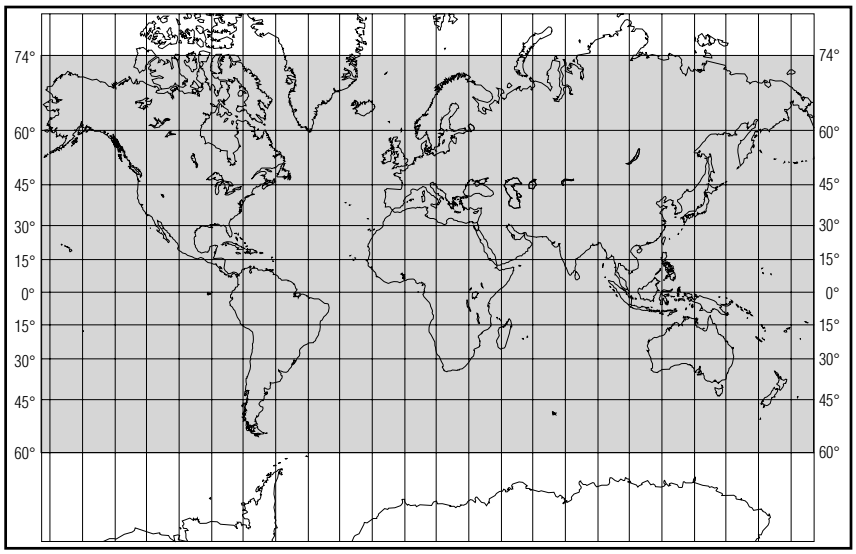


Figure 3-2 KLN 94 Navigation Coverage Area

3.2. TURN-ON AND SELF TEST

Well, it's time to get down to business and actually use the KLN 94! Figure 3-1 can be folded out and used as a reference during the following procedures. This is especially handy if you're learning while away from your GPS. The steps below take a lot of words to explain, but before you know it, you will be "flying" through them.

***NOTE**: When power is applied to the KLN 94 it always "wakes up" in the Leg mode. Only the Leg mode is described in this chapter. In this mode the KLN 94 performs great circle navigation (the shortest distance between two points located on the earth's surface). The course deviation*

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output displayed on the unit's internal course deviation indicator (CDI) and provided to an external horizontal situation indicator (HSI) or CDI is five nautical miles (full scale sensitivity) left and right in Leg mode. The other modes are described in section 5.5 and chapter 6.

To turn on and initialize the KLN 94:

1. Turn on the KLN 94 by pushing in the On/Off/Brightness knob. For the first few seconds a single color Power-On page is displayed at a fixed brightness. When the screen changes to full color, rotate the knob to adjust display brightness to the desired level.

   After an additional few seconds, the operational revision status (ORS) level number is displayed on the Power-On page (figure 3-3). The ORS level displayed should match the ORS level indicated on the cover of this Pilot's Guide .



Figure 3-3

***NOTE**: If the temperature is very cold when the KLN 94 is turned on, a Warm Up screen is displayed after the Power-On screen. Line 4 will display the approximate time the Warm Up screen will be displayed prior to automatically changing to the Power-On screen. The CLR button may be pressed to bypass the Warm Up screen but the display may be extremely sluggish until it warms up.*

When an extensive internal test is complete, the Power-On page will automatically be replaced by the Self Test page (figure 3-4).



Figure 3-4

***NOTE**: If the KLN 94 is operating in the Take-Home Mode, the Take-Home Warning Page (figure 3-5) is displayed first and must be acknowledged by pressing ENT. See section 3.16 for more information on the Take-Home mode.*



Figure 3-5

***NOTE**: A warning page (figure 3-6) is displayed if the unit is turned on without a database card.*

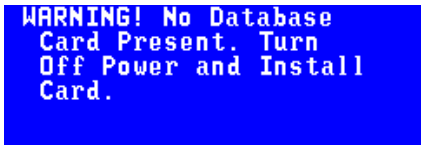


Figure 3-6

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2. Use the right inner knob to enter the current altimeter setting into the "Baro" field and then press the ENT button. (If the KLN 94 is interfaced to a compatible airdata system you will not be able to enter data into this field. Verify that the data displayed on the Self Test page is the same as is being displayed on the appropriate equipment in the aircraft which is interfaced to the KLN 94. If the KLN 94 is not connected to any other equipment in the aircraft, you may skip to step 3.

   The distance field in the upper left corner always displays **34.5 NM** (or **63.9 km**). If the KLN 94 is interfaced to a compatible indicator that displays DME distance, the indicator should be displaying 34.5 nautical miles.

   If the KLN 94 is interfaced with a NAV indicator such as an HSI or a course deviation indicator (CDI), the deviation bar (D-bar) should be indicating a half scale deviation to the right. The TO/FROM indicator should be showing FROM.

   If the KLN 94 is interfaced with a NAV indicator such that the KLN 94 can "read" the selected course from the NAV indicator, then the **OBS** field should display the same selected course as on the NAV indicator.

   The **RMI** field always displays 130 degrees. If the KLN 94 is connected to a compatible RMI in the aircraft, the RMI should indicate a bearing to the station of 130 degrees.

   If any of the above checks fail, do not use the associated indicator with the KLN 94.

3. If the KLN 94 has passed the internal self test, the bottom of the Self Test page will display **Pass** and all external annunciators (if any installed) should be illuminated. If instead, **Fail** is displayed, recycle power to the KLN 94. If the Self Test page still displays **Fail**, the KLN 94 requires repair and should not be used for navigation.

4. Use the right outer knob to position the cursor over **OK?** if it is not already there. When you are ready to approve the Self-test page, press the ENT button.

5. The next page displayed will be the Initialization page (figure 3-7). Verify that the date displayed in the top left corner of the Initialization page is correct.



Figure 3-7

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The KLN 94 has an internal battery powered calendar/clock, so the date and time normally don't require setting. The battery has a life of approximately 3 years. In addition, the KLN 94's system date and time are automatically updated very precisely when at least one satellite is being received. However, if for some reason the date or time are incorrect, it is necessary to enter the correct date or time so that the KLN 94 can reach the navigation mode quickly. The date should be correct and the time should be correct within ten minutes so that the KLN 94 will start looking for the correct satellites.

If the date is incorrect, rotate the right outer knob counterclockwise until the cursor is over the entire date field (figure 3-8). Rotate the right inner knob until the correct day of the month is displayed (figure 3-9). Then, move the cursor to the month field by rotating the outer knob one click clockwise and change the month as necessary. Use the same methods to select the correct year (figure 3-10). When the date is correct, press ENT.

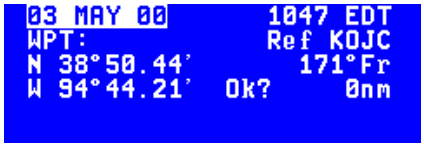


Figure 3-8

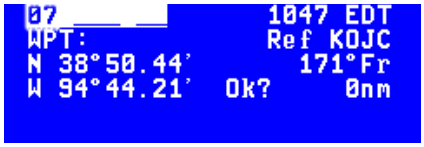


Figure 3-9



Figure 3-10

6. Verify that the time displayed in the upper right corner of the Initialization page is correct to within ten minutes of the actual time. Remember, once the KLN 94 receives the first satellite, it will automatically be very accurately updated by the satellite to the correct time. However, you are responsible for assuring the desired time zone is selected on the KLN 94. If it is necessary to reset the time, position the cursor over the time zone field (figure 3-11) and select the desired time zone (figure 3-12).

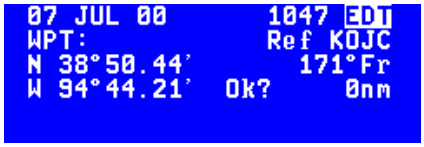


Figure 3-11

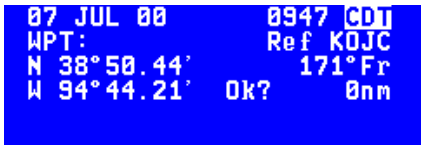


Figure 3-12

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The KLN 94 is capable of displaying the following time zones:

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

You will be able to change the time zone any time you desire on several other pages, so don't worry if you're not sure which time zone to choose. UTC—Coordinated Universal Time (also called "Zulu") is always a safe choice.

The local time zone (LCL) is selected on the SET 2 page, and is defined to be a certain time offset from Zulu (UTC).

Once you have selected the desired time zone, position the cursor over the entire time field and select the correct hour with the right inner knob (figure 3-13). Since 24 hour time is used, be sure to add 12 if the time is after 1:00 P.M. (2:30 P.M. becomes 1430). Now move the cursor to the tens of minutes position and select the desired value, and repeat



Figure 3-13

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this process for the last digit of the time field. When the correct time has been entered (figure 3-14), press ENT to start the clock running. Don't worry that you can't update the seconds. The KLN 94 system time will automatically be corrected very precisely once a satellite is received.



Figure 3-14

7. To aid the GPS receiver in acquiring your position, it helps to have a reasonable idea of where you are, and the Initialization page is where you have the chance to set this initial position. Check to see if the displayed initial position is where you actually are. This latitude/longitude is the last known position before the power was shut down the last time. Unless the unit has been moved since its last use, this position should be correct. On the right side of the screen will be the identifier of the nearest airport in the database, with a radial and distance from that airport. If you need to change the initial position to—let's say—Omaha Eppley (KOMA), move the cursor to the **WPT:** field and use the right inner knob to select a K as the first character of the identifier (figure 3-15). Move the cursor to the right one character and select an O and then right again to select an M. The final A should be filled in by the database (figure 3-16). When you press ENT, the latitude and longitude fields will change to those of KOMA (figure 3-17). If necessary, the latitude and longitude may be entered manually.



Figure 3-15



Figure 3-16



Figure 3-17

8. When all information on the Initialization page is correct, move the cursor to **Ok?** using the right outer knob and press ENT to move on.

9. If the KLN 94 installation is approved for VFR use only or for IFR use without approach capability, a page will be displayed after the Initialization page to notify you of this.

***NOTE**: In some installations, KLN 94 is configured for use in IFR En route and Terminal operations, but not for non-precision approaches. If this is the case, line 3 will read **GPS Approaches Disabled** and you will not have access to approaches in the database.*

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10. The Database page will now be displayed with the cursor over **Acknowledge?**. Line 1 indicates whether an Americas, Atlantic International, or Pacific International aeronautical database is being used. If the aeronautical database (airports, navaids, approaches, etc) is current, line 2 will show the date when the aeronautical database expires (figure 3-18). If the aeronautical database is out of date, line 2 shows the date that it expired (figure 3-19). The KLN 94 will still function with an out-of-date aeronautical database; however, you must exercise extreme caution and always verify that the database information is correct before using information from an out-of-date aeronautical database. Line 3 indicates which database region is used for the LAND database (roads, rivers, etc) on ORS 02 and higher units. Line 4 displays the date that the land database was created. The land database has no expiration date and new data is available approximately once a year. Press ENT to acknowledge the information on the Database page.

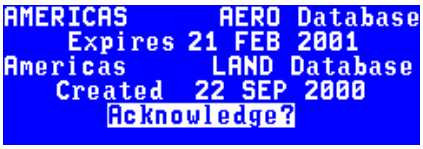


Figure 3-18



Figure 3-19

The first time the KLN 94 is turned on after a new database card was inserted, it takes approximately seven minutes to download data from the card to internal memory. During this time the Database page will temporarily display:

STANDBY

Database being

Updated

When the download is complete the normal database page will be displayed.

WARNING: The accuracy of the database information is assured only if the database is current. Operators using an out-of-date database do so entirely at their own risk.

***NOTE**: If your KLN 94 is interfaced with a remote Shadin fuel/air data computer but no fuel flow indicator, the Fuel on Board page will be displayed following the Database page (figure 3-20). This page allows you to*

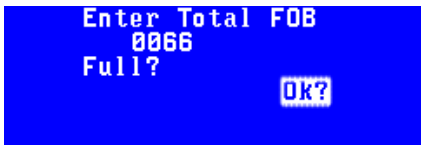


Figure 3-20

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*set the amount of fuel on board (FOB) and initializes the Auxiliary (AUX) 15 and 16 fuel calculator pages. Possible units are gallons (**GAL**), pounds (**LB**), imperial gallons (**IMP**), liters (**L**), or kilograms (**KG**). If you wish to manually set the FOB, use the right outer knob to move the cursor to line 2 and use the right inner knob to select the desired value. Another option is to move the cursor to **Full?** and press ENT, which will update the FOB to the tanks-full value set at the time of installation. To go on, move the cursor to **Ok?** and press ENT.*

Either the APT 5 or NAV 1 page will now be displayed on the screen. If the last active waypoint was an airport, the APT 5 page showing the airport's communications frequencies will be displayed (figure 3-21). Almost always, the waypoint which was active when you last turned the KLN 94 off is the airport where you landed. Therefore, when you get ready to depart, the airport communication frequencies for that airport will automatically be displayed for you!



Figure 3-21

Next, you may want to check the NAV 2 page to see your present position. Use the right outer knob to select the NAV page type and then the right inner knob, if necessary, to select the NAV 2 page. It is quite likely that the present position will be dashed at first (figure 3-22). It takes the KLN 94 a couple of minutes to acquire the GPS satellites and to make its initial calculation of your position. When the KLN 94 reaches a NAV ready status and is able to navigate, the NAV 2 page will display your present position relative to the nearest VOR (figure 3-23). Verify that the present position shown on the NAV 2 page is correct.



Figure 3-22

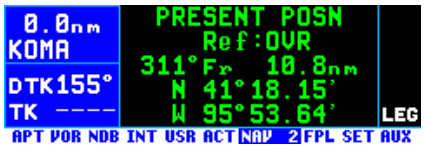


Figure 3-23

***NOTE**: In order to reach a Nav ready status, the aircraft must be away from obstructions blocking the GPS antenna's view of required satellites. If the KLN 94 fails to reach a Nav ready status within five minutes refer to section 3.7, "Initialization And Time To First Fix".*

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3.3. DISPLAY FORMAT

The KLN 94 uses a color LCD. In normal operation, the display screen is divided into four segments (figure 3-24). When the map page (NAV 4) page is displayed the page bar is removed to maximize the height of the map. Also, in some cases such as the display of system messages the segment dividers disappear and you have a "full-screen" page.



Figure 3-24

Display Segment 1 (Navigation Data)

A typical display screen is shown in figure 3-26. Display segment 1 is the Navigation Data segment. On all normal pages segment 1 consists of four lines of data.

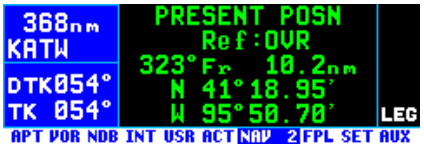


Figure 3-26

- The top line of segment 1 always displays distance to the active waypoint.
- The identifier of the active waypoint is usually displayed on the second line.

***NOTE**: In cases when the active waypoint identifier is displayed on a segment 2 page, line 2 will display the current groundspeed (figure 3-27).*



Figure 3-27

- The third line of segment 1 displays the desired track (DTK) when the KLN 94 is in the LEG mode, its normal mode of operation. DTK is the course to the active waypoint the aircraft should be flying. The DTK value will flash if the course selected on the external CDI or HSI differs from the desired track by more than 10 degrees. When the KLN 94 is in OBS mode of operation the OBS course is displayed on line 3. See section 5.5 for modes of operation.
- The aircraft's actual track (TK) over the ground is displayed on line four. Displaying the DTK and TK together like this makes it easy to determine the proper heading to fly in order to make the TK match the DTK. As long as they match the aircraft will remain on course. If the TK begins to differ from the DTK it won't be long until the deviation needle on the CDI or HSI will start be move off center. See Appendix A for a graphical description of navigation terminology such as DTK and TK.

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Display segment 1 changes somewhat when the map page (NAV 4) is being displayed. See section 3.11.4.

Display Segment 2 (Page)

Aeronautical information is presented on the screen in the form of "pages". Segment 2 is where these pages are displayed. A page is a presentation of specific data in an organized format. Various page "types" are used to display related kinds of data. For example, one page type is NAV (navigation). NAV pages show information such as distance, groundspeed, bearing, course, and other data relating to navigation. Another page type is APT (airport). APT pages contain information pertinent to a specific airport such as name, city, state, elevation, runways, and communication frequencies.

Display Segment 3 (Page Bar)

The specific page type and number is shown on the page bar at the bottom of the display. Ten page types are shown on the page bar; however, only the selected page type is shown in reverse video (white characters on a blue background). In figure 3-27, the NAV 1 (Navigation 1) page is being displayed in segment 2 and is annunciated as such on the segment 3 page bar.

You might think of the page types as the chapters in a book and the page numbers as the pages within a chapter. Just as a chapter in a book may have from one to many pages, a KLN 94 page type may have from one to 26 pages associated with it. There are, for example, 26 flight plan pages (FPL 0, FPL 1, FPL 2, … FPL 25) in the flight plan page type and up to eight airport pages (APT 1, APT 2, … APT 8) in the airport page type.

Figure 3-28 shows an example of an APT 5 page. Notice the "+" sign in the page identification. Whenever a "+" sign is part of a page identifier there will be two or more pages, all having the same page number, used to present all of the required information. That is, all of the information associated with a particular page number doesn't fit on the page being viewed. In this case the "+" sign indicates that there are two or more APT 5 pages. Figure 3-29 shows the second of 10 APT 5 pages for KICT (Wichita Mid-Continent Airport).



Figure 3-28



Figure 3-29

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Display Segment 4 (Annunciations)

Segment 4 displays annunciations associated with the operation of the KLN 94 (figures 3-30 and 3-31).



Figure 3-30

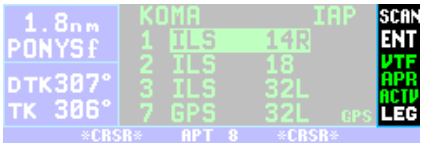


Figure 3-31

Line one shows the WPT (waypoint alert) annunciation when approaching the active waypoint (see sections 3.10.3 and 4.2.2) or the SCAN annunciation when the scan function has been enabled. The scan function is enabled by pulling the right inner knob to the "out" position on pages that allow waypoint lists to be scanned by turning the right inner knob.

Line two shows the message prompt, a large "M", when the KLN 94 has a message for you to view on the message page (see section 3.5 "Message Page"). This line is also used to indicate that the KLN 94 is ready for you to press the ENT button to approve something, such as a selected waypoint, by flashing the ENT (enter) prompt.

Line three displays a white "VTF" when a vectors-to-final approach has been loaded into the active flight plan (but not yet activated) and a green "VTF" when the vectors-to-final approach has been activated (see section 6.2.8).

Lines four and five display if the unit is in either the approach arm (APR ARM) or approach active (APR ACTV) modes (see section 6.2.1). The KLN 94 may also be configured at the time of installation to display terminal (TERM) and approach (APR), respectively, in lieu of APR ARM and APR ACTV. If the KLN 94 is in the en route mode these lines are blank.

Line six will normally display "LEG" which is the default mode. "OBS" is displayed when the pilot has selected the OBS mode (see section 5.5 "Navigation Modes").

Either "LEG" or "OBS" is always displayed on line six. The other lines in the annunciation segment will be blank unless the annunciation is active.

***NOTE**: The waypoint alert, message, and approach annunciations may also be displayed on remote annunciators. See section 3.14 "Remote Mounted Annunciators".*

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3.4. BASIC OPERATION OF PANEL CONTROLS

Remember that figure 3-1 is a fold-out page that you may want to refer to as you read this chapter.

The KLN 94 has three knobs and eleven buttons which are used to perform all operations. Most of the page selection and data entry is done with the knobs on the right side of the front panel and the cursor (CRSR) button immediately above them.

The cursor position is indicated by an area of reverse video. For example, if the characters are normally green on a black background, the characters change to black on a green background when the cursor is on. In figure 3-32 the cursor is over **3000**. Many pages allow you to add, delete, or change data on the screen by first pressing the CRSR button to turn the cursor function on and bring the cursor on the screen. The right knobs are then used to enter or change data. When the cursor is turned on, the page bar changes to only show the actual page being displayed in the middle with ***CRSR *** on either side. In some cases the cursor will flash to indicate that the ENT button must be pressed to approve the data.



Figure 3-32

3.4.1. PAGE SELECTION

It is now time to learn to select a desired page.

***NOTE**: The cursor function is not used in selecting pages and the CRSR button should not be pressed at this time. If **CRSR** is annunciated in page bar, press the CRSR button to turn the cursor function off.*

The right outer knob is rotated to select one of ten page types for the display. These ten page types are the following:

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Chapter Name/ Page # Range	Page Type	Page Functions
APT 1-8*	Airport	Directory of published airports
VOR 1-2	VOR	Directory of published VOR stations
NDB 1	NDB	Directory of published non-directional beacons (NDB)
INT 1-2	Intersections	Directory of published named intersections
USR 0-3	User Waypoint	Directory of user-defined waypoints
ACT **	Active Waypoints	Information about the active flight plan waypoints
NAV 1-4	Navigation	Navigation data
FPL 0-25	Flight Plan	Active and stored flight plans
SET 1-14	Setup	Setting initial position and date/time, updating the data base, and selecting certain features
AUX 1-14***	Auxiliary	Status reports, distance, bearing, time and fuel calculator; air data calculations based on pilot-entered inputs and deleting user wpts and remarks

* KLN 94's which are not approved for IFR have 6 airport pages.

** Varies with the type of waypoints in the active flight plan.

*** Up to 21 with fuel management system and air data interfaces.

The ten page types are listed across the page bar at the bottom of the screen. Remember that the page type/number of the page actually selected is shown in reverse video (white characters on a blue background).

The page bar works kind of like a map to get you from one page type to another. To change page types turn the right outer knob either direction. The area of reverse video moves across the page bar so that it is always over one of them. For example, let's say you were on a NAV page (figure 3-33) and you wanted to select a SET page. You would look at the page bar and see that the SET pages are two places to the right of the NAV pages. Therefore, turning the right outer knob two clicks clockwise will get you to the SET pages (figure 3-34). The page type selection wraps around from Auxiliary (AUX) to Airport (APT); that is, the knob has no mechanical stops.



Figure 3-33

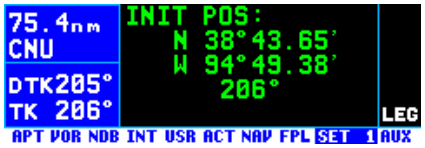


Figure 3-34

Once you have selected the desired page type using the right outer knob, you may select the page number by rotating the right inner knob. So to change from the SET 1 page to the SET 4 page turn the right inner knob clockwise three clicks.

Let's use an example to make sure you understand. You are presently viewing the APT 2 page and you wish to view the NAV 3 page. Rotating the right outer knob six clicks clockwise will display the NAV page that you

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last viewed—we'll say the NAV 2 page. Turning the right inner knob one click clockwise or three clicks counterclockwise will bring you to the NAV 3 page. Or, from the APT 2 page you could turn the right outer knob four clicks counter-clockwise to get to the NAV pages. Got it?

***NOTE**: In this Pilot's Guide the right smaller knob is assumed to be in the "in" position unless it specifically states that the knob should be in the "out" position. Therefore, the words "rotate the right inner knob" mean to turn the right inner knob while the knob is in the "in" position.*

3.4.2. DATA ENTRY

Now that you've learned how to select the desired page, you're ready to learn the means of entering data. It is necessary to enter data, for example, in order to specify a waypoint of your choice to go Direct To. The general procedure for entering a waypoint identifier is described below and is shown in figures 3-35 through 3-43 for entering a waypoint (in this case, First Flight airport in North Carolina, identifier KFFA) on the Auxiliary 4 (AUX 4) page.

To enter a waypoint identifier:

1. If the cursor is not on the screen (figure 3-35), press CRSR to turn on the cursor function (figure 3-36).

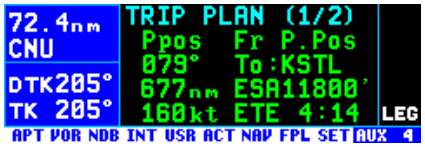


Figure 3-35



Figure 3-36

2. If required, rotate the right outer knob to position the cursor (figure 3-37).



Figure 3-37

3. Rotate the right inner knob to select the first character of the waypoint identifier (figure 3-38).



Figure 3-38

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4. Turn the right outer knob one click clockwise to move the cursor to the second character position (figure 3-39).



Figure 3-39

5. Rotate the right inner knob to select the second character (figure 3-40).

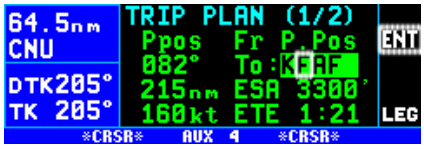


Figure 3-40

6. Use the right outer and inner knobs in this manner until the complete waypoint identifier is displayed (figure 3-41). Note that you may not have to enter the last characters of the identifier because each time you enter a character, the KLN 94 offers you the first identifier in the database beginning with the characters you have entered.



Figure 3-41

7. If **ENT** is flashing on the right side of the screen, then press ENT. This will prompt the KLN 94 to display a waypoint page for the waypoint identifier you just entered (figure 3-42).

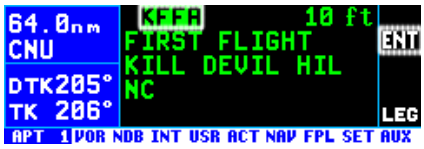


Figure 3-42

8. Verify the waypoint information displayed, and then press ENT again to approve the waypoint page. The display will return to the page previously displayed (figure 3-43).



Figure 3-43

Often, you will find yourself entering airports that begin with the same character over and over again. In section 2.3, you learned how the KLN 94 uses ICAO identifiers, which means that many U.S. airport identifiers begin with the letter K. Also, many airport identifiers in Europe begin with the letter E or the letter L. Especially when flying VFR, you will mostly want to enter Direct To or Flight Plan waypoints which are airports. You can set the default first waypoint identifier character on the SET 11 page.

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To change the default first waypoint identifier character:

1. Select the SET 11 page (figure 3-44) and turn on the cursor by pressing the CRSR button (figure 3-45).



Figure 3-44

2. Use the right inner knob to select the desired character (figure 3-46), such as a K in the U.S., a C in Canada, a P in Alaska, an E or an L in Europe, etc.



Figure 3-45

3. Turn off the cursor. To try it out, proceed to the SET 1 page (initial position). Turn the cursor (CRSR) on (it will come on over the waypoint field). Try turning the right inner knob one click clockwise (figure 3-47). There's the character you just selected on the SET 11 page!



Figure 3-46

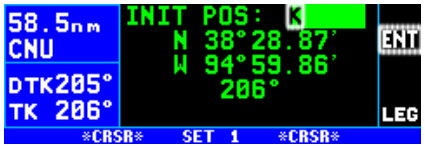


Figure 3-47

4. Turn off the cursor.

3.4.3. THE DUPLICATE WAYPOINT PAGE

There are some waypoints in the database whose identifiers are not unique. That is, more than one waypoint has the same identifier. When a waypoint identifier has been entered which is not unique to a single waypoint, a Duplicate Waypoint page appears on the screen. The Duplicate Waypoint page is then used to select which of the waypoints having the same identifier is actually desired.

The waypoint identifier is displayed on the top left of the page. Below the identifier is the number of waypoints in the database having the identifier. A list of the waypoint types (APT, VOR, NDB, INT, USR) and the associated countries which use the identifier is shown. Some countries such as the USA are further regionalized (e.g. "NE USA") to aid in making the correct selection.

***NOTE**: The duplicate waypoints are displayed in order of closeness to the aircraft's present position, the closest being displayed first.*

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To see an example of a Duplicate Waypoint page, try entering the identifier "AC" as a Direct To waypoint:

1. Press [D►].
2. Select "AC" as the waypoint identifier (figure 3-48). **AC** is the full identifier of several waypoints in the KLN 94 database.



Figure 3-48

3. Press [ENT]. The Duplicate Waypoint page will be displayed on the screen (figure 3-49). At the time of this writing, there were three waypoints in the Americas database having the identifier **AC**. The list includes an NDB in the southcentral U.S., an NDB in the northeast U.S., and an NDB in Canada. The cursor will be over the first waypoint listed. On the screen in figure 3-49, the NDB in SC USA is closest to the aircraft's present position since it is listed first.



Figure 3-49

If there are more than four duplicates, view the rest of the choices by rotating the right outer knob clockwise. Doing so will move the flashing cursor over waypoints two, three, and four and then will cause the waypoint list to "scroll" so that the other waypoints in the list may be seen.

4. To select the desired waypoint, move the cursor over the appropriate choice (figure 3-50).
5. Press [ENT] and the display will change to the waypoint page for the selected waypoint (figure 3-51).
6. Press [ENT] again to approve the waypoint page.

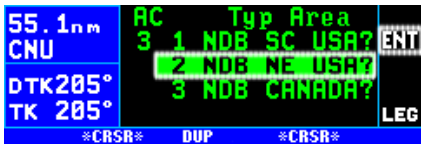


Figure 3-50

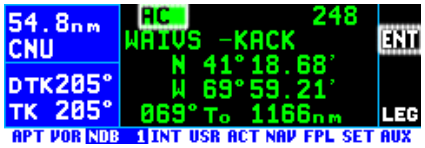


Figure 3-51

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3.5. MESSAGE PAGE

Whenever the KLN 94 wants to get your attention, the message prompt (a large yellow "M" on the right side of the screen) begins flashing (figure 3-52). If you have a remote message annunciator in your aircraft, it will also begin flashing at that time. 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 Pilot's Guide.



Figure 3-52

To view a message:

1. Press the MSG button. The MSG page will appear and show the new message (figure 3-53).



Figure 3-53

***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 MSG again to return to the page previously in view. If all of the messages cannot be displayed on one Message page, repeated presses of MSG will show the other messages before returning to normal operation. If a message condition exists which requires a specific action by you, the message prompt will remain on but will not flash.

3.6 SCRATCHPAD MESSAGES

The lower left corner of the display can also display short operational messages to the user called "scratchpad messages". These messages are displayed for approximately five seconds, then this area returns to a display of the page type and number. Figure 3-54 shows an example of a scratchpad message indicating an expired database. A complete listing of scratchpad messages is available in Appendix C of this Pilot's Guide.



Figure 3-54

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3.7. INITIALIZATION AND TIME TO FIRST FIX

Since the KLN 94 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 NAV ready condition. The time required from power on until the KLN 94 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 KLN 94 to reach a NAV ready condition, it is necessary to meet the following conditions:

1. The KLN 94's "almanac" data should be current. Almanac data is orbital information for all the satellites and is used for initial acquisition when the KLN 94 is first turned on. This data is stored in the KLN 94's non-volatile memory and is considered current for up to six months. Each satellite sends almanac data for all satellites. Since the KLN 94 routinely updates the almanac data during normal operation, the almanac data will become out of date only if the KLN 94 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 KLN 94 will take approximately 12 minutes to acquire your present position. The Self Test, Initialization, and Database pages should be approved.

2. The aircraft 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 possible, position the aircraft away from hangars or other obstructions.

3. It is very helpful for the KLN 94 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 battery backed memory of the KLN 94 so it is not normally required to update it. If the KLN 94 has the correct time, date and position, then the time to first fix will usually be less than two minutes. If this information is not correct, then the KLN 94 will start to look for any satellites. Eventually, the KLN 94 will find enough satellites to determine the position of the aircraft. This process can take as long as 12 minutes. It is possible for you to update this information manually, which will allow the KLN 94 to reach a NAV ready status much faster. To set the time and date follow steps 5 and 6 in section 3.2, "Turn-On and Self-Test." The initial position is usually set during turn-on and self-test, but if for some reason it is necessary to update the position after the power-on sequence, then use the following steps. Remember, if acquisition time is not important then it is not necessary to update the time, date or position.

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To initialize the position from the SET 1 page:

1. If the cursor is not on the screen (figure 3-55), press the CRSR button to bring it on the page over the **INIT POS** field (figure 3-56).

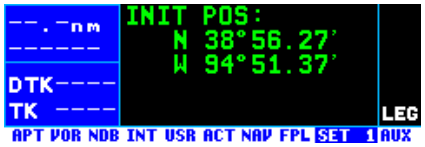


Figure 3-55

2. Using the right inner and outer knobs, 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 (figure 3-57). Any waypoint in the database 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 U.S., 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 U.S., Alaska, and Canada, use the airport identifiers as they are charted.



Figure 3-56



Figure 3-57

3. Once you have entered the complete identifier, press ENT. The display will change to the waypoint page for the waypoint you entered (figure 3-58).



Figure 3-58

4. If this is the waypoint you intended to enter, press ENT again. The display will change back to the SET 1 page.

***NOTE**: As an alternative, you can also enter the approximate latitude and longitude of your present position directly on the SET 1 page instead of entering a waypoint.*

5. With the right inner knob, position the cursor over **Ok**? if it is not already there (figure 3-59).
6. Press ENT to approve the initial position. The cursor will automatically be removed from the screen.



Figure 3-59

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***NOTE**: If the KLN 94 is in the Take-Home mode, you are allowed to enter the groundspeed (**kt**) and heading (°) fields in order to simulate flight (figure 3-60). They are not used for actual initialization in an aircraft. However, entering a groundspeed will allow the KLN 94 to "fly" along the active flight plan (or to a direct to waypoint) starting from the initialization waypoint. A heading may be entered in the initial heading field while in the Take-Home mode if the one offered is not desired. See section 3.16 for more details on the Take-Home mode.*



Figure 3-60

7. Select the NAV 2 page. When the KLN 94 reaches the NAV ready status and is therefore able to navigate, the NAV 2 page will display the present position. Verify that the latitude and longitude or the waypoint, radial, and distance display of present position are correct.

3.8. SELECTING AND SCANNING WAYPOINTS

There are five types of waypoints: airports, VORs, NDBs, intersections, and user waypoints. Waypoints in the published database fall into one of the first four types. You can create up to 500 user waypoints to supplement the waypoints in the database (see section 5.4 to create a user waypoint).

There are three methods you may use to select a specific waypoint for viewing. You may enter the waypoint's identifier directly, you may scan through the waypoint identifiers in alphabetical order, or you may enter the waypoint's name. If the waypoint is an airport, you may also select it by entering the city where the airport is located.

3.8.1. SELECTING WAYPOINTS BY IDENTIFIER

The most direct way of selecting a specific waypoint is to simply enter the waypoint's identifier directly on the appropriate waypoint page type (APT, for example). Let's use Chicago O'Hare International Airport whose identifier is KORD as an example.

To select a waypoint by identifier from a waypoint page:

1. Use the right outer and inner knobs to select the Airport 1 (APT 1) page (figure 3-61). (Actually, the airport identifier can be entered on any of the



Figure 3-61

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Airport pages but we'll use the APT 1 since it displays the airport name and city).

2. Turn on the cursor (CRSR) and make sure the right inner knob is pushed in. The cursor will appear over the first character of the airport identifier (figure 3-62).



Figure 3-62

3. Turn the right inner knob to select a "K" as the first character (figure 3-63). You may turn the knob either clockwise or counter-clockwise, and the letters and numbers wrap around with a blank character separating the "9" and the "A". Notice that as you turn through letters, the KLN 94 automatically fills in the identifier of the first waypoint in alphanumeric order in the database which matches what you've entered so far (in this case, Hall Airport in Kaufman, Texas). Go ahead and experiment a little bit.



Figure 3-63

4. Use the right outer knob to move the cursor to the second character and then select an "O" with the right inner knob (figure 3-64).



Figure 3-64

5. Use the same process to select an "R" and then a "D" (figure 3-65). You are now viewing the APT 1 page for **KORD**.



Figure 3-65

The KLN 94 feature of filling in characters of the identifier can be a time saver! For a second example, let's select Bloomington VOR whose identifier is **BMI**.

More selecting a waypoint by identifier:

1. Make sure you have turned the cursor off from the previous example. With the right knobs, select the VOR 1 page (figure 3-66).

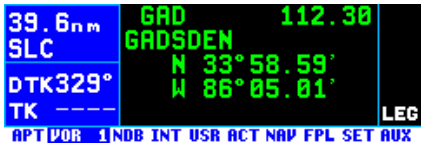


Figure 3-66

2. Turn the cursor (CRSR) on.

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3. Change the first character to a "**B**" (figure 3-67).

4. Move the cursor to the second character and select "**M**" (figure 3-68). Eureka! When you entered the "**M**", the KLN 94 searched its database for the first VOR identifier beginning with the letters "**BM**" and found **BMI**. Many times you will only have to enter two or three characters of the waypoint identifier and the KLN 94 will furnish the rest.



Figure 3-67

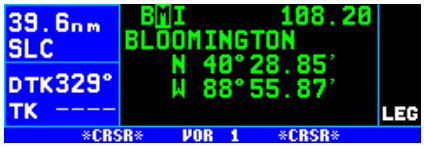


Figure 3-68

5. Turn off the cursor (CRSR).

3.8.2. SELECTING WAYPOINTS BY SCANNING

You may also select waypoints by scanning through them. This may be done with the cursor either on or off.

To select a waypoint by scanning with the cursor off:

1. Select the page type for the waypoint you are looking for (APT, VOR, NDB, INT or USR).

2. Pull the right inner knob to the "out" position. The SCAN annunciator will appear (figure 3 – 69).



Figure 3-69

3. Turn the right inner knob clockwise to scan through the waypoints in alphabetical order, or counterclockwise to scan in reverse alphabetical order. Remember that numbers are considered lower in order than letters. Thus, the airport identifier **KA2** comes before **KAAF**.

***NOTE**: The faster you turn the knob while scanning, the larger the step through the waypoints. This variable rate scanning allows you to get from one end of the list to the other very quickly. When the knob is turned slowly, you will go through the waypoints one at a time.*

You may also want to scan waypoints with the cursor on. This is especially useful if you remember the first part of the identifier, or if you wanted to scan all airports that start with a **KL**, for example. Let's give it a try.

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To select a waypoint by scanning with the cursor on:

1. Select the page type for the waypoint you are looking for (APT, VOR, NDB, INT or USR). In this case, we want the APT 1 page.

2. Turn on the cursor (CRSR). It will appear over the first character of the waypoint identifier. Select a **K** with the right inner knob.

3. Move the cursor one place to the right and select an **L** (figure 3-70).



Figure 3-70

4. Move the cursor one place to the right and pull the right inner knob out. The cursor will by over the last two characters of the waypoint identifier (figure 3-71).



Figure 3-71

5. Use the right inner knob to leaf through all the database airports whose identifiers begin with **KL**. You will see **KLAA**, Lamar Municipal in Lamar, CO, and **KLAF** (figure 3-72), Purdue University in Lafayette, IN among others.



Figure 3-72

3.8.3. SELECTING WAYPOINTS BY NAME OR CITY

When you know the identifier of the desired waypoint you will use one of the two methods just described to select it. However, what if you know the name but you don't know the identifier of your desired waypoint? You're in luck because the KLN 94 will allow you to enter the first few characters of the name to help you find it in the database. We will use a couple of examples to illustrate how this is done. For VORs and NDBs, you may use the navaid name. For airports, you may use the airport name or the city name (where the airport is located).

In this first example we want to view the information in the KLN 94 database for Napoleon VOR (located just east of Kansas City) but we don't remember the identifier for it.

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To select a VOR or NDB by navaid name:

1. With the cursor off, use the right knobs to select the VOR 1 page (figure 3-73). The VOR waypoint in view is not important.



Figure 3-73

2. Press CRSR and then make sure the right inner knob is pushed to the "in" position.
3. With the right outer knob, move the cursor over the first character in the VOR name which is being displayed (figure 3-74).



Figure 3-74

4. Change this first character to an "**N**" in this case (figure 3-75).
5. Move the cursor one space to the right and select the second character, "**A**" (figure 3-76).



Figure 3-75

6. Select the third character, "**P**" (figure 3-77). Up pops Napoleon and its identifier, ANX!
7. Turn off the cursor (CRSR) so you can view other pages.



Figure 3-76

We will now use another example to show how we may enter a few characters and then scan through all the waypoints in the database beginning with those characters. Let's use this method to find Newport News airport in Newport News, VA.



Figure 3-77

To select an airport by scanning the airport name:

1. With the cursor off and the right inner knob in the "in" position, select the APT (Airport) 1 page. The airport displayed at this time is not important.
2. Turn on the cursor (CRSR).
3. Move the cursor over the first character in the airport name (figure 3-78).



Figure 3-78

4. Change the first character to an "**N**".

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5. Move the cursor one place to the right, and select an "**E**" (figure 3-79).

6. Enter the "**W**" and "**P**" in a similar manner (figure 3-80).

7. Now, move the cursor one place to the right of the "P" and pull the right inner knob out. The rest of the airport name field will be in reverse video (figure 3-81).

8. Turn the right inner knob clockwise, scanning through Newport Municipal in Newport, OR; then Newport Municipal in Newport, AR; and then our desired Newport News, in Newport News, VA. whose identifier is **KPHF** (figure 3-82). By turning off the cursor (CRSR), pushing the right inner knob in and turning it, you can leaf through the remainder of the pages for KPHF.



Figure 3-79



Figure 3-80



Figure 3-81



Figure 3-82

NOTE: *This same method may be used with the name of the city where the airport is located.*

There are a few changes made to names in order to accommodate the KLN 94 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)

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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.

3.9. "NEAREST" FUNCTIONS

At any time, you can have access to the nearest airports, waypoints, Special Use Airspace (SUA), Flight Service Station (FSS) frequencies, and Center frequencies to your position. Your ticket to do this is the handy NRST button.

When you first press the NRST button, a page is displayed asking which nearest function you would like to select (figure 3-83). The choices are:

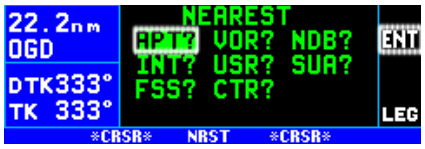


Figure 3-83

APT Airports
VOR VORs
NDB NDBs
INT Intersections
USR User-defined waypoints
SUA Special Use Airspaces
FSS Flight Service Station Frequencies
CTR Center Frequencies

To select the desired nearest function, use the right outer knob to move the cursor to the desired selection and press ENT. Notice that the cursor is initially over the **APT** field, so you may press NRST then press ENT immediately to access the nearest airports.

Selecting any of the waypoint types (**APT**, **VOR**, **NDB**, **INT**, or **USR**) takes you immediately to the waypoint page for the first nearest waypoint of that type, for example, the nearest airport (figure 3-84). The right inner knob may be pulled to the "out" position and the inner knob used to scan through the other nearest waypoints in the list.



Figure 3-84

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3.9.1. VIEWING THE NEAREST WAYPOINTS

There are actually two waypoint scan lists for airports, VORs, NDBs, intersections and user-defined waypoints. These two lists are the "complete" list and the "nearest" list. The complete list contains all of the waypoints in the database for a waypoint type (all the airports, for example). The nearest list consists of the 20 nearest waypoints (of that type) to your present position. Therefore, if you are in the nearest airport list, it will contain the 20 nearest airports relative to your location.

The nearest list is positioned in front of the complete list. That is, instead of using the NRST button, you may also scan backwards (turn the right inner knob counterclockwise while in the "pulled out" position) through the complete list to reach the nearest list. You will know when you have reached the nearest list because the top middle portion of the waypoint page will flash the relative position of the waypoint to your position. "**1**" indicates nearest (figure 3-84) while "**20**" indicates the twentieth nearest (figure 3-85). As you scan clockwise with the right inner knob "**1**, **2**, **3**, ..., **20**", the next scan position is the beginning of the complete list. The nearest list can only be reached by scanning backwards. It does not wrap around after the last waypoint in the complete list.



Figure 3-85

Waypoint pages displayed in the nearest list do not contain a latitude and longitude position as they do in the complete list. Instead, the bearing and distance to the waypoint (or the radial and distance from the waypoint) are displayed. In addition, nearest airport pages display the length, surface, and lighting of the longest runway. Once the nearest waypoint is being displayed, the other waypoint pages (for example, APT 2 and APT 3) for that airport are available for display by making sure the right inner knob is pushed in and then turning it to select the desired airport page.

The nearest list is limited to 200 NM of the aircraft's present position for all nearest items except for special use airspace (SUA) which is limited to 175 NM.

3.9.1.1 Nearest Airport Criteria

The 20 airports in the nearest list are the 20 airports which meet the criteria selected on the Setup 4 (**SET 4**) page. For example, you probably wouldn't want to take a turboprop into a 1500 foot grass strip! The SET 4 page allows you to specify what criteria you want an airport to meet before it is considered for the nearest airport list.

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To specify the nearest airport criteria:

1. Select the SET 4 page and turn on the cursor (CRSR).

2. Use the right inner knob to select the minimum length runway desired for the airport to qualify for the nearest airport list (figure 3-86). Values between 1000 feet and 5000 feet or between 300m and 1500m in 100 foot or meter increments may be selected.



Figure 3-86

3. Rotate the right outer knob clockwise to move the cursor over the runway surface criteria.

4. Turn the right inner knob to select either **HRD** or **ANY**. If **ANY** is chosen, then both hard and soft surface runways meeting the required runway length will be included in the nearest airport list. If **HRD** is chosen, then only hard surface runways will be included. Hard surface runways include concrete, asphalt, pavement, tarmac, brick, bitumen, and sealed. Soft surface runways include turf, gravel, clay, sand, dirt, ice, steel matting, shale, and snow.

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

3.9.1.2 Continuous Display of Nearest Airport

When the nearest airport page is initially displayed, "**1**" is displayed immediately to the right of the airport identifier to designate this airport as the nearest airport. However, if you continue to fly along your flight plan with this page selected, the same airport will be displayed and its position in the nearest airport list will change from **1** to **2**, **3**, **4** ... **20** until finally it won't be in the nearest airport list at all. The reason for this is that in the event of an actual emergency once you have determined which airport you are heading for, you don't want the nearest airport list to update while you are maneuvering or looking up data on the other airport pages for that airport.

There may be times, however, when you're flying over "unfriendly" terrain when you wish to always have the nearest airport displayed on the screen.

To display the nearest airport continuously:

1. Display the nearest airport page by pressing NRST followed by pressing ENT.

2. Turn on the cursor (CRSR).

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3. Rotate the right outer knob clockwise to position the cursor over "**1**" (figure 3-87). As long as the cursor is left in this position, this page will update so that the nearest airport is always shown as the flight progresses.



Figure 3-87

3.9.2. VIEWING THE NEAREST SPECIAL USE AIRSPACES

The KLN 94 database stores the locations of areas of special use airspace (SUA). The types of SUA areas stored in the database and the abbreviations used to denote these areas are the following:

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

The nearest special use airspace feature is constantly keeping track of the 10 nearest areas of SUA within 175 NM of the aircraft's present position. Pressing the NRST button and selecting the **SUA** option will display the SUA 1 page for the nearest SUA to your location, including those which you are inside (figure 3-88). Turn to section 3.13 "Special Use Airspace Alerting" to learn more about how an altitude input affects special use airspace sensing and how the KLN 94 determines if you are inside special use airspace or not.

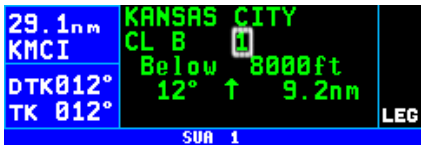


Figure 3-88

The SUA 1 page displays the following information:

Line 1: The name of the special use airspace area.

Line 2: The SUA type (see the list of abbreviations above, this particular SUA is Class B airspace), and the sequence number (1st nearest, 2nd nearest, etc.).

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Line 3: The altitude limits of the SUA.

Line 4: The proximity of the nearest point on the border of the SUA, in the form of the absolute bearing, relative bearing, and distance to the SUA border. The absolute bearing is the approximate heading you would fly to most quickly get into the SUA. The relative bearing arrow in the middle of this line points to the SUA border, telling you if it is directly ahead of you (↑), straight off your left wing (←), etc. The bearing and distance are not displayed if the aircraft is inside, above or below an SUA. Finally, the distance to the SUA is displayed on the right side of line 4.

If the aircraft is inside the SUA, line 4 will read ***A/C INSIDE SUA***, if you are above or below the SUA, as indicated by the encoding altimeter, line 4 will indicate this (***A/C ABOVE SUA*** or ***A/C BELOW SUA***).

A single clockwise turn of the right inner knob selects the SUA 2 page, which displays either the controlling ATC facility (figure 3-89), or if the special use airspace is a Class B, Class C, CTA, or TMA, the page will be displayed as in figure 3-90, instructing you to press CLR to see the APT 5 page (airport communications) for the primary airport so that the correct communications frequency may be determined.



Figure 3-89



Figure 3-90

To scan through the remainder of the nearest SUA areas, pull the right inner knob to the "out" position and turn it clockwise to view the SUA pages for the second nearest through tenth nearest SUAs.

***NOTE**: The KLN 94 displays the ten nearest SUAs regardless of your present altitude and the altitude limits of the SUA. For instance, it will include SUAs specified as "Below 6000ft" even if you are cruising at 10,000 feet.*

3.9.3. VIEWING THE NEAREST FLIGHT SERVICE STATION FREQUENCIES

The KLN 94 stores in its database the locations of Flight Service Stations (FSS) and their remote communications sites. In addition, the KLN 94 determines which two of these FSS points of communication are closest to your present location. What a convenience for you! Next time you want to file a flight plan from the air or contact an FSS for some other reason, you can easily use the KLN 94 to determine a suitable FSS and the appropriate frequency.

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NOTE: *In some areas of the world the KLN 94 provides the location of the nearest point of communication with a facility providing information (INF) or radio (RDO) services.*

Pressing the NRST button and selecting the **FSS** option will display two of the nearest points of communication with Flight Service Stations. There will normally be two FSS 1 pages, one for each of the two points of contact. The name of the FSS is at the top of the page. There can be from one to three frequencies included for a point of contact (figure 3-91). Remember that in the U.S. the frequency 122.00 MHz is used for "Flight Watch" and the frequency 123.60 MHz is used for Aeronautical Advisory Service. As you know, it is often possible to communicate with an FSS by transmitting on 122.10 MHz and listening on the VOR frequency. In cases like this, the FSS 1 page displays the frequencies to use for transmit and receive and also the name of the VOR through which you are communicating (figure 3-92).



Figure 3-91



Figure 3-92

The frequencies displayed on the nearest FSS page are QuickTune™ frequencies. When the cursor is positioned over a frequency displayed on this page and the ENT button is pressed, the frequency is automatically inserted into the standby window of a Bendix/King KX 155A or KX 165A Nav/Comm. (QuickTune™ must be enabled in the installation for this to be operational). QuickTune™ is described in section 3.15.

3.9.4. VIEWING THE NEAREST CENTER FREQUENCIES

The KLN 94 also stores in its database the low altitude transmitter locations of each of the ARTCC "Centers". The KLN 94 determines the proper Center to contact and the appropriate frequencies to use for the aircraft's present position. Pressing the NRST button and selecting the **CTR** option will display this information to you (figure 3-93). Next time you wish to obtain VFR flight following or communicate with Center for any reason, you have a quick way to get a frequency for establishing contact! Appendix D contains a listing of Center abbreviations used on the CTR page.



Figure 3-93

NOTE*: Frequencies for Area Control Centers are displayed on the CTR page for some areas of the world.*

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The frequencies displayed on the nearest Center page are QuickTune™ frequencies. When the cursor is positioned over a frequency displayed on this page and the ENT button is pressed, the frequency is automatically inserted into the standby window of a Bendix/King KX 155A or KX 165A Nav/Comm. (QuickTune™ must be enabled in the installation for this to be operational). QuickTune™ is described in section 3.15.

3.10. DIRECT TO OPERATION

The ⊕► button is used to initiate Direct To operation (navigation from your present position direct to your destination). When ⊕► is pressed, the Direct To page will be displayed with a flashing cursor over a waypoint identifier (figure 3-94). The waypoint identifier which appears on the Direct To page is chosen by the KLN 94 according to the following rules:



Figure 3-94

1. If the Flight Plan 0 (FPL 0) page is displayed on the screen and the cursor is over one of the waypoint identifiers in FPL 0 when ⊕► is pressed, then that waypoint identifier will appear on the DIR page. You will appreciate this feature when you learn to use flight plans in section 4.2.

2. If the KLN 94 is displaying the NAV 4 page and the right inner knob is in the "out" position, then the waypoint highlighted in the lower right hand corner of the NAV 4 map display will be the default waypoint. You will also find this feature useful when operating from the active flight plan especially during approaches with the KLN 94.

OR . . .

3. If there is any waypoint page (APT, VOR, NDB, INT, USR, or ACT page) in view when ⊕► is pressed, then the DIR page will contain the identifier for the waypoint just viewed.

If none of the conditions above are occurring, then:

4. When ⊕► is pressed, the waypoint identifier for the current active waypoint will be displayed. However, if the KLN 94's active waypoint is the Missed Approach Point and the aircraft has flown past the MAP, then the KLN 94 will display the first waypoint of the missed approach procedure on the Direct To page.

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

5. The Direct To page displays a blank cursor field. In order for there not to be an active waypoint, there is no Direct To waypoint and there are no waypoints in Flight Plan 0.

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3.10.1. 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 Lovell Airport in Chattanooga, TN. Its ICAO identifier is KCHA.

To fly Direct To a waypoint (procedure 1):

1. Press [D▸]. The Direct To page is displayed (figure 3-95). The cursor will already be on. A waypoint identifier may or may not be displayed, it doesn't matter at this point.



Figure 3-95

2. Rotate the right inner knob to select the first character of the desired waypoint's identifier, in this case, a "**K**" (figure 3-96). Remember to enter the "K", "C", or "P" prefix for certain airports in North America, if required (see section 2.3, "ICAO Identifiers").



Figure 3-96

3. Turn the right outer knob one click clockwise to move the flashing portion of the cursor over the second character position (figure 3-97).



Figure 3-97

4. Rotate the right inner knob to select the second character of the identifier (figure 3-98).



Figure 3-98

5. Use the right outer and inner knobs as in the previous steps until the desired identifier is completely displayed (figure 3-99).



Figure 3-99

6. Press [ENT] to display the waypoint page for the selected waypoint (figure 3-100).



Figure 3-100

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7. Press ENT again to approve the displayed waypoint page. The screen will change to the NAV 1 page, and the selected waypoint will now be the active Direct To waypoint (figure 3-101).



Figure 3-101

***NOTE**: In some cases during approach operations, the KLN 94 presents a page asking how a waypoint is used when the waypoint identifier is entered character by character. When this page is presented, simply choose the desired use of the waypoint (e.g. FAF or MAHP) by moving the cursor with the right outer knob and pressing ENT. Choosing the correct use of the waypoint is required to ensure proper waypoint sequencing once the aircraft reaches the waypoint.*

To fly Direct To a waypoint (procedure 2):

1. Select the desired waypoint page (APT, VOR, NDB, INT, or USR) on the screen (figure 3-102) using one of the three procedures explained in section 3.8.



Figure 3-102

2. Press D. The Direct To page is displayed and it contains the desired waypoint identifier (figure 3-103).



Figure 3-103

3 Press ENT. The display will revert to the NAV 1 page with the selected waypoint as the Direct To waypoint.

***NOTE**: There are additional means of more efficiently initiating Direct To operation when operating from a flight plan. See sections 3.11.4, section 4.2.4.2, and section 4.2.4.3.*

To recenter the D-Bar by going direct to the active waypoint:

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.

1. Select a non-waypoint page (NAV, FPL, SET, or AUX) on the screen.
2. Press D. The Direct To page is displayed on the left, containing the active waypoint identifier.
3. Press ENT.

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***NOTE**: If the KLN 94 is in the approach mode and this method is used to center the D-bar when the missed approach point is the active waypoint, then the approach mode will be cancelled and the KLN 94B will revert to the approach arm mode.*

3.10.2. CANCELLING 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 4.2.4 “Combining Direct To and Flight Plan Operation”. When the Direct To operation is cancelled the KLN 94 orients itself on the closest leg of the active flight plan (FPL 0).

To cancel Direct To operation:

1. Press [D►].
2. Press [CLR] to blank out the waypoint identifier field (figure 3-104).
3. Press [ENT].



Figure 3-104

3.10.3. WAYPOINT ALERTING FOR DIRECT TO OPERATION

The purpose of waypoint alerting is to notify you that you are approaching the active waypoint (the Direct To waypoint in this case). Approximately 36 seconds prior to reaching a Direct To waypoint the **WPT** annunciation at the top of the annunciation display segment will begin flashing (figure 3-105). If an external waypoint alert (WPT) annunciator is mounted in the aircraft, this annunciator will begin flashing at the same time. In addition, the arrow preceding the waypoint identifier on the waypoint page for the active waypoint will begin flashing. This arrow will also be flashing on any NAV or FPL page displaying the active waypoint identifier.



Figure 3-105

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3.11. NAVIGATION PAGES

As you would expect, the NAV (navigation) pages contain information relating specifically to the KLN 94's navigation capabilities. The KLN 94 has four NAV pages. The procedure for selecting specific pages, including the NAV pages, was described in section 3.4.1, "Page Selection".

3.11.1. THE NAVIGATION 1 (NAV 1) PAGE

The NAV 1 page is shown in figure 3-106.



Figure 3-106

Line 1: The active navigation leg. For Direct To operation this consists of the Direct To symbol, ⊕→, followed by the active Direct To waypoint identifier (figure 3-106). For the leg of a flight plan this consists of the "from" waypoint identifier and the active "to" waypoint identifier (figure 3-107). An arrow ⌖ precedes the active waypoint identifier.



Figure 3-107

Line 2: A course deviation indicator (CDI) that graphically displays left and right deviation from desired course. 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. In en route use, each dot represents one nautical mile deviation from the desired track (full scale deviation is ± 5 NM). Different CDI scales are used during terminal and non-precision approach flight with KLN 94. For now, let's talk only about en route operations. 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 3-108). 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

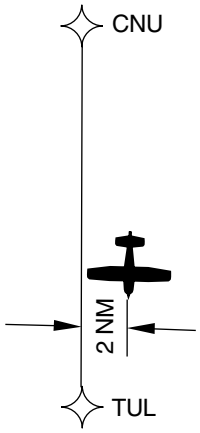




Figure 3-108

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active waypoint while a “down” triangle (figure 3-109) indicates “from” the active waypoint. The word **FLAG** is displayed over the CDI when the KLN 94 is not usable for navigation (figure 3-110).



Figure 3-109



Figure 3-110

Line 3: Numeric crosstrack correction – the crosstrack distance (how far off course) and direction to fly to intercept the desired track. The numeric crosstrack correction distance display is especially handy when more than five nautical miles off of course. If your crosstrack distance was 13.1 nautical miles left of course, the graphic CDI needle will be pegged on the right side (which doesn’t tell you much). But this presentation will show you exactly how far off course you are (figure 3-111).



Figure 3-111

The CDI scale factor is also displayed on line 3. This is the full scale deviation. Normal en route CDI scale factor is ± 5 NM which means each dot represents 1 NM of deviation off course. The CDI scale factor may be changed as described in section 5.6. “Changing The CDI Scale Factor.”

Line 4: VNAV status, which will either by **Off**, **Armed**, time until VNAV begins, or the suggested VNAV altitude (see section 5.2. “Advisory VNAV Operation.”

Line 5: A data field which can display either bearing to the active waypoint (**To**) or radial from the active waypoint (**Fr**). By placing the cursor over this field and turning the right inner knob you may select which of these is displayed. Line 5 also displays the estimated time en route (ETE) from present position to active waypoint.

***NOTE**: Due to “great circle” courses and magnetic variation differences between present position and the active waypoint, the To bearing and From radial may not be exactly 180° different from each other when the system is in the Leg mode. This condition is most likely to occur when long distances are involved, and/or you are operating in very northerly or southerly latitudes. See figure 3-112 for an example depicting a case like this. The aircraft is somewhere over Georgia, and the active waypoint is KPHX. The bearing to steer is 269°, and radial is 72°. Generally, you will want to use bearing (not radial) when long distances are involved.*

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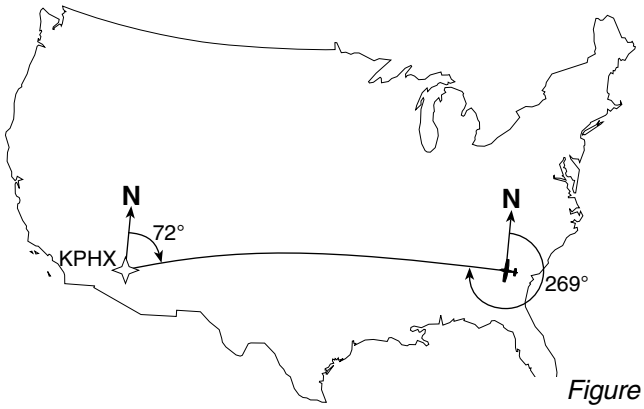


Figure 3-112

3.11.2. THE NAVIGATION 2 (NAV 2) PAGE

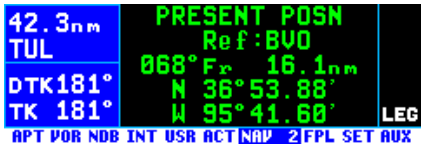


Figure 3-113

The NAV 2 page in figure 3-113 displays the aircraft's present position in two formats: (1) the radial and distance from a nearby VOR and (2) latitude and longitude. You can change the reference waypoint from the nearby VOR to any waypoint in the published or user database.

To change the NAV 2 page present position reference waypoint:

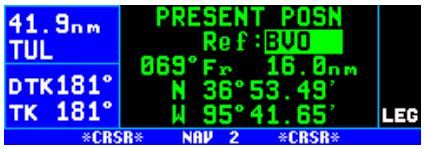


Figure 3-114

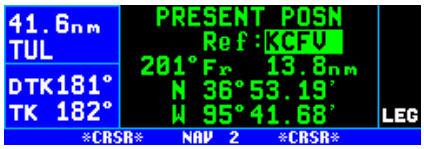


Figure 3-115

1. Turn on the cursor (CRSR). It will be over the **Ref:** field (figure 3-114).
2. Use the right inner and outer knobs to enter the waypoint you wish to use as a reference.
3. Press ENT. The waypoint page for the identifier just entered will be displayed.
4. If this is the waypoint you intended, press ENT again. The display will return to the NAV 2 page (figure 3-115).

***NOTE**: If you change the reference waypoint, change to a page other than the NAV 2 page, then turn back to the NAV 2 page, the reference waypoint will revert back to a nearby VOR.*

***NOTE**: Your present position may be easily stored as a user-defined waypoint by pressing ENT while viewing the NAV 2 page. See section 5.4.1, "Creating A Waypoint At Your Present Position."*

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3.11.3. THE NAVIGATION 3 (NAV 3) PAGE

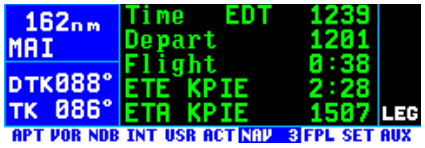


Figure 3-116

The Navigation (NAV) 3 page shows you several important times pertaining to your flight (figure 3-116).

Line 1: The current system time zone and the actual time. The time zone may be changed by turning the cursor (CRSR) on over it and turning the right inner knob. All times shown on the NAV 3 page are in terms of the system time zone (except for the flight time and ETE, which are periods of time).

Line 2: The time of departure. This is the time when a valid groundspeed was first greater than 30 knots (typically during takeoff).

Line 3: The elapsed flight time, which will be the hours and minutes since the departure time.

Line 4: The estimated time en route to the destination.

Line 5: Estimated time of arrival (ETA) at your destination. If the active waypoint is not part of the active flight plan, the active waypoint will be the destination. Otherwise, the last waypoint in your active flight plan will be the destination.

3.11.4. THE NAVIGATION 4 (NAV 4) PAGE – MOVING MAP

The NAV 4 page is a graphical moving map which offers you excellent "bird's-eye-view" situational awareness. This page shows the aircraft's present position relative to the route of flight, aeronautical data, and cartographic (land) data. The aeronautical data includes things like airports, VORs, NDBs, intersections, and special use airspace. Land data includes items such as cities, roads, bodies of water, geographical boundaries, obstacles, and railroad tracks. User waypoints may also be displayed on the map.

CAUTION: There are land data items that may not be dispayed on the map or may not be displayed accurately in position. Do not depend on the land data displayed on the map as the sole means of identifying or avoiding land data items.

3.11.4.1 Selecting The NAV 4 (Map) Page

In addition to the normal way of selecting pages with the right knobs, the NAV 4 page may be instantly displayed by pressing either the map range ( ) button or the map menu (MNU) button. Once the NAV 4 page is displayed these buttons are used to change the map scale and to bring up the map menu, respectively.

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3.11.4.2 NAV 4 Page Format

The NAV 4 page has a unique format unlike any other KLN 94 page (figure 3-117). The page bar is removed on the NAV 4 page to utilize the maximum screen height for the map. The page being displayed, NAV 4, is shown in the bottom right corner of the screen.



Figure 3-117

Display segment one, on the far left side of the screen, now has five lines rather than four lines on the other pages. It displays the following:

- Line 1 - Distance to the active waypoint
- Line 2 - Active waypoint identifier
- Line 3 - Desired track (DTK) in the LEG mode or OBS course in the OBS mode. The DTK value flashes if the course selected on the external CDI or HSI differs from the desired track by more than 10 degrees.
- Line 4 - Actual track (TK), bearing to active waypoint (BRG), radial from active waypoint (RAD), or groundspeed
- Line 5 - Groundspeed, estimated time en route (ETE) to active waypoint, cross track error, or vertical navigation (VNAV) status

Lines 4 and 5 can be configured by the pilot to display any of the items listed.

To configure lines 4 and 5 to display the desired Navigation items:

1. Press CRSR to turn on the cursor.
2. Rotate the right outer knob counterclockwise to position the cursor over the desired line (figure 3-118)



Figure 3-118

3. Rotate the right inner knob to select the desired item (figure 3-119).
4. Press CRSR to turn off the cursor when done



Figure 3-119

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3.11.4.3. Selecting What Is Shown On The Map

The aircraft's present position symbol and route of flight are always selected for display on the map. The map range scale will determine how much of the route is displayed.

When operating Direct To a waypoint which is not in the active flight plan, the Direct To waypoint and its associated course line are shown on the map, and although the waypoints of the active flight plan (FPL 0) are shown on the screen, they are not connected by course lines (figure 3-120).

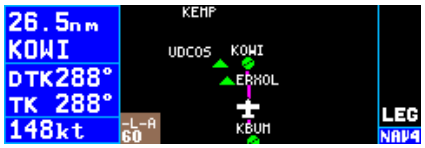


Figure 3-120

When you are navigating with a flight plan the NAV 4 page displays the waypoints of the active flight plan with their waypoint identifiers (figure 3-121). Course lines connect the flight plan waypoints. The course line to the active waypoint is magenta, other course lines are white.

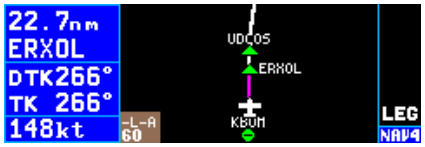


Figure 3-121

Other items of interest to the pilot may also be selected for display on the map. These fall into two basic categories, aeronautical (aero) data and land data. It would be easy to put so much on the map that it is impossible to read. Therefore it is important to configure the map to display those items which are most important to you.

3.11.4.4. Configuring Aeronautical Data For The Map

The SET 7 page is used to configure the aeronautical data for the map. The following items may be configured on this page:

- Nearest 10 areas of special use airspace (SUA) within 175 NM of the aircraft. Only those SUA types selected on the SET 6 page will be displayed. See section 3.13 "Special Use Airspace Alerting." Inner rings for Class B, Class C, TMA and CTA airspace are displayed up to the 30 NM range (ORS 03 and higher units).
- Nearest 20 VORs within 200 NM of the aircraft
- Nearest 20 airports (APT) within 200 NM of the aircraft. Only those airports meeting the criteria selected on the SET 4 page are displayed.
- Nearest 20 intersections (INT) within 200 NM of the aircraft. (The default setting for intersections is "OFF" to avoid clutter. This may be changed as described below.)
- Nearest 20 NDBs within 200 NM of the aircraft

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- Nearest 20 user defined waypoints (USR) within 200 NM of the aircraft
- Tower rings (TWR Rings). A tower ring is a 4 NM radius circle drawn around airports having a control tower that operates at least part time. **Note that a tower ring is not Class D airspace which usually consists of a 3 to 7 NM radius ring plus additional extensions.** Tower rings are not displayed for the primary airport associated with class B, class C, CTA, or TMA airspace.
- Holding Patterns and Procedure Turns (Hold Pat) associated with approaches, DPs and STARs. (ORS 02 and higher)

Each of the above items may be turned on or off individually. The item is turned on by selecting the maximum map range scale you want the item to be displayed. Therefore if the 5 NM map range scale is selected for intersections, the intersections will be displayed on the map for range scales 5 NM and smaller and will not be displayed on the map for range scales greater than 5 NM.

To configure aeronautical data for the map:

1. Press the MNU button while viewing the NAV 4 map page to bring up the map menu. The cursor will already be over "Setup Aero Data?" (figure 3-122).

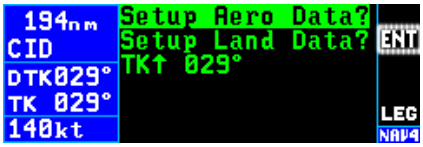


Figure 3-122

2. Press the ENT button. This brings up the SET 7 page (figure 3-123).

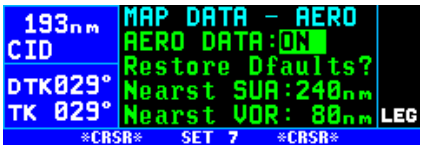


Figure 3-123

***NOTE**: All aeronautical data may be turned off by using the right outer knob to position the cursor over the field to the right of "AERO DATA: " and then using the right inner knob to select "OFF" (figure 3-124).*

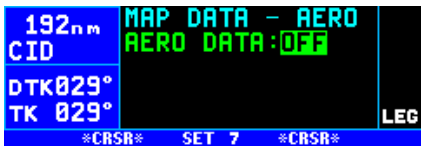


Figure 3-124

3. Use the right outer knob to position the cursor over the field next to the item to be configured. Lines 4 and 5 are a scrolling region so after positioning the cursor over the VOR field, further clockwise turns of the knob will scroll down the list. To configure intersections, position the cursor over the distance field to the right of INT (figure 3-125).

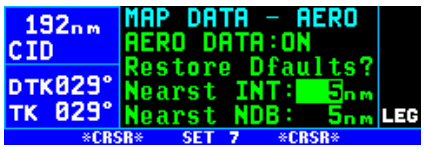


Figure 3-125

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4. Rotate the right inner knob to select the desired range (figure 3-126). Range scales greater than that selected will not display the selected item. Range scales equal to or less than that selected will display the item.

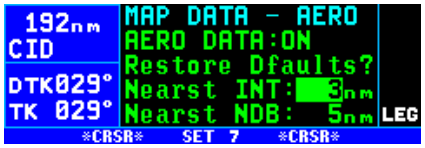


Figure 3-126

5. Use the right inner and outer knobs to finish configuring the rest of the aeronautical items for the map.

6. Press the ⇕ button or MNU button to return to the map.

***NOTE**: Each aeronautical item has a factory set default range value. To change an individual item to the default value place the cursor over the range field to the right of the desired item and press the CLR button. To change all aeronautical items to their default ranges, place the cursor over "Restore Dfaults?" on line 3 and press the ENT button.*

3.11.4.5. Runway Diagrams

If the selected map range scale is 5 NM (7 km) or less, runway diagrams are depicted along with the airport symbol.

3.11.4.6. Configuring Land Data On The Map

The SET 8 page is used to configure the land data for the map. The following items may be configured on this page:

- Cities/towns – large, medium, and small
- Roads – freeways, national highways, local highways
- Lakes and Rivers
- Railroads
- Geographical boundary lines
- Obstacles – towers less than1000 ft. AGL and those 1000 ft. AGL and greater

***NOTE**: At the time this Pilot's Guide was written, obstacle data is only available for the United States.*

Each of the above items may be turned on or off individually. The item is turned on by selected the maximum map range scale you want the item to be displayed.

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To configure land data for the map:

1. Press the MNU button while viewing the NAV 4 map page to bring up the map menu.



Figure 3-127

2. Turn the right outer knob clockwise to position the cursor over "Setup Land Data?" (figure 3-127).

3. Press the ENT button. This brings up the SET 8 page (figure 3-128).



Figure 3-128

***NOTE**: All land data may be turned off by using the right outer knob to position the cursor over the field to the right of "LAND DATA: " and then using the right inner knob to select "OFF" (figure 3-129).*



Figure 3-129

4. Use the right outer knob to position the cursor over the field next to the item to be configured. Lines 4 and 5 are a scrolling region so after positioning the cursor over the Med City field, further clockwise turns of the knob will scroll down the list. To configure Lakes, position the cursor over the distance field to the right of Lakes: (figure 3-130).



Figure 3-130



Figure 3-131

5. Rotate the right inner knob to select the desired range (figure 3-131). Range scales greater than that selected will not display the selected item. Range scales equal to or less than that selected will display the item.

6. Use the right inner and outer knobs to finish configuring the rest of the land items for the map.

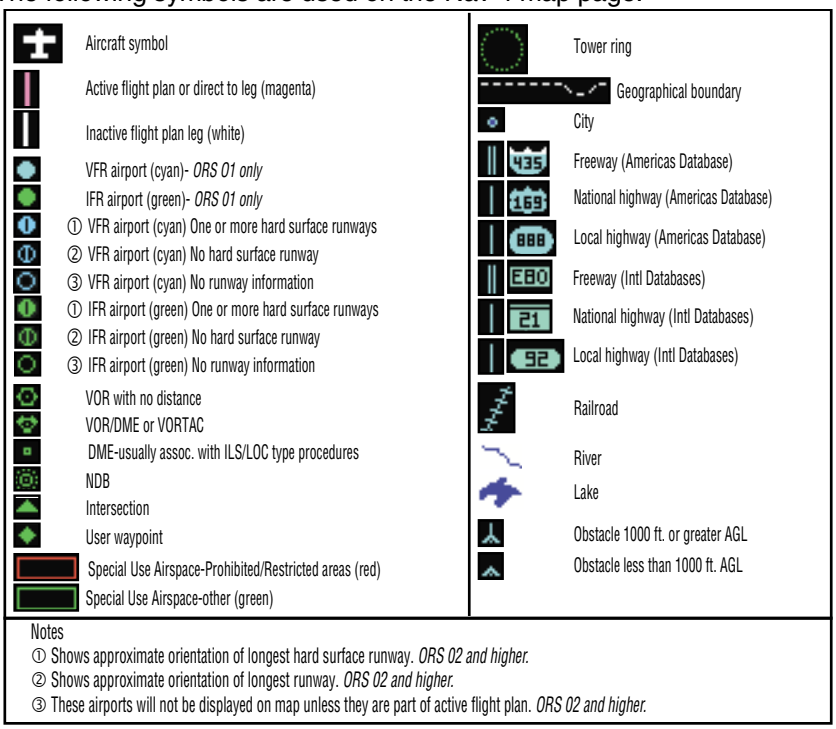
7. Press the button or MNU button to return to the map.

***NOTE**: Each land item has a factory set default range value. To change an individual item to the default value place the cursor over the range field to the right of the desired item and press the CLR button. To change all land items to their default ranges, place the cursor over "Restore Dfaults?" on line 3 and press the ENT button.*

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3.11.4.7. Symbols Used On The Map

The following symbols are used on the Nav 4 map page:



3.11.4.8. Selecting The Map Orientation

All KLN 94 installations are capable of three map orientations: actual track up (TK↑), North up (N↑), and desired track up (DTK↑). In addition, if the KLN 94 is interfaced with a compatible source of heading then a heading up presentation (HDG↑) may also be selected.

In the actual track up orientation, viewing the map is like looking at a chart that is turned so that the direction the aircraft is tracking over the ground is pointing up. In a no-wind condition actual track is identical to the aircraft's heading. The aircraft must be moving at least two knots to calculate the actual track. The map will be blank at any speed less than two knots.

When the North up orientation is selected, viewing the map is like looking at a navigation chart with North at the top. The aircraft symbol rotates based on the aircraft's actual track (or heading if available). If the KLN 94 does not have a heading input and the aircraft is not moving the aircraft symbol is replaced by a "+" symbol.

If desired track is selected, the map is like looking at a chart that is turned so that the course line is always pointing up.

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The heading up mode orients the map with the aircraft's heading as up. The heading up orientation is not presented as a choice if heading is not provided to the KLN 94.

If a heading input is available to the KLN 94 then heading up is usually the best map orientation to select. Otherwise, actual track up display is usually preferred for use in flight. However, since the track up display is only usable when the aircraft is moving two knots or more 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.

To change the map orientation:

1. Select the NAV 4 (map) page if not already displayed. The easiest way to do this is to press either the map range ( ) button or the map menu (MNU) button.



Figure 3-132

2. Press the MNU button to display the Map Menu page (figure 3-132).



Figure 3-133

3. Rotate the right outer knob clockwise to position the cursor over the map orientation (figure 3-133).

4. Select the desired map orientation by turning the right inner knob (figure 3-134).



Figure 3-134

5. Press the button or MNU button to return to the map using the selected orientation.

3.11.4.9. Changing the Map Range Scale

The map range scale is displayed in the bottom left corner of the map. The number displayed is the distance in nautical miles from the aircraft's present position symbol to the top of the screen. The 10 NM scale is selected in figure 3-135. Press the upper portion of the button to increase the range scale and the bottom portion to decrease the range



Figure 3-135

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scale. The scale may be changed from 1/2 NM to 1000 NM (or 1 km to 2000 km if km selected as distance unit on SET 12 page).

In addition, an "AUTO" scale mode may be selected so that the map scale automatically changes to display the active waypoint and, if there is one, the next waypoint after the active waypoint (figure 3-136).The AUTO map scale may be selected in two ways: 1) by pressing either portion of the button continuously for 2 seconds, or 2) by repetitively pressing the button either one step "below" the 1/2 NM (1 km) or "above" 1000 NM (2000 km) until "AUTO" is displayed. The AUTO scale mode is especially useful when using the KLN 94 for approaches.



Figure 3-136

The overzoom icon is displayed when the selected map scale range is beyond the accuracy of the stored land data (figure 3-137). This occurs at small map scale ranges and means that land data positions may not be accurately displayed.



Figure 3-137

Remember, 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 aeronautical and land data. Or, select another combination of these starting from the Map Menu page. Experiment and continue to make new selections for different phases of your trip.

3.11.4.10 Decluttering The Screen

The map may be temporarily decluttered by pressing the CLR button to make it easier to view the active flight plan waypoints or the Direct To waypoint. The first press of the CLR button turns off the land data and an "**-L**" annunciation is shown above the map range scale (figure 3-138). A second press of the CLR button removes the aeronautical data and an "**-A**" annunciation is also displayed (figure 3-139). The land and aeronautical data may be brought back by pressing the CLR button again or by leaving the map page and returning to it. The CLR button only declutters what has been turned on from the SET 7 and SET 8 pages.



Figure 3-138

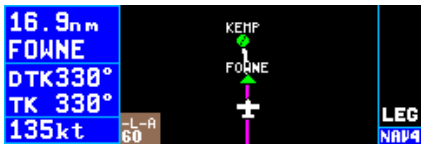


Figure 3-139

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When the KLN 94 goes into the approach active mode all land data, except for bodies of water, is automatically decluttered from the map. A "**-L**" is then annunciated. In the approach active mode the first press of the CLR button restores land data and subsequent presses work as described in the previous paragraph.

3.11.4.11. Waypoint Scan Feature

The NAV 4 page's waypoint scan feature may be used as an easy way to initiate Direct To operation to the active waypoint, active flight plan (FPL 0) waypoints, or waypoints from the nearest list without leaving the map page. This feature is also useful for quickly accessing a waypoint page for a waypoint displayed on the map. To utilize the waypoint scan feature:

1. Pull the right inner knob to the "out" position. The identifier of the active waypoint will be displayed in the waypoint scan field located in thethe lower right corner of the map (figure 3-140).



Figure 3-140

2. Rotate the right inner knob clockwise or counter-clockwise to select the desired waypoint (figure 3-141). FPL 0 waypoints and the Direct To waypoint are displayed in green while other waypoints are displayed in white to make it easy to determine the break from the FPL 0 list to the nearest list (figure 3-142). The waypoints are displayed in the following order.



Figure 3-141



Figure 3-142

- A Direct To waypoint not in FPL 0 (if one exists)
- The FPL 0 waypoints
- A list of the nearest waypoints viewable on the map (airports, VORs, NDBs, intersections, user waypoints). This list includes only those that meet the requirements specified on the SET 6 and SET 7 pages. For example, if the map scale is currently at 60 NM but you chose to view NDBs only up to 5 NM on the SET 7 page, the NDBs will not appear on the map and will not be in the waypoint scan list. These nearest waypoints are all grouped together and presented in order of closeness to the aircraft's present position. Therefore, when scanning through the nearest list you may go from an airport, to an intersection, to a VOR, etc.

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3. (ORS 02 and higher) If the waypoint displayed in the scan field is actually displayed on the map, its map icon is encircled on the map (figures 3-141 and 3-142). Waypoints that are located close together on the map are easy to uniquely identify using this feature. In addition, a line is drawn from the aircraft symbol toward the waypoint even if the waypoint is not actually displayed on the map.

4. To initiate a Direct To operation to the waypoint in the scan field press the [D▸] button (figure 3-143). Press the [ENT] button to complete the Direct To operation. Press the inner knob back to the "in" position. This procedure may be used on any waypoint in the scan field.



Figure 3-143

OR

5. To bring up the waypoint page for the waypoint in the scan field, press the [ENT] button (figure 3-144). This feature is nice if you want to identify an airport or navaid that appears on the map but is not in your flight plan.

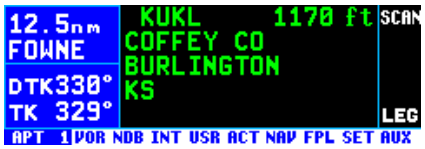


Figure 3-144

NOTE: *This feature is not available for waypoints associated with DPs, STARs, and approaches. If the [ENT] button is pressed while a DP, STAR, or approach waypoint is in the waypoint scan field a scratchpad message stating "NO WPT Page" will be displayed.*

6. Press the ⟲ or (MNU) button to return to the map.

3.11.4.12. Holding Patterns And Procedure Turns (ORS 02 and higher)

The KLN 94 map is capable of displaying holding patterns associated with DPs, STARs, and approaches as well as procedure turns associated with approaches (figure 3-145). The KLN 94 does **NOT** provide complete navigational guidance for these procedures. It is necessary to use the OBS mode to navigate relative to the inbound leg of holding patterns and the inbound/outbound legs of procedure turns. The pilot is required to fly the headings published on the instrument approach charts for the other parts of the holding pattern or procedure turn.

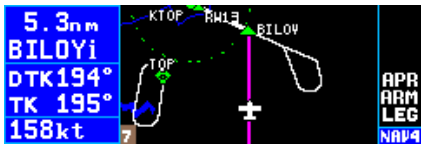


Figure 3-145

Holding patterns and procedure turns associated with approaches are only displayed on the map when the appropriate approach transition or missed approach procedure has been loaded into the active flight plan.

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For example if an approach has three IAFs but only one of the IAFs utilizes a procedure turn, the procedure turn will only be displayed when the one IAF is selected. In addition it is necessary to select a maximum map range scale to display holding patterns and procedure turns on the SET 7 page (see section 3.11.4.4).

CAUTION: Fly the published procedure for conducting procedure turns and holding patterns. Do not rely solely on the depicted procedure on the map as it may not be depicted to the proper scale.

Holding patterns and procedure turns are sized on the map according to the aircraft's groundspeed. The radius of turns is based on standard rate turn using the aircraft's groundspeed. Therefore as the aircraft's groundspeed changes due to the aircraft's configuration or the effect of the wind the size of the pattern will change. Holding patterns defined with fixed distance legs (e.g. 2 NM legs) are depicted with the defined leg length.

3.12. WAYPOINT PAGES

***NOTE**: Each of the waypoint page types includes a field which displays present magnetic bearing to or magnetic heading from the waypoint. Due to "great circle" courses and magnetic variation differences between present position and the active waypoint, the To bearing and From radial may not be exactly 180° different from each other. This condition is most likely to occur when long distances are involved, and/or you are operating in very northerly or southerly latitudes. See section 3.11.1 and figure 3-112 for more details.*

3.12.1. AIRPORT PAGES

3.12.1.1. The Airport 1 (APT 1) Page

See figure 3-146.



Figure 3-146

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint. The airport elevation above MSL in feet or meters, which is rounded to the nearest 10 feet or nearest meter.

Line 2: The name of the airport.

Line 3: The city where the airport is located.

Line 4: The state if the airport is located in the U.S., the Province if located in Canada, or the country if outside the U.S. and Canada. A listing of the abbreviations used for States, Provinces, and countries is contained in

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Appendix D. The right side of line 4 will read **HELIPORT** if applicable, **MILITARY** if it is a military airport (Figure 3-147), and **PRIVATE** if it is a private use airport.



Figure 3-147

If the airport is being viewed as part of the *nearest airports list* (see section 3.9.1, "Viewing the Nearest Waypoints"), the APT 1 page format will differ as follows (see figure 3-148):



Figure 3-148

Line 1: After the airport identifier, the number designating the airport's position in the nearest airport list is displayed. In figure 3-148, KLIT is the third nearest airport.

Line 2: Same as a normal APT 1 page.

Line 3: The length, surface and lighting of the longest runway.

Line 4: The magnetic bearing to or the magnetic radial from the airport and the distance. Placing the cursor over the radial/bearing field and turning the right inner knob changes it between radial from and bearing to the airport.

3.12.1.2. The Airport 2 (APT 2) Page

See figure 3-149.



Figure 3-149

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint.

Lines 2-3: The latitude and longitude of the airport reference point (the "official" location of the airport).

Line 4: The magnetic bearing to or the magnetic radial from the airport and the distance. Placing the cursor over the radial/bearing field and turning the right inner knob changes it between radial from and bearing to the airport.

If the airport is being viewed as part of the nearest airports list (see section 3.9.1, the APT 2 page format will differ as follows (see figure 3-150):



Figure 3-150

Line 1: After the airport identifier, the number designating the airport's position in the nearest airport list is displayed.

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Line 2: The city where the airport is located.

Line 3: The state if the airport is located in the U.S., the Province if located in Canada, or the country if outside the U.S. and Canada. A listing of the abbreviations used for States, Provinces, and countries is contained in Appendix D. The right side of line 3 displays **HELIPORT**, **MILITARY**, or **PRIVATE** as appropriate.

Line 4: The magnetic bearing to or the magnetic radial from the airport and the distance. Placing the cursor over the radial/bearing field and turning the right inner knob changes between radial from and bearing to the airport.

3.12.1.3. The Airport 3 (APT 3) Page

See figure 3-151.

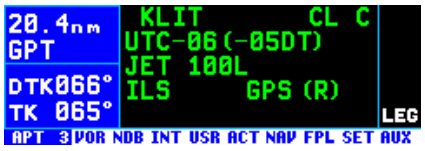


Figure 3-151

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint. Also on line 1 is the environment. For example, the airport in figure 3-151 has overlying Class C airspace. The possible environments are:

CL B	Class B airspace
CL C	Class C airspace
CTA	Control area
TMA	Terminal area
TRSA	Terminal radar service area

Line 2: The airport's time difference from UTC during standard time and during daylight time (in parentheses).

Line 3: Fuel types available at the airport. This line will be blank if there is no fuel available at the airport.

80	80 octane
100	100 octane
100L	100 octane, low-lead
JET	Jet fuel (of any type)
AUTO	Automotive fuel (also known as MOGAS)

Line 4: Approach type(s) available at the airport. If an airport has an ILS approach and/or an MLS approach, no indication of non-precision approach availability will be given.

NO APR	No IFR approach
NP APR	Non-precision approach(es) only
ILS	ILS approach

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MLS MLS approach
ILS/MLS ILS and MLS approaches

If the airport has a GPS approved non-precision approach included in the KLN 94 database, **GPS** will also be displayed on line 4.

The lower right corner will display (**R**) if the airport has an approach/departure radar environment.

3.12.1.4. The Airport 4 (APT 4) Page

See figure 3-152

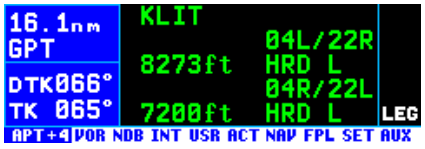


Figure 3-152

The APT 4 page displays the runway designation, length, surface, and lighting for up to five runways in order of length, beginning with the longest runway. Since there are many times when all of an airport's runway information does not fit on one page, additional APT 4 pages are used to display the data. Remember that a "+" inserted between the page type and the number (**APT+4** in this case) is used to indicate that there is more than one Airport 4 page.

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint.

Line 2: The runway designation for the first runway on the page.

***NOTE**: In some parts of the world, runway numbers are based on true runway heading rather than magnetic. These runways are prevalent in northern Canada, where there is a large magnetic variation gradient. For these runways, a ᵀ symbol separates the two runway numbers (example **14ᵀ32**).*

Line 3: The runway length for the first runway listed on the page, the runway surface type and the type of lighting (blank if none).

Runway surface abbreviations:

HRD Hard surface
TRF Turf
GRV Gravel
CLY Clay
SND Sand
DRT Dirt
SNW Snow
ICE Ice
SHL Shale
MAT Steel mat

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Runway Lighting Abbreviations:

L	Sunset to sunrise
LPC	Pilot controlled lighting
LPT	Part-time or on-request lighting

Lines 4-5: Runway information for the next shortest runway (if any), in the same format as lines 1 and 2.

In the event that there is no runway information for an airport, the following message is displayed on the APT 4 page:

No Runway Data

3.12.1.5. The Airport 5 (APT 5) Page

See figure 3-153.

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint.



Figure 3-153

Lines 2-5: The VHF communication frequencies associated with the airport. Also, frequencies for ILS and LOC-type approaches at the airport. The type and frequency are listed.

All communication and navigation frequencies are QuickTune™ frequencies which means that pressing the ENT button with the cursor over the frequency sends the frequency to the standby window of a KX 155A or KX 165A Nav/Com if this feature is enabled in the installation (see section 3.15 "QuickTune™ Nav/Com Frequency Selection"). In order to make the QuickTune™ feature even easier to use, lines 2-5 are a scrolling region when there is more than one APT 5 page (designated by APT+5). What this means is that you can turn on the cursor on the first APT 5 page and use the right outer knob to move the cursor through all the frequencies for all this airport's APT 5 pages without having to turn the cursor on and off while you change between APT 5 pages.

The communication abbreviations are:

AAS	aeronautical advisory service
AFIS	aerodrome flight information service
ARVL	arrival
APR	approach
ASOS	automated surface observation system
ATF	aerodrome traffic frequency
ATIS	automatic terminal information service
AWOS	automatic weather observing station
CL B	class B airspace (VFR frequency)

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CL C	class C airspace (VFR frequency)
CLR	clearance delivery
CTA	control area (VFR frequency used outside the U.S.)
CTAF	common traffic advisory frequency
CTR	center (when center is used for approach/departure control)
DEP	departure
DIR	director (approach control/radar)
GCO	ground communications outlet
GRND	ground control
MCOM	multicom
MF	mandatory frequency
PCL	pilot-controlled lighting
PTAX	pre-taxi clearance
RAMP	ramp/taxi control
RDO	radio
RDR	radar-only frequency
TMA	terminal area (VFR frequency used outside the U.S.)
TWR	control tower
UNIC	unicom

The Navigation abbreviations are:

ILS	Instrument landing system approach
LOC	Localizer approach
LBC	Localizer back course
LDA	Localizer type directional aid approach
SDF	Simplified directional facility approach

Part-time operation, such as for a control tower, is indicated with an asterisk (*) to the right of an airport frequency.

The frequencies associated with class B or C airspace, CTA or TMA are VFR frequencies. Airports which have one of these categories of frequencies also have APR and DEP which are IFR frequencies.

Where required, APR, DEP, CL B, CL C, CTA, and TMA frequencies are sectorized. That is, a frequency may be used only within a certain range of radials from a designated reference location. The format for displaying the sectorization is to show the frequency first, followed by the identifier of the associated reference point, followed next by the associated altitude restrictions. For example, figure 3-154 shows that the Orlando approach control frequency 121.10 MHz is used between the 311° radial



Figure 3-154

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and the 60° radial from KMCO (Orlando International Airport) for altitudes at and below 5500 feet.

In a few cases, APR, DEP, CL B, CL C, CTA, and TMA frequencies are sectorized such that the restrictions cannot be displayed on a single page. When this occurs the following message is displayed on the APT 5 page:

Text Of Freq Use
Not Displayed

3.12.1.6. The Airport 6 (APT 6) Page

The Airport 6 page is used to store and display user-entered remarks. These remarks might include information on lodging, dining, airport services, etc. Up to 200 waypoints (airports and user waypoints combined) may include remarks. See figure 3-155.

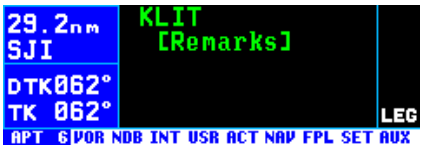


Figure 3-155

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint.

Lines 2-4: The pilot-entered remarks for the airport. Three lines of 16 characters each are available for the remarks. Letters, numbers, hyphens, and spaces may be used in the remark. If no remarks have been entered for the airport, line 2 will display "**[Remarks]**".

To enter an airport remark on the APT 6 page:

1. Turn on the cursor and move it until the cursor fills line 2 of the screen (figure 3-156).
2. Select the desired character with the right inner knob and move the cursor to the next character on the line with the right outer knob (figure 3-157).
3. Repeat step 2 as necessary to complete line 2.
4. Press ENT to approve line 2. The cursor will automatically move to the next line (see figure 3-158).
5. Use the right inner and outer knobs to complete line 3. The ENT button must be pressed to approve line 3 separately.



Figure 3-156



Figure 3-157



Figure 3-158

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6. Use the right inner and outer knobs to complete line 4. The ENT button must be pressed to approve line 4 separately.
7. Turn the cursor off when you are finished creating the remark (figure 3-159).



Figure 3-159

***NOTE**: If there are already 200 waypoints with remarks and an attempt is made to enter a remark for a waypoint, a scratchpad message "Remarks Full" is displayed. It is then necessary to delete remarks using the AUX 13 page before new remarks can be entered.*

The Auxiliary 13 (AUX 13) page is a list of waypoints with associated remarks. If you wish to delete a waypoint remark for an airport it is done from the AUX 13 page, see section 5.11.

3.12.1.7. The Airport 7 (APT 7) Page

The APT 7 page shows the departure (DP) and arrival (STAR) procedures that are available for the selected airport. If both DP and STAR procedures are available then there will be two APT 7 pages indicated by **APT+7** (figure 3-160). If there are no DP or STAR procedures in the database then this page will be as shown in figure 3-161.



Figure 3-160

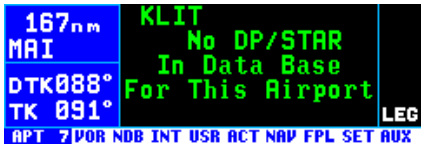


Figure 3-161

***NOTE**: If the KLN 94 is configured for VFR use only there will not be an APT 7 page.*

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint. "DP" is displayed for the list of departure procedures and "STAR" is displayed for the list of arrival procedures.

Lines 2-5: List of the DPs or STARs. If there are more than four procedures, the final one in the list is on line 5 on the screen. To view the procedures that are not in view, turn on the cursor with the CRSR button and turn the right outer knob clockwise.

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The APT 7 page is also used to load DPs and STARs into the active flight plan. This page may be accessed using the manual method of selecting pages using the right inner and outer knobs; however the preferred way of loading DPs and STARs is via the PROC (procedure) button. See section 6.3.

3.12.1.8. The Airport 8 (APT 8) Page

See figure 3-162.

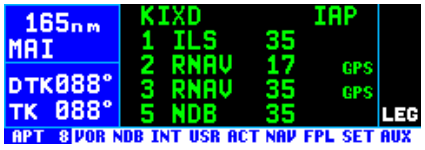


Figure 3-162

The APT 8 page is used to display IAPs (Instrument Approach Procedures) available for the selected airport and also to load an approach into the active flight plan. While the manual method of selecting pages using the right inner and outer knobs may be used, the preferred method of selecting and loading approaches is via the PROC (procedure) button. To learn how to select an approach, see section 6.2.3.

Remember that the desired approach must be in the published database in order to be used by KLN 94. If there are no approaches for this airport in the database then this page will be as shown in figure 3-163.

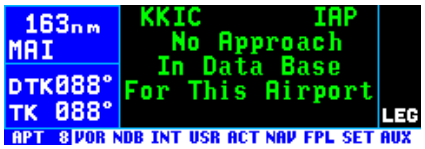


Figure 3-163

The APT 8 page displays approaches approved for use with an approach approved KLN 94 as well as approaches where the KLN 94 may only be used to provide situational awareness monitoring. Approaches approved for GPS have a "GPS" symbol to the right of the approach name such as the RNAV 17 and RNAV 35 approaches in figure 3-162.

***NOTE**: If the KLN 94 is configured for VFR use or IFR en route use only, the APT 8 page is not displayed.*

Line 1: The ICAO identifier (see section 2.3) of the airport; an arrow precedes the identifier if it is the active waypoint. "IAP" designates that a list of instrument approach procedures is being displayed.

Lines 2-5: Listing of the instrument approach procedures for the airport. If there are more than four IAPs, the final one in the list is on line 5 of the screen. To view the IAPs that are not in view, turn on the cursor using the CRSR button and turn the right outer knob clockwise.

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The different types of IAPs and the abbreviations used on the APT 8 page are:

Approach	Abbreviation
ILS & ILS DME	**ILS**
LOC & LOC DME	**LOC**
LOC BC & LOC DME BC	**LBC**
LDA & LDA DME	**LDA**
SDF	**SDF**
RNAV	**RNAV & RNV**
TACAN	**TACAN**
VOR/DME	**VOR/D**
VOR	**VOR**
NDB/DME	**NDB/D**
NDB	**NDB**
GPS	**GPS**
Helicopter	**HEL**

3.12.2. VOR PAGES

Two pages of information may be displayed for each VOR in the KLN 94. Sample VOR pages are shown in figures 3-164 through 3-166).

3.12.2.1. The VOR 1 Page

See figure 3-164.



Figure 3-164

Line 1: The VOR identifier, preceded by an arrow if it is the active waypoint. To the right of the identifier is the frequency of the VOR in megahertz. This frequency is a QuickTune™ frequency which means that pressing the ENT button with the cursor over the frequency sends the frequency to the standby window of a KX 155A or KX 165A Nav/Com if the feature is enabled in the installation (see section 3.15 describing QuickTune™ operation).

Line 2: The name of the VOR.

Lines 3-4: The latitude and longitude of the VOR

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If the VOR is being viewed as part of the *nearest VORs list* (see section 3.9.1), the VOR 1 page format will differ as follows (see figure 3-165).



Figure 3-165

Line 1: After the VOR identifier, the number designating the VOR's position in the nearest VOR list is displayed. In figure 3-165, LAX is the second nearest VOR.

Lines 3-4: In place of the latitude/longitude, line 3 is blank and line 4 displays the magnetic bearing to or the magnetic radial from the VOR and the distance. Placing the cursor over the radial/bearing field and turning the right inner knob changes it between radial from and bearing to the station.

3.12.2.2. The VOR 2 Page

See figure 3-166.



Figure 3-166

Line 1: The VOR identifier, preceded by an arrow if it is the active waypoint.

Line 2: The published magnetic station declination of the VOR. Magnetic station declination is another way to say the published magnetic variation for the VOR.

Line 4: The magnetic bearing to or the magnetic radial from the VOR and the distance. Placing the cursor over the radial/bearing field and turning the right inner knob changes it between radial from and bearing to the station.

3.12.3. NDB PAGE

There is one page of information displayed for each NDB in the KLN 94. A sample NDB page is shown in figure 3-167.



Figure 3-167

3.12.3.1. The NDB 1 Page

The NDB 1 page format for an en route NDB is shown in figure 3-167.

***NOTE**: Outer markers and outer compass locators (LOM) may be stored by their NDB identifier or as an intersection by their intersection name.*

Line 1: The NDB identifier, preceded by an arrow if it is the active way-

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point. To the right of the identifier is the frequency of the NDB in kilohertz. If the NDB is being viewed as part of the *nearest NDBs list* (see section 3.9.1) the number designating the NDB's position in the nearest NDB list is displayed after the NDB identifier.

Line 2: The name of the NDB.

Lines 3-4: The latitude and longitude of the NDB.

Line 5: The magnetic bearing to or the magnetic radial from the NDB and the distance. Placing the cursor over the radial/bearing field and rotating the right inner knob changes it between radial from and bearing to the station.

The format for terminal NDBs (those NDBs **only** associated with an approach) is shown in figure 3-168. The NDB 1 page for terminal NDBs shows the airport identifier associated with the NDB to the right of the name on line 2.



Figure 3-168

3.12.4. INTERSECTION PAGES

The Intersection pages contain low altitude, high altitude, approach, and DP/STAR intersections as well as outer markers and outer compass locators. Outer markers and outer compass locators may be stored by their NDB identifier or as an intersection by their intersection name. **In addition DMEs associated with ILS and Localizer-type approaches are stored with intersections.**

3.12.4.1. The Intersection 1 (INT 1) Page

The Intersection pages for the waypoint ELVIS (figures 3-169 and 3-170) are used as an example of what is displayed for an actual intersection. The intersection page for IJFK (figure 3-171) is used to show how the page appears for a DME associated with an ILS or Localizer-type approach.

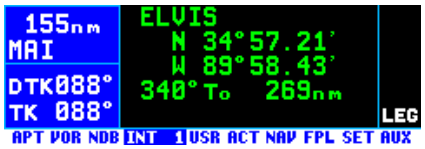


Figure 3-169

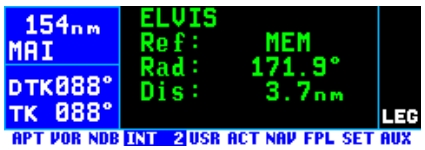


Figure 3-170

Line 1: The intersection identifier, preceded by an arrow if it is the active waypoint. If the waypoint is a DME the letters "DME" appear to the right of the identifier.

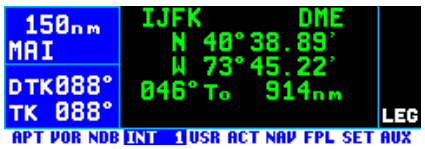


Figure 3-171

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Lines 2-3: The latitude and longitude of the intersection.

Line 4: The magnetic bearing to or the magnetic radial from the user-defined waypoint and the distance. Placing the cursor over the radial/bearing field and turning the right inner knob changes it between radial from and bearing to the station.

3.12.4.2. The Intersection 2 (INT 2) Page

See figure 3-170.

Line 1: The intersection identifier, preceded by an arrow if it is the active waypoint. If the waypoint is a DME the letters "DME" appear to the right of the identifier.

Line 2: The identifier of the intersection's reference waypoint. When this page is first viewed, the reference waypoint is the nearest VOR to the intersection. The reference waypoint may be changed by the pilot to any waypoint (published or user-defined). However, once you leave this page and come back, the reference waypoint reverts back to a nearby VOR.

Line 3: The magnetic radial from the reference waypoint to the intersection.

Line 4: The distance from the reference waypoint to the intersection.

3.12.5. USER WAYPOINT PAGES

The User waypoint pages (USR 0, USR 1, USR 2, and USR 3) allow you to create "custom" waypoints for use in navigation. A crop sprayer might want to create a waypoint on a field that is sprayed regularly, for instance. Another candidate might be a small private airport which is not included in the KLN 94 database. To learn how to create a user-defined waypoint, see section 5.4.

3.12.5.1. The User 0 (USR 0) Page

See figure 3-172.

***NOTE**: The USR 0 page is only displayed for waypoint identifiers that do not have a previously defined position.*



Figure 3-172

Line 1: The identifier for the as-yet-undefined waypoint.

Lines 2-4: Cursor fields for the three possible user-defined waypoint creation methods. For information on creating user-defined waypoints, see section 5.4.

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3.12.5.2. The User 1 (USR 1) Page

See figure 3-173.

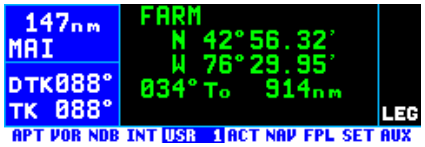


Figure 3-173

Line 1: The user-defined waypoint identifier, preceded by an arrow if it is the active waypoint.

Lines 2-3: The latitude and longitude of the user-defined waypoint.

Line 4: The magnetic bearing to or the magnetic radial from the user-defined waypoint and the distance.Placing the cursor over the radial/bearing field and turning the right inner knob changes it between radial from and bearing to station.

3.12.5.3. The User 2 (USR 2) Page

See figure 3-174.



Figure 3-174

Line 1: The user-defined waypoint identifier, preceded by an arrow if it is the active waypoint.

Line 2: The identifier of the user-defined waypoint's reference waypoint. When this page is first viewed, the reference waypoint is the nearest VOR to the user waypoint. The reference waypoint may be changed by the pilot to any waypoint (published or user-defined). However, once you leave this page and come back, the reference waypoint reverts back to a nearby VOR.

Line 3: The magnetic radial from the reference waypoint to the user waypoint.

Line 4: The distance from the reference waypoint to the user waypoint.

3.12.5.4. The User 3 (USR 3) Page

See figure 3-175.



Figure 3-175

Line 1: The identifier of the user-defined waypoint; an arrow precedes the identifier if it is the active waypoint.

Lines 2-4: If the user waypoint was created from the NAV 2 page (see 5.4.1 "Creating A Waypoint At Your Present Position") line 2 displays the date and time that the user waypoint was created. Otherwise, all three line may be used for pilot-entered remarks for the user waypoint. Three

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lines of 16 characters each are available for the remarks. A combination of up to 200 user-defined waypoints and airports may include remarks. Letters, numbers, hyphens, and spaces may be used in the remark. If no remarks have been entered for the user-defined waypoint, line 2 will display **[Remarks]**.

To enter a user-defined waypoint remark on the USR 3 page:

1. Turn on the cursor and move it until the cursor fills line 2 of the screen (figure 3-176).
2. Select the desired character with the right inner knob and use the right outer knob to move the cursor to the next character on the line (figure 3-177).
3. Repeat step 2 as necessary to complete line 2.
4. Press ENT to approve line 2. The cursor will automatically move to the next line (see figure 3-178).
5. Use the right inner and outer knobs to enter the text for line 3. Press ENT to approve line 3.



Figure 3-176



Figure 3-177



Figure 3-178

6. Use the same procedure to enter text and press ENT to approve line 4.
7. Turn the cursor off when you are finished creating the remark.

***NOTE**: If there are already 200 waypoints with remarks and an attempt is made to enter a remark for a waypoint, a scratchpad message "Remarks Full" is displayed. It is then necessary to delete remarks using the AUX 13 page before new remarks can be entered.*

The Auxiliary 13 (AUX 13) page is a list of waypoints with associated remarks. If you wish to delete a waypoint remark for a user-defined waypoint, see section 5.11.

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3.13. SPECIAL USE AIRSPACE ALERTING

The KLN 94 database contains the location of areas of special use airspace (SUA). The types of SUA areas stored in the database and the abbreviations used to denote these areas are the following:

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

The Setup 6 (SET 6) page shown in figure 3-179 is used to chose the types of SUA for which SUA alerting shall be given. These SUA type are divided into four groups as follows:

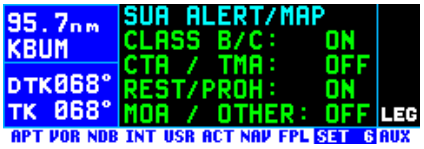


Figure 3-179

CLASS B/C:	Class B, Class C, and Terminal Radar Service Areas (TRSA)
CTA/ TMA:	Control Areas and Terminal Areas (used only internationally outside the U.S.)
REST/PROH:	Restricted and Prohibited Areas
MOA /Other:	Military Operation Areas, Alert Areas, Warning Areas, Danger Areas, Caution Areas, Training Areas

***NOTE**: The SUA types selected on the SET 6 page also determine which ones are displayed on the NAV 4 map page.*

To select the SUA types for SUA alerting and for display on the NAV 4 page map:

1. Select the SET 6 page.

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2. Press the CRSR button to turn on the cursor.
3. Use the right outer knob to move the cursor over the desired SUA group (figure 3-180).
4. Use the right inner knob to select **ON** or **OFF**.



Figure 3-180

5. Turn the cursor off with the CRSR button.

The KLN 94 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 3-181). If the special use airspace is a Class B, Class C, CTA, or TMA, the message page will also instruct you to press the CLR button if you wish to see the Airport 5 page (airport communications) for the primary airport so that the correct communications frequency may be determined (figure 3-182).



Figure 3-181



Figure 3-182

***NOTE**: In addition to the message page messages that alert you to special use airspace, the KLN 94 can also display the ten nearest areas of SUA. It will even give you the direction and distance to the nearest edge of the SUA. See section 3.9.2. "Viewing The Nearest Special Use Airspaces."*

The SUA alert feature is three dimensional. The SUA areas are stored in the KLN 94 database 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 KLN 94 as all altitude 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 KLN 94 as "unlimited".

Only the outer lateral boundaries are used for SUA alerting of Class B, Class C, CTA, and TMA airspace (although the inner rings are displayed on the map on ORS 03 and higher units). These SUA areas are stored as "cylinders" of airspace so all altitudes below the upper limit of these areas are considered to be in the SUA.

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If the altitude input to the KLN 94 is pressure altitude from an altitude encoder or air data computer, then you must manually update the KLN 94 with an altimeter setting (baro correction in order to receive accurate SUA alerting. You may easily update the altimeter setting by pressing the ALT button to display the Altitude 1 (ALT 1) page (figure 3-183) The right inner knob is used to change the altimeter setting. When the setting is complete, press ALT twice to return to the page previously in view.



Figure 3-183

CAUTION: Failure to keep the altimeter baro setting updated will result in inaccurate special use airspace alerting. If this feature is used, it is a good idea to update the altimeter baro setting on the ALT 1 page each time you make a change to an aircraft's altimeter setting.

***NOTE**: If there is no altitude input to the KLN 94, all altitudes will be regarded as being within the boundary of the SUA area.*

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 (figure 3-184). If one of the SUA areas is penetrated, another message will state: **Inside SUA**.

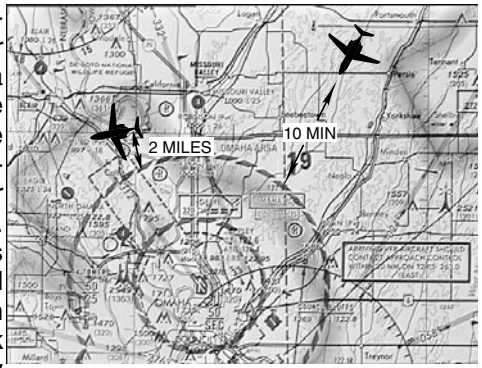


Figure 3-184

The SUA alert feature may be disabled (or enabled) on the Setup 5 (SET 5) page, shown in figure 3-185. Select the SET 5 page, turn on the cursor (B). The right inner knob is used to choose between **SUA ALERT ENABLED** and **SUA ALERT DISABLED**.



Figure 3-185

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If the SUA alert feature has been enabled, the KLN 94 allows you to select a vertical buffer on the SET 5 page in order to provide an additional layer of protection from inadvertently entering an SUA. To select a vertical buffer, make sure the SUA alert feature has been enabled. Turn on the cursor (CRSR) and use the right outer knob to position the cursor over the Buffer altitude field (figure 3-186). Then use the right inner knob to select the buffer (figure 3-187). The buffer may be selected in one hundred foot or ten meter increments. After the desired selection has been made, turn the cursor off.



Figure 3-186



Figure 3-187

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.

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 KLN 94'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.

***NOTE**: Special Use Airspace alerting is disabled when the KLN 94 is in the approach arm or approach active modes.*

3.14. REMOTE MOUNTED ANNUNCIATORS

The KLN 94 has outputs capable of driving several remote annunciator lights. Since the KLN 94 is capable of displaying many of these annunciations on the unit itself, a particular installation may or may not include remote annunciators.

These annunciators should be mounted in the pilot's normal scan area so that they are easily seen. A typical annunciator unit integrating several of the annunciators is shown in figure 3-188; however, actual annunciation abbreviations and configurations may be different.

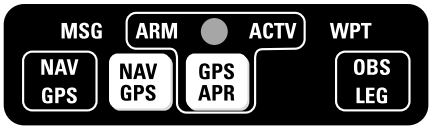


Figure 3-188

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Waypoint Alert: The remote waypoint alert annunciator is on whenever waypoint alerting is occurring. See sections 3.10.3. “Waypoint Alerting for Direct To Operation” and 4.2.2. “Turn Anticipation and Waypoint Alerting.”

Message: The remote message annunciator is on whenever the message prompt is on. See section 3.5. “Message Page.”

NAV/GPS: There may be a NAV/GPS switch/annunciator to switch a CDI or HSI indicator’s navigation source between the KLN 94 and a VOR/ILS system.

GPS APR: An optional GPS APR switch/annunciator allows display and control of the KLN 94 approach modes (see section 6.2.1).

3.15 QUICKTUNE™ NAV/COMM FREQUENCY SELECTION

When the KLN 94 is interfaced with either of Bendix/King’s KX 155A or KX 165A Nav/Comms, it is capable of providing QuickTune™ frequency selection for both VHF communication and navigation frequencies. This allows you to place the cursor over a frequency displayed on the APT 5, VOR 1, FSS 1 (nearest FSS), or CTR 1 (nearest “Center”) pages and automatically transfer the frequency to the appropriate comm or nav standby window by pressing the ENT button.

In addition, if a localizer-type approach (ILS, LOC, SDF, or LDA) or VOR approach is loaded into the KLN 94’s active flight plan, the frequency associated with the approach is automatically sent to the nav standby window of the KX 155A or KX 165A. This applies regardless of whether or not the approach is approved for GPS.

At the time of installation the KLN 94 may be configured for QuickTune™ with compatible Nav/Comms in the aircraft. It may be configured for up to four comms and four navs (four KX 155A’s or four KX 165A’s), although one or two is more common.

To determine how many Nav/Comms are configured into the KLN 94 QuickTune™ system:

1. Select the SET 14 page. If the word “disabled” appears as in figure 3-189 then the KLN 94 is not capable of providing QuickTune™ frequency selection. If a number appears as in figure 3-190 then the KLN 94 is configured to provide QuickTune™ and you may continue with step 2.

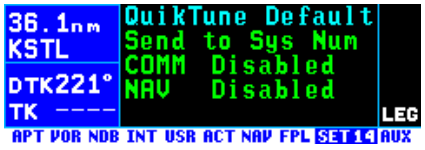


Figure 3-189

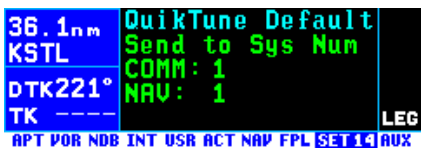


Figure 3-190

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2. Note what the default number is next to "Comm" and "Nav". In figure 3-190, the default number is 1 for both Comm and Nav.
3. Press the CRSR button to turn on the cursor.
4. Rotate the right inner knob to view the comms configured for QuickTune™. If only one number is displayed then it is the only comm configured for QuickTune™.
5. Rotate the inner knob if necessary to display the number that was displayed in step 2 above.
6. Rotate the right outer knob to position the cursor over the number next to "Nav".
7. Rotate the right inner knob to view the navs configured for QuickTune™. Select the number that was displayed in step 2.
8. Turn off the cursor.

3.15.1. QUICKTUNE™ OPERATION WITH ONE COMPATIBLE NAV/COMM

To use the QuickTune™ feature when the KLN 94 is configured with only one compatible Nav/Comm:

1. Turn on the cursor and use the right outer knob to position the cursor over the desired frequency on an APT 5, VOR 1, FSS 1, or CTR 1 page (figure 3-191). Remember that on the APT 5 page you can scroll the cursor through all of the airport frequencies without having to turn the cursor off and back on to change pages.

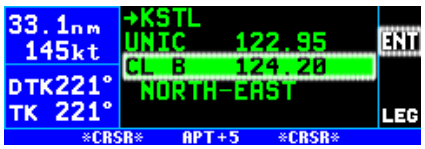


Figure 3-191

2. Press the ENT button to send the frequency to the KX 155A (or KX 165A) comm or nav frequency standby window.
3. Press the appropriate comm or nav frequency transfer button when ready to activate the frequency.

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3.15.2. QUICKTUNE™ OPERATION WITH MORE THAN ONE COMPATIBLE NAV/COMM

In order to use QuickTune™ when there is more than one Nav/Comm configured with the KLN 94 it is necessary to specify a default QuickTune™ receiver for both comm and nav. This action is accomplished on the SET 14 page by turning on the cursor and selecting the desired default unit for both comm and nav.

To use the QuickTune™ feature when the KLN 94 is configured for more than one Nav/Comm:

1. Position the cursor over the desired frequency on an APT 5, VOR 1, FSS 1 or CTR 1 page as in figure 3-191.
2. Press the ENT button. The frequency and the default unit the frequency will be sent to is displayed as shown in figure 3-192. Remember the default unit can be changed on the SET 14 page.

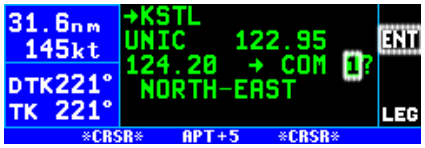


Figure 3-192

3. If desired, turn the right inner knob to select another unit to send the frequency to (figure 3-193).

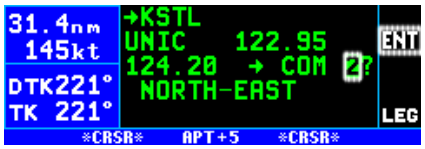


Figure 3-193

4. Press the ENT button again to send the frequency to the selected comm or nav standby window.
5. Press the appropriate comm or nav frequency transfer button on the KX 155A (or KX 165A) when ready to activate the frequency.

3.16. USING THE TAKE-HOME MODE

It is very likely that the KLN 94 will become your “best friend” in the cockpit. As with any good friend, you may need some time to get well-acquainted. This will allow you to utilize it to the maximum extent. A great way to get to know the KLN 94 is to use it outside the airplane, using the take-home mode.

When the KLN 94 is in the take-home mode, it performs as if it is receiving adequate satellite signals to determine its position. It displays the latitude and longitude of its last known position or of whatever position it is initialized to on the Setup 1 (SET 1) page (see section 3.7, “Initialization and Time to First Fix”). In addition, a groundspeed may be entered on the SET 1 page and the KLN 94 will track a flight plan or a direct to waypoint

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just as if it was actually functioning in an aircraft. Distances count down, waypoints sequence, and the deviation bar follows the progress of the simulated flight. Using the take-home mode is an excellent way to learn the operation of the KLN 94 without worrying about the engine running, other traffic, or even terrain.

There are products available which allow you to use the KLN 94 at your home, office, or hotel to have get-acquainted time in the take-home mode, for instance the Commander 2000 from Lone Star Aviation. It is also helpful to do flight planning and perform database updates outside the airplane, perhaps with a home personal computer.

For more information on the Commander 2000, or to place an order, contact:

Lone Star Aviation Corp.
804 North Great S.W. Pkwy
Arlington, TX 76011
Phone: (817) 633-6103
FAX: (817) 633-6208
lonestaraviation.com

The KLN 94 is automatically put into the take-home mode when it is used with a Commander 2000. In addition, an authorized Honeywell Service Center may also arrange for you to put the KLN 94 into the take-home mode by grounding the appropriate pin at the back of the unit while it is removed from the aircraft and is connected to an appropriate power supply. **The KLN 94 must never be put into the take-home mode when it is installed in the aircraft.** A special page is displayed shortly after turn on when the unit is in the take-home mode (figure 3-194). Press the ENT button to acknowledge the take-home mode.



Figure 3-194

To use the take-home mode:

1. Make sure the unit is in the take-home mode.
2. Select the SET 1 page (figure 3-195).
3. Press the CRSR button to turn on the cursor (figure 3-196).
4. To start from the last position skip to step 6. To change the starting location enter the identi-



Figure 3-195

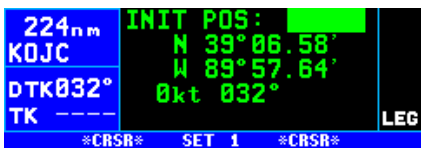


Figure 3-196

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fier of the starting point of the trip (figure 3-197).

5. Press ENT once to view the waypoint page and a second time to approve the waypoint page.



Figure 3-197

6. Rotate the right outer knob to position the cursor over the groundspeed field (figure 3-198) and then turn the right inner knob to select the desired groundspeed (it must be above 30 knots).

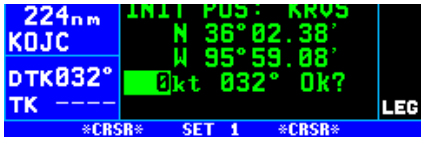


Figure 3-198

7. Press the ENT button.

8. Use the right outer knob to position the cursor over the **OK?** field and then press the ENT button (figure 3-199). You are now flying!

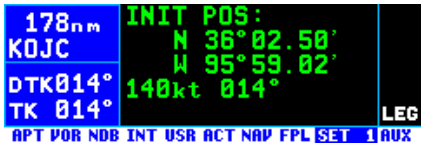


Figure 3-199

3.17 SAMPLE TRIP

We've talked a lot about the features of the KLN 94, and now it's time to put those features to work for us and try a sample trip! Our trip will be from Adams field (KLIT) in Little Rock, Arkansas to Mueller Municipal airport (KAUS) in Austin, Texas. The weather is perfect and we decide to make the trip VFR and fly direct to Austin.

3.17.1 PRE-DEPARTURE

1. Apply power to the KLN 94 by pushing the On/Off/Brightness knob to the "in" position. Rotate the knob to adjust the display brightness to the desired level.

2. Enter the current altimeter setting on the Self Test page and press the ENT button. The cursor will move over **OK?**. Verify that the information on the Self Test page is correct and press ENT.

3. Verify that the information on the Initialization pages is correct, including the time and date. Position the cursor over **Ok?** and press ENT to approve the Initialization page.

4. Read the Database page and acknowledge it by pressing ENT.

5. The APT 5 page for Adams field (**KLIT**), which shows the communications frequencies, is now displayed on the screen since **KLIT** was the active waypoint when you last removed power from the KLN 94. The first APT 5 page indicates

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that the ATIS frequency is 125.65 MHz, the pre-taxi clearance delivery frequency is 118.95 MHz, and the ground control frequency is 121.90 MHz. After listening to ATIS, we contact clearance delivery for our clearance out of the Little Rock Class C airspace. Next, we give ground control a call and receive our taxi clearance.

6. By this time the KLN 94 has reached a NAV ready status. We can verify this by turning to the NAV 2 page. It shows a valid present position, in this case 3.8 nautical miles on the 320 degree radial from Little Rock (**LIT**) VOR.

7. Press [D►] to bring up the Direct To page. Use the right inner and outer knobs to enter the identifier of Mueller Municipal airport (KAUS) by using the right inner knob to select the characters and the right outer knob to move the flashing part of the cursor to the desired cursor location.

8. Press [ENT]. The APT 1 page for Mueller Municipal is now displayed on the screen.

9. Press [ENT] again to approve the waypoint page. The NAV 1 page is now displayed. The NAV 1 page indicates it is 387 nautical miles to Austin and that the desired track (DTK) is 225 degrees. After take-off, the NAV 1 page will also display groundspeed, actual track (TK), and estimated time en route.

3.17.2 EN ROUTE

1. We depart from runway 36 at Little Rock and are told to "maintain runway heading." After several radar vectors for traffic avoidance we are finally cleared on course. The D-Bar indicates that the radar vectors have taken us north of the original course and we decide to proceed Direct To Austin from our present position. To recenter the D-Bar, press [D►], and then press [ENT].

2. After departure control has directed "squawk 1200, frequency change approved," we decide it would be a good idea to obtain VFR flight following. To obtain the frequency for Center, press the [NRST] button, move the cursor to the **CTR?** selection, and press [ENT]. The KLN 94 indicates that for our position, we should be able to contact Memphis Center on 135.80 MHz.

3. We've only flown about 100 nautical miles, but we begin wondering where we would go if an engine suddenly started running rough. We decide to use the KLN 94 to determine where the nearest airports are from our present location. To view the nearest airports press [NRST], and then press [ENT]. The nearest airport is Hope Municipal (**M18**) which is eight nautical miles from our position on a bearing to the airport of 11 degrees. You now rotate the right inner knob to view the other APT

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pages for Hope Municipal. We learn, for example, that it is located in Hope, Arkansas, and has two hard surface runways that are each 5500 feet in length. By pulling the right inner knob to the "out" position, you may now scan clockwise through the remaining 19 airports in the nearest airport list.

4. For the majority of the en route portion of the flight, you select the NAV 4 page's moving map display by pressing the map range scale ( ) button. You continue to press the button up or down to select the 30 nautical mile range scale. Press the MNU button to display the map menu. From this map menu page you may quickly get to the SET 7 page to configure the aeronautical data or the SET 8 page to configure the land data as desired. In addition you can change the map orientation from the map menu page.

5. Since it is a good idea to not rely on just one navigation source, we cross check the KLN 94 position against other equipment in the aircraft. The NAV 2 page indicates we are presently located on the Texarkana (**TXK**) VOR 68 degree radial at a distance of 19 nautical miles. By tuning our NAV receiver and DME to **TXK**, we are able to confirm that this is the correct position.

3.17.3 TERMINAL AREA

1. About 50 nautical miles from Austin's Mueller airport we start preparing for our arrival. Viewing the APT 5 page for **KAUS** you determine that the ATIS frequency is 124.40 MHz and tower is 121.00 MHz.

2. A few minutes later, the message prompt begins flashing. When you press MSG, the message page advises **Airspace Alert - Austin CL C - Below 4500 ft - See KAUS freq-Press CLR**. The Special Use Airspace Alert feature has determined that you are within 10 minutes of penetrating the Austin Class C airspace. When you press CLR and view the APT 5 page for KAUS, you see that the Class C airspace frequencies are sectorized. You determine from the APT 5 page that the proper frequency to use is 118.80 MHz since we are Northeast of Austin and 118.80 MHz is the appropriate frequency to use from 355 degrees to 175 degrees. You turn to the NAV 4 page so that you can see the outer boundary of the Austin Class C airspace relative to your location and route.

3. After you call Austin approach control for clearance into the Class C airspace, you view the rest of the APT pages for KAUS to determine the field elevation and available runways.

6. After landing, the KLN 94 is turned off either by pulling the On/Off/Brightness knob out to the Off position, or with the avionics master switch if one is installed.

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4. FLIGHT PLAN OPERATION

If you are going to use your KLN 94 for more than just flying VFR, direct from one airport to the next, it will be well worth your while to learn its flight plan capabilities. This section of the Pilot's Guide describes how to create, edit, and fly flight plans.

4.1. CREATING AND MODIFYING FLIGHT PLANS

The following rules and considerations apply to KLN 94 flight plans:

- The KLN 94 is capable of storing in its memory 25 flight plans plus an active flight plan (FPL 0).
- Each of the flight plans may contain up to 20 waypoints. The waypoints may consist of any combination of published waypoints from the database or user created waypoints. The active flight plan may contain up to 35 waypoints if it includes approach and DP/STAR waypoints.
- The flight plans are numbered 0 through 25 (FPL 0, FPL 1, FPL 2, . . . , FPL 25).
- The active flight plan is **always** FPL 0. The standard procedure is to create a flight plan using 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 Pilot's Guide will refer to FPL 0 as the "active flight plan" and FPL 1 through FPL 25 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.
- 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, the KLN 94 navigation system will be flagged.
- The first waypoint in the flight plan should **always** be the departure airport.

4.1.1. CREATING A FLIGHT PLAN

A flight plan for a flight from Lakefront airport in New Orleans, LA to St. Petersburg/Clearwater, FL International airport will be used as an example of how to create a flight plan. The waypoints making up the flight plan

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are: **KNEW** (Lakefront airport), **GPT** (Gulfport VOR), **SJI** (Semmes VOR), **CEW** (Crestview VOR), **MAI** (Marianna VOR), **SZW** (Seminole VOR), **CTY** (Cross City VOR), and **KPIE** (St. Petersburg/Clearwater International airport).

To create a flight plan:

1. Select the flight plan (FPL) pages with the right outer knob.
2. Select a flight plan page (preferably other than FPL 0) which does not contain a flight plan (figure 4-1). If all of the flight plan pages contain flight plans, refer to section 4.1.6, "Deleting Flight Plans".



Figure 4-1

3. Turn on the cursor with the CRSR button.

***NOTE**: The KLN 94 flight plan operation is designed so that the first waypoint in the flight plan should always be the departure airport. 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 2.3, "ICAO Identifiers".*

4. Use the right inner knob to select the first character of the departure waypoint identifier (figure 4-2). If you have set the default first waypoint character to **K** on the SET 11 page, you will just need one turn clockwise (see section 3.4.2, "Data Entry").



Figure 4-2

5. Turn the right outer knob to move the flashing part of the cursor over the second character, then select the desired character.
6. Use the above procedure to select the entire identifier for the first waypoint (figure 4-3).



Figure 4-3

7. Press ENT. A waypoint page for the identifier just entered will be displayed on the screen (figure 4-4). If a mistake was made and the wrong waypoint identifier was entered, press CLR and begin



Figure 4-4

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again. If no mistake was made but the waypoint identifier just entered isn't in the database, a page allowing creation of a user defined waypoint will appear on the screen. Refer to section 5.4 for instructions on how to create a user-defined waypoint.

8. Press ENT again to approve the waypoint page being displayed. The cursor will move automatically to the second waypoint position (figure 4-5).



Figure 4-5

***NOTE**: A small number of waypoints are stored in the database as "fly-over" waypoints. These waypoints are associated with DP/STAR procedures. "Fly-over" means that, for some reason, the governing agencies have decided that it is important to fly directly over the waypoint instead of being able to "cut the corner" by using turn anticipation (see section 4.2.2. "Turn Anticipation And Waypoint Alerting"). In these cases the KLN 94 will present a waypoint type identification page (figure 4-6). Simply select the way in which the waypoint is intended to be used with the right outer knob and press ENT. If the **DP/STAR** choice is selected, the KLN 94 will disable turn anticipation for that waypoint (if previously enabled). The KLN 94 will enable turn anticipation after the waypoint has been passed (if turn anticipation was previously enabled). If **En Route** is selected, then normal turn anticipation occurs.*

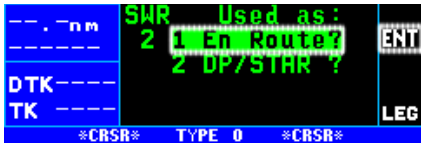


Figure 4-6

9. Use the same procedure to enter the rest of the waypoints in the flight plan (figure 4-7). If the flight plan consists of four or more waypoints, the waypoints will automatically scroll as necessary to allow entry of the next waypoint.



Figure 4-7

10. When all of the waypoints have been entered in the flight plan, the right outer knob may be rotated to move the cursor up and down and manually "scroll" through the waypoints making up this flight plan. This is useful if the flight plan contains five or more waypoints since not all of the waypoints can be displayed at one time. When the right outer knob is rotated counterclockwise, the cursor may be positioned over **Use?**. If there are more than four waypoints in the flight plan, the

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first three waypoints will then be displayed followed by the last waypoint in the flight plan. Rotate the right outer knob to move the cursor and manually scroll to see the missing intermediate waypoints.

11. Turn off the cursor with the CRSR button. Additional flight plans may now be created in the same manner.

4.1.2. VIEWING DISTANCE AND DESIRED TRACK BETWEEN STORED FLIGHT PLAN WAYPOINTS

The stored flight plan (FPL 1-25) 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 desired track (**DTK**) from the previous waypoint.

If you have more than four 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 cursor (B) and use the right outer knob to scroll down the flight plan until the waypoint of interest is on the screen.

This display will default to the distance presentation at power-on.

To change between distance and desired track display on a numbered flight plan page:

1. Turn on the cursor (CRSR); it will come up over the **USE?** field near the upper left corner of the screen. Rotate the outer knob to position the cursor over the distance (**Dis**) field (figure 4-8).



Figure 4-8

2. Turn the right inner knob one click to change to desired track (**DTK**) (figure 4-9). An additional click changes back to **Dis**.



Figure 4-9

4.1.3. ACTIVATING A NUMBERED FLIGHT PLAN

To activate one of the previously created numbered flight plans:

1. Use the right outer and inner knobs to select the desired flight plan page (figure 4-10).



Figure 4-10

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2. Press CRSR to turn on the cursor. It will appear over **Use?** (figure 4-11). If you haven't left the numbered flight plan since creating this flight plan, rotate the outer knob counterclockwise to position the cursor over **Use?**.



Figure 4-11

3. Press ENT to activate the flight plan in the order shown (figure 4-12). To activate the flight plan in inverse order (first waypoint becomes last and last waypoint becomes first), rotate the outer knob one step clockwise to position the cursor over **Use? Inverted?** before pressing ENT. The result is shown in figure 4-13.



Figure 4-12



Figure 4-13

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.

4.1.4. ADDING A WAYPOINT TO A FLIGHT PLAN

A waypoint may be added to any flight plan containing fewer than 20 waypoints.

To add a waypoint to a flight plan:

1. Turn on the cursor with the CRSR button.

2. With the outer knob, 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 **SJI** is presently the second waypoint in the flight plan and you wish to insert **GPT** in the number 2 position in front of **SJI**, move the cursor over **SJI** (figure 4-14).



Figure 4-14

3. Use the inner knob to enter the first character of the waypoint being inserted. As you begin to turn the knob, the existing waypoint in this

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position automatically jumps down to the next position. In this case, **SJI** automatically moves to waypoint 3 and KPIE changes to waypoint 8 (figure 4-15).



Figure 4-15

4. Complete the waypoint entry operation (figure 4-16).



Figure 4-16

***NOTE**: If adding a waypoint or waypoints (such as adding DP/STAR/ Approach procedures) would exceed the capacity of FPL 0, KLN 94 will notify you that it is deleting waypoints from the beginning of FPL 0 to make room for the addition.*

5. Press [ENT] to display the waypoint page on the right side for the identifier just entered (figure 4-17).

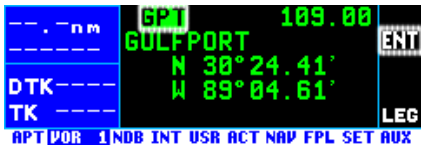


Figure 4-17

6. Press [ENT] again to approve the waypoint page (figure 4-18).



Figure 4-18

7. Turn off the cursor ([CRSR]).

4.1.5. DELETING A WAYPOINT FROM A FLIGHT PLAN

To delete a waypoint from a flight plan:

1. Press [CRSR] to enable the cursor if it is not on already.
2. Move the cursor over the waypoint you wish to delete (figure 4-19).



Figure 4-19

3. Press [CLR]. 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 4-20). If a mistake was made and you do not wish to delete this waypoint, press [CLR].



Figure 4-20

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4. Press ENT and the waypoint will be deleted from the flight plan. The other waypoints in the flight plan will be correctly repositioned (figure 4-21).



Figure 4-21

5. Turn off the cursor with the CRSR button.

4.1.6. DELETING FLIGHT PLANS

To delete a flight plan which is no longer required:

1. Display the flight plan (FPL 0, FPL 1, . . ., or FPL 25) which is to be cleared (figure 4-22).



Figure 4-22

2. Make sure that the cursor is turned off, and use the CRSR button if it is not.

3. Press CLR. The words **Delete FPL?** will appear at the top of the page (figure 4-23). If a mistake was made and you do not wish to clear this flight plan, press CLR again.



Figure 4-23

4. Press ENT to clear the flight plan. The flight plan page will appear as in figure 4-24.



Figure 4-24

4.1.7. 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 (figure 4-24). If none exist, use the procedure described in section 4.1.6, "Deleting Flight Plans," to clear a flight plan which is no longer required.

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2. Turn on the cursor with the CRSR button. It will appear over the blank first waypoint position (figure 4-25).

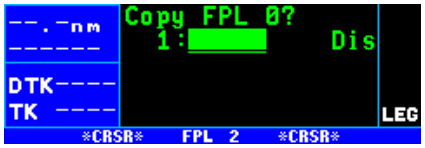


Figure 4-25

3. Rotate the right outer knob counterclockwise to position the cursor over **Copy FPL 0?** (figure 4-26).



Figure 4-26

4. Press ENT to load the active flight plan into this numbered flight plan (figure 4-27).



Figure 4-27

4.2. OPERATING FROM THE ACTIVE FLIGHT PLAN

4.2.1. GENERAL PROCEDURES

Everything you have learned in this Pilot's Guide thus far is applicable to using the KLN 94 for flight plan operation. The following rules and considerations apply for flight plan operation while the KLN 94 is in the Leg mode:

- Always verify that you are viewing the active flight plan page (FPL 0) and not one of the other numbered flight plan pages.
- The active leg of the flight plan is designated with a ↳ symbol. A leg is defined as the course line between a pair of waypoints (a "from" waypoint and a "to" waypoint). The head of the arrow is positioned to the left of and points to the active "to" waypoint. In figure 4-28, SLC (Salt Lake City VOR) is the "to" waypoint. The tail of the symbol is positioned to the left of the "from" waypoint. KPVU (Provo Municipal) is the "from" waypoint in figure 4-28. The symbol is not displayed unless the KLN 94 is actually receiv-



Figure 4-28

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ing GPS signals suitable for navigation. *(**Note**: If the unit is in the take-home mode, it has been "tricked" into thinking it is receiving signals and therefore the symbol can be displayed).* Also, the symbol 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 Direct To operation is occurring, view the NAV 1 page. If the top line shows the D→ symbol (figure 4-29) instead of a "from" waypoint (figure 4-30), then Direct To navigation is occurring. If it is desired to cancel the Direct To operation and operate from the active flight plan, press [D→], [CLR], and then [ENT].



Figure 4-29



Figure 4-30

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

- 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 (figure 4-31).



Figure 4-31

- 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 cursor on and use the right outer knob 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 4-32).



Figure 4-32

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4.2.2. TURN ANTICIPATION AND WAYPOINT ALERTING

Prior to reaching a waypoint in the active flight plan, the KLN 94 will provide navigation along a curved path segment to ensure a smooth transition between two adjacent legs in the flight plan. That is, the CDI or HSI left/right deviation will be referenced to the dashed line in figure 4-33. 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 KLN 94 automatically sequences to the next leg after passing the midpoint in the transition segment.

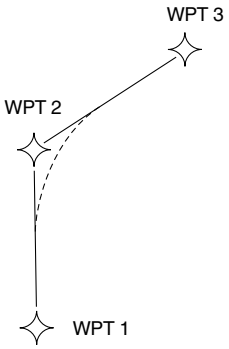


Figure 4-33

Approximately 20 seconds prior to the beginning of turn anticipation, the **WPT** (waypoint alert) annunciator starts flashing in the upper right section of the screen. In addition, 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 (figures 4-34 and 4-35). This is called "waypoint alerting". If an external waypoint alert annunciator is mounted in the aircraft, this annunciator will begin flashing at the same time.



Figure 4-34



Figure 4-35

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. This occurs when the waypoint alert annunciator stops flashing and goes on steady. At this time, the KLN 94 will notify you with a message on the Message page of the new desired track to select on your HSI or CDI.

Adj Nav Crs to 123°

A message will not be given if the change in desired track (course change) is less than 5°.

The desired track (**DTK**), displayed in the middle of the left side of the screen, also changes to the value for the next leg at the beginning of turn anticipation. Turn anticipation becomes inactive when transition to the next leg has been made.

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Although normally not recommended, turn anticipation may be disabled on the Setup 10 (SET 10) page by pressing the CRSR button and then rotating the right inner knob to change back and forth between **ENABLED** (figure 4-36) and **DISABLED** (figure 4-37). If turn anticipation is disabled, navigation is provided all the way to the waypoint, and waypoint alerting occurs approximately 36 seconds prior to actually reaching the waypoint.



Figure 4-36



Figure 4-37

4.2.3. 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 Active (ACT) Waypoint page type. When the ACT page type is first selected, the waypoint page for the active waypoint will be displayed (figure 4-38). The location of the waypoint in the flight plan (waypoint 1, waypoint 2, etc.) is annunciated with a number to the left of the identifier. In addition, an arrow to the left of the waypoint number designates the active waypoint.



Figure 4-38

To view the waypoints in the flight plan that are not the active waypoint:

1. From the ACT page, pull the right inner knob to the "out" position and turn it to scan through each of the waypoints in the order they are contained in the flight plan (figure 4-40).



Figure 4-40

2. Once the desired waypoint is found, the right inner knob may be pushed back to the "in" position and rotated to display any of the other waypoint pages for that waypoint (figure 4-41).



Figure 4-41

3. Pulling the knob back out will allow further scanning of the waypoints in the active flight plan.

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4.2.4. 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 on an IFR flight plan, it is common to receive vectors in the terminal area and then be given a clearance direct to the first waypoint in the flight plan that was filed. The KLN 94 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. However, there are several methods for Direct To operation optimized for flight plan operation.

4.2.4.1 Direct To Operation From The Map

When operating from the Nav 4 map page the method described in section 3.11.4.11. “Waypoint Scan Feature” will often be the most convenient because your don’t have to leave the map to initiate the Direct To operation. As described in that section, this involves pulling the right inner knob out to the “scan” position and then turning this knob to display the desired flight plan waypoint identifier in the lower right corner of the map. The [D►] button is then pressed to bring up the Direct To page with the selected waypoint identifier already displayed. Pressing the [ENT] button approves the Direct To waypoint and returns the unit to the map page. Press the right inner knob back to the “in” position.

4.2.4.2 Direct To Operation From Any Page

Another good method of selecting a FPL 0 waypoint as the Direct To waypoint is to press the [D►] button from any page to bring up the Direct To page. Then pull the right inner knob out to the “scan” position and rotate it to scan though the active flight plan waypoints until the desired FPL 0 waypoint is displayed. Press the [ENT] button to complete the operation. Press the right inner knob back to the “in” position.

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4.2.4.3 Direct To Operation From The FPL 0 Page

If you are presently viewing the active flight plan page there is an easy method of selecting the Direct To waypoint.

To fly direct to a waypoint in the active flight plan while viewing the FPL 0 page:

1. Select the FPL 0 page.
2. Turn on the cursor with the CRSR button and use the left outer knob to position the cursor over the desired waypoint (figure 4-42).
3. Press D→. The display will change to the Direct To page (figure 4-43), with the identifier of the selected waypoint.
4. Press ENT to approve the Direct To. The NAV 1 page will be displayed (figure 4-44) reflecting the new active waypoint.
5. If you now turn back to the FPL 0 page, you will see that the active waypoint is now preceded by an arrow only, instead of the ↳ (figure 4-45). This is because there is no "from" waypoint in the flight plan.



Figure 4-42



Figure 4-43



Figure 4-44



Figure 4-45

4.2.4.4 Cancelling Direct To Operation

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 D→, then press CLR, then ENT. The unit will orient itself on the closest leg of the flight plan.

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

The right side of the active flight plan (FPL 0) page may be used to display (1) the cumulative distance (**Dis**) along the flight plan route from the present position to each flight plan waypoint, (2) the estimated time en route (**ETE**) to each waypoint, (3) the estimated time of arrival (**ETA**) at each waypoint, or (4) the magnetic desired track (**DTK**) for each waypoint.

If you have more than five 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 cursor (CRSR) and use the right outer knob to scroll down the flight plan until the waypoint of interest is on the screen.

This display will default to the distance (**Dis**) presentation at power-on (figure 4-45).

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

1. Turn on the cursor with the CRSR button; it will come up initially over the distance **(Dis)** field.
2. Turn the right inner knob to change the field from distance (**Dis**), to **ETE** in hours:minutes (figure 4-46), to **ETA** in terms of the system time zone (figure 4-47), to **DTK** (figure 4-48) and then back to **Dis**. Note that the system time zone abbreviation (e.g. **CDT**) is used to annunciate when **ETA** is selected.
3. Press the CRSR button to turn the cursor off.

***NOTE**: When the KLN 94 is in OBS mode, the FPL 0 page will present OBS selected course (**OBS**) as an option instead of magnetic desired track (**DTK**). The selected course will be displayed to the right of the active waypoint, and the **OBS** fields for all other waypoints will be blank (figure 4-49).*



Figure 4-46



Figure 4-47



Figure 4-48



Figure 4-49

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4.2.6 CHANGING THE SYSTEM TIME ZONE

The ETA shown on the FPL 0 page is the for the system time zone. The system time zone may be changed from either the NAV 3 or SET 2 page. Section 3.2 gives a list of available time zones.

To change the system time zone:

1. Select either the NAV 3 or SET 2 page.
2. Turn on the cursor with the CRSR button and use the right outer knob to position the cursor over the time zone field (figure 4-50).
3. Rotate the right inner knob to select the desired time zone (figure 4-51).
4. Turn off the cursor.

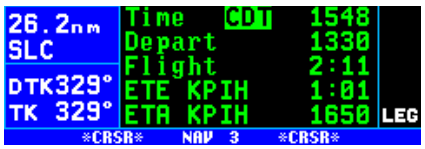


Figure 4-50

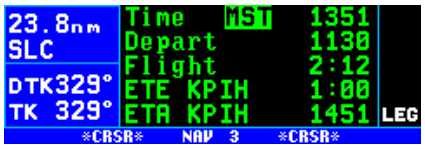


Figure 4-51

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5. INTERMEDIATE OPERATION

Many of the KLN 94's advanced features and functions are covered in this section of the Pilot's Guide. You may pick and choose which of these features are applicable to the type of flying you do. If you are a serious IFR pilot be sure to learn the information presented on the KLN 94's navigation modes described in section 5.5.

5.1. ALTITUDE PAGES

The ALT (altitude) pages are used to control and display most of the altitude-related functions of the KLN 94, including minimum safe altitudes and vertical navigation (VNAV). The ALT pages are accessed by pressing the ALT button. The first time the ALT button is pressed, the ALT 1 page is displayed (figure 5-1). If the ALT button is pressed again while the ALT 1 page is displayed, the display changes to the ALT 2 page. Pressing ALT a third time goes back to the page which you were on before you changed to the ALT pages.



Figure 5-1

The ALT 1 page is used to set the current barometric pressure or "baro setting" which is displayed on line 1. Since all encoding altimeters and some air data computers output pressure altitude, it is often required that you manually input the proper baro setting in order to get accurate altitude functions. The KLN 94 functions which use the altitude input are special use airspace (SUA) alerting, altitude alerting, vertical navigation (VNAV), and the GPS approach mode. It is a good idea to update the altimeter baro setting on the ALT 1 page each time you make a change to the aircraft's altimeter setting.

To Change the Baro Setting:

1. Press ALT. The ALT 1 page will be displayed with the cursor over the altimeter baro setting field (figure 5-1).

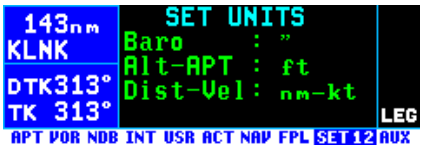


Figure 5-2

***NOTE**: The SET 12 page (figure 5-2) is used to set the unit of measure for various parameters. The altimeter barometric setting can be set to inches of Mercury ("), millibars (mB), or hectopascals (hP). Altitude, airport elevation, and runway lengths can be set to feet (ft) or meters (m). Finally, distances and velocities can be set to nautical miles (NM) and knots (kt) or kilometers (km) and kilometers/hour (k/h). To change a unit of measure: select the SET 12 page; turn on the cursor (CRSR) and move it over the desired unit of measure using the*

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right outer knob; turn the right inner knob to select the desired unit of measure; and turn the cursor off again.

2. Use the right inner knob to update the altimeter baro setting (figure 5-3).
3. Press ALT twice to return to the page previously being viewed.



Figure 5-3

Line 3 displays the Minimum Safe Altitude (**MSA**)

IMPORTANT: The minimum safe altitude displayed is the altitude defined by Jeppesen as "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 U.S. and is approximately 40 nautical miles at the northern most parts of the U.S. The MSA altitude information is contained in the database and is updated when the database cartridge is updated.

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 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". The KLN 94 displays dashes for areas outside the database coverage area or for areas where the Grid MORA is not defined.

Line 4 displays the Minimum En route Safe Altitude (**ESA**).

IMPORTANT: When the KLN 94 is in the Leg mode, the minimum en route safe altitude is the highest MSA sector altitude from the present position to the active waypoint, then to the destination waypoint along the active flight plan. See figure 5-4. When the KLN 94 is in the OBS mode, the minimum en route safe altitude is the highest MSA sector altitude from the present position to the active waypoint.

WARNING: The MSA and 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.

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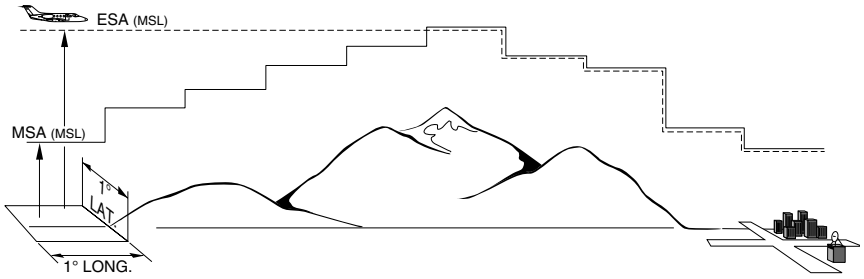


Figure 5-4

5.2. ADVISORY VNAV OPERATION

The KLN 94's advisory vertical navigation (VNAV) feature allows you to program a descent or ascent path, and then provides you with an advisory altitude to fly that will provide guidance along the vertical path. For example, you can program the VNAV to provide descent guidance so that you arrive at your active waypoint or a waypoint in the active flight plan at an altitude that you specify. The KLN 94 will alert you of when to start the descent, and display the advisory altitudes to fly throughout the descent. Vertical navigation is always set up on the ALT 2 page but may then be viewed on the NAV 1, NAV 4 (map), or ALT 2 pages.

5.2.1. VNAV FOR DIRECT TO OPERATION

The Altitude 2 (ALT 2) page is used to program the KLN 94 for vertical navigation. To get to the ALT 2 page from any non-altitude page, press the ALT button twice. The following example will be used to illustrate how to use the VNAV feature. You are using the KLN 94 to fly direct to your destination airport, Dubuque Municipal airport (KDBQ) located in Dubuque, Iowa. You are presently about 65 nautical miles west of Dubuque, flying at 7500 feet MSL (figure 5-5). You desire to use the VNAV to provide vertical guidance to Dubuque's traffic pattern altitude of 1900 feet MSL.



Figure 5-5

To use VNAV on a Direct To:

1. Select the ALT 2 page by pressing the ALT button twice (figure 5-6). The aircraft's actual altitude (7500 feet) is displayed on the left side of line 2. If the displayed altitude is incorrect it is probably because you have not recently updated the KLN 94's altimeter baro setting on the ALT 1 page.



Figure 5-6

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***NOTE**: There may be some difference (less than 100 feet) between the indicated altitude and the aircraft's actual altitude if the altitude input to the KLN 94 is from an altitude encoder because these encoders only provide altitude in 100 foot increments.*

The identifier for the active waypoint (**KDBQ**) is automatically displayed on the ALT 2 page. Prior to programming a VNAV operation, the top of the page displays that the VNAV is inactive (**Vnv Inactive**).

2. The cursor should be on and over the selected altitude field on the right side of line 2. If the cursor is not on, press CRSR.

3. Enter the desired altitude of 1900 feet in the selected altitude field, using the right inner knob. The altitude may be entered in 100 foot or 10 meter increments (figure 5-7).



Figure 5-7

***NOTE**: If the KLN 94 does not have an altitude input, the indicated altitude field on the left side of line 2 will be preceded by a colon (:), indicating that you should manually enter the aircraft's present altitude, as well as the desired altitude.*

4. Use the right outer knob to move the cursor to the offset field adjacent to the active waypoint identifier. Entering an offset allows you to reach the desired altitude a specified distance before or after reaching the waypoint. If you wished to reach a certain altitude 5 miles after passing a waypoint, you would enter **+05**. In this example you desire to reach traffic pattern altitude two nautical miles prior to the airport, which allows sufficient time to slow down and prepare for the landing. Enter an offset of **-02** NM (figure 5-8).



Figure 5-8

5. Use the right outer knob to move the cursor to the groundspeed (**GS:**) field. Use the right inner knob to select your anticipated groundspeed for the descent (figure 5-9), remembering that it may increase from your current groundspeed when you start descending.



Figure 5-9

Notice that the bottom right corner of the ALT 2 page now displays a vertical speed. If you wish to start your descent now using the displayed

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vertical speed, use the outer knob to position the cursor over the vertical speed field (figure 5-10). VNAV operation is initiated by bringing the cursor over the vertical speed field. Or, by leaving the cursor off of this field, you may watch the required vertical speed increase as you fly toward your waypoint. When the desired vertical speed is reached, position the cursor over the vertical speed field and VNAV will commence. When VNAV begins, the top of the page displays an advisory altitude. Descending at the vertical speed displayed on line 4 should keep you very close to the VNAV advisory altitude, but you may need to make slight adjustments to stay right on pace.



Figure 5-10

A better way yet to initiate VNAV is to program a desired vertical speed to use for the descent, after you have entered the desired altitude, waypoint, offset, and groundspeed. To program a vertical speed, do the following step:

6. Use the right outer knob to move the cursor to the vertical speed field, and then enter the desired value (figure 5-11). Vertical speed may be selected in increments of 100 feet per minute or 10 meters per minute. If the time to begin your descent is greater than one hour, **Vnv Armed** will now be displayed on the top line of the page. If the time is less than one hour, the top line displays a countdown to the time to begin the descent.



Figure 5-11

7. Return to any desired page for now by pressing the ALT button once. Alternatively, you may turn off the CRSR and use the outer knob to change pages. Approximately 90 seconds before the time to begin descent, the message prompt will flash. When you view the Message page, it will display **Vnv Alert**. This is notification for you to view the NAV 1, NAV 4 (map), or ALT 2 page because it is getting close to the time to begin your descent. All three of these pages are capable of displaying VNAV data.

8. When the countdown timer reaches 0:00, the time will be replaced with an advisory altitude (figure 5-12). Begin your descent at a rate such that the altitude displayed on your altimeter matches the advisory altitude.



Figure 5-12

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***NOTE**: During your descent, check your actual groundspeed to verify that it is similar to the one you entered on the ALT 2 page. If it is different, you should enter your actual groundspeed so that the VNAV function will work properly.*

If you make any changes to the "from" or "to" altitudes, the VNAV waypoint, or the waypoint offset once VNAV has been armed, or is actually in progress, the VNAV status will change to "Inactive". Additionally, you may force the VNAV into "Inactive" status by changing the vertical speed to **+0000fpm**. To reactivate VNAV after changing a parameter, simply move the cursor to the vertical speed field, or select the new desired vertical speed.

If you make a change to the groundspeed during the time VNAV is active, VNAV will remain active, and a new vertical speed will be calculated and displayed. If you wish to change this vertical speed, go ahead and do so and the VNAV descent or ascent will be modified for the new parameters.

CAUTION: Advisory VNAV operation will only be accurate if the altimeter baro correction is kept updated. If advisory VNAV is used, it is a good idea to update the altimeter baro set on the ALT page each time you make a change to the aircraft's altimeter setting.

5.2.2. VNAV FOR FLIGHT PLAN OPERATION

Using the vertical navigation function when flying via a flight plan is virtually the same as for the previous Direct To example. The ALT 2 page will initially contain the identifier for the active "to" waypoint in the flight plan. You may program the vertical ascent or descent referencing this waypoint or you may use the right inner knob to cycle through the waypoints in the active flight plan (FPL 0) which are still in front of the aircraft's position. When another valid waypoint in the flight plan is entered on the ALT 2 page, the aircraft's lateral flight path is not altered. This means that you may program a vertical flight path having an ascent or descent point that begins prior to the flight plan leg containing the selected VNAV waypoint.

5.3. ALTITUDE ALERTING

If your aircraft does not already have an altitude alerting capability you may wish to use the KLN 94's capability of assisting you with altitude management during your flying. Altitude alerting allows you to select a target altitude and it then provides you with an aural alarm 1000 feet prior to reaching the selected altitude, another aural alarm upon reaching the selected altitude, and another aural alarm if you deviate from the selected altitude.

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***NOTE**: The altitude alerting function of the KLN 94 does not meet FAR Part 91 for turbojet-powered civil airplanes.*

***NOTE**: Before you use the altitude alerting function, it is a good idea to make sure that the KLN 94 baro setting is current. To do this, press the [ALT] button and use the right inner knob to modify the baro setting.*

To Use Altitude Alerting:

1. Select the Setup 13 (SET 13) page and turn on the cursor ([CRSR]). It will come on over the **Alert:** field. If **OFF** is displayed, turn the right inner knob to select **ON** (figure 5-13).



Figure 5-13

2. Select a warn altitude deviation by positioning the cursor over the **Warn:** field. Use the right inner knob to select the desired value (figure 5-14). It is selectable in one hundred foot increments from 200 feet up to 900 feet or in ten meter increments from 60 meters to 270 meters. Normally, you will use the same value all the time so you only have to enter this the first time you use altitude alerting. The recommended warn altitude deviation is 300 feet or 100 meters.



Figure 5-14

3. If necessary, adjust the altitude alert audio volume by moving the cursor to the **Volume:** field. Use the left inner knob to select a desired volume between 00 and 99. The larger the number, the louder the volume (figure 5-15).



Figure 5-15

4. Press [ALT] . The Altitude 1 (ALT 1) page will be displayed with the cursor over the altimeter baro set field.

***NOTE**: The altimeter baro set units may be changed between inches, millibars and hectopascals on the SET 12 page).*

5. Use the right inner knob to update the altimeter baro setting if required (figure 5-16).



Figure 5-16

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6. Press the ALT button again to move on to the ALT 2 page (figure 5-17). Only line 2 of the ALT 2 page is used for altitude alerting. The remainder of the ALT 2 page is used only for vertical navigation, or VNAV. The first altitude displayed on line 2 is the current indicated altitude (9000 feet in figure 5-17). With the proper altimeter baro setting, the indicated altitude should be the same as the aircraft's actual altimeter.



Figure 5-17

***NOTE**: There may be some difference (less than 100 feet) between the indicated altitude and the aircraft's actual altitude if the altitude input to the KLN 94 is from an altitude encoder because these encoders only provide altitude in 100 foot increments.*

7. The cursor should be positioned on the selected (or to) altitude field (figure 5-17). Enter the selected altitude using the right inner knob (figure 5-18).



Figure 5-18

8. Press ALT to return to the page which was previously displayed. Notice that when you are on an ordinary (non-altitude) page, the first press of the ALT button brings up the ALT 1 page, the second press of ALT brings up the ALT 2 page, and the third press takes you back to the original page.

9. The aural alarm activates as follows:

   - 1000 feet prior to reaching the selected altitude—three short tones
   - Upon reaching the selected altitude—two short tones
   - Deviating above or below the selected altitude by more than the warn altitude—four short tones

***NOTE**: Due to the resolution of the altitude input, it may be necessary to descend slightly below or climb slightly above the selected altitude before the two tones are activated indicating that the selected altitude has been reached. This selected altitude alert must be activated to arm the system for providing the altitude deviation alert.*

The KLN 94 can provide the aural alarm tones in either of two ways: it may be connected to an audio input of an audio amplifier contained in an audio panel so that the aural alarm is heard through the aircraft's speaker

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and headphones. Or the KLN 94 may be interfaced with an external tone generator installed in the aircraft.

In order to use altitude alerting, the KLN 94 must have an altitude input. If the altitude input is from an altitude encoder or from an air data computer not having a baro altitude output, then it will be necessary for you to manually input the proper altimeter setting in order to get accurate alerting. Remember, the altitude coming from an encoder is pressure altitude and must be corrected with the proper altimeter setting to convert to actual altitude. This altimeter setting is easily accomplished by entering the altimeter baro setting on the Altitude (ALT) 1 page. Press [ALT] twice more to return to the page previously displayed. It's so easy you have no excuses for not keeping the baro setting updated!

CAUTION: The altitude alerting feature will only be accurate if the altimeter baro correction is kept updated. If altitude alerting is used, it is a good idea to update the altimeter baro set on the ALT 1 page each time you make a change to the aircraft's altimeter setting.

***NOTE**: The altitude alerting feature can be disabled in the KLN 94 at the time of installation so that these features are not selectable by the pilot. When this has been done, the SET 13 page displays **Feature Disabled**.*

5.4. CREATING USER-DEFINED WAYPOINTS

You may create and store up to 500 user-defined waypoints. These waypoints will be very helpful to you. One major application is private use airstrips, which are not included in the Jeppesen database. 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 create a user-defined waypoint. If you happen to know the latitude and longitude of the point, that is one option. The waypoint can also be defined as a radial and distance from another waypoint. A third choice is just to store your present position under the identifier you have chosen.

***NOTE**: Whenever you are in a waypoint entry situation, such as a Direct To waypoint or flight plan, and you enter an identifier which is not in the database, the KLN 94 will automatically start the user-defined waypoint creation process.*

To delete a user-defined waypoint that is no longer needed, see section 5.11. "Viewing and Deleting User Waypoints and Waypoint Remarks".

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5.4.1. 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. This is nice for "remembering" a spot you are at. Let's suppose you're at a private strip that you want to name "VALLY"

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

1. Select the NAV 2 page (present position) and press the ENT button. A page like the one in figure 5-19 will be displayed with your latitude and longitude at the time you pressed the button. The user-defined waypoint is initially given the name USR##, where ## is the first available number between 01 and 99.

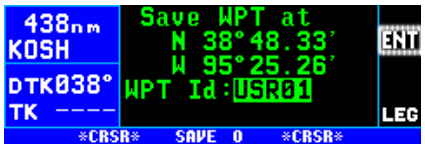


Figure 5-19

2. If you wish to use this waypoint name, press ENT and the waypoint creation is complete (figure 5-20). If you want to choose your own name for it, turn the right inner knob to select the first character of the identifier (figure 5-21). Remember that when the cursor is on, the right inner knob changes the character and the right outer knob moves the cursor around.



Figure 5-20

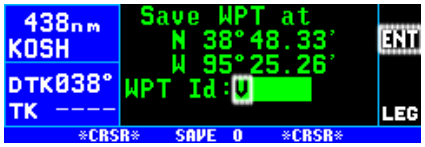


Figure 5-21

3. Spell out the rest of the identifier using the right inner and outer knobs (figure 5-22).

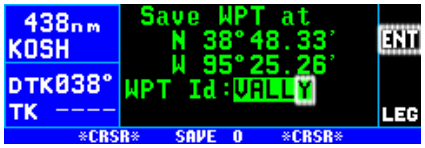


Figure 5-22

4. Press ENT. The USR 1 page for your new waypoint will be displayed with its latitude and longitude (figure 5-23). The cursor is turned off automatically.

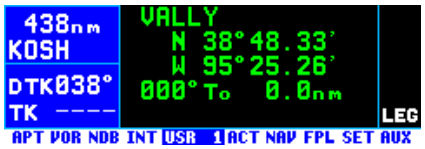


Figure 5-23

***NOTE**: Another way to create a user-defined waypoint at your present position is to select the USR pages, spell out the identifier letter by letter (see next section), and then select the **Present Pos?** option (figure 5-24) and press ENT.*



Figure 5-24

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5.4.2. CREATING A WAYPOINT AT A CERTAIN 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 your hypothetical farm at N 42°56.32', W 76°29.95'

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

1. From any user waypoint (USR) page, turn on the cursor (CRSR). It will be over the first character in the waypoint identifier field (figure 5-25).



Figure 5-25

2. Use the right inner knob to select the first character of the identifier (figure 5-26). Remember that when the cursor is on, the right inner knob changes the character and the right outer knob moves the cursor around.



Figure 5-26

3. Spell out the rest of the identifier using the right inner and outer knobs (figure 5-27).



Figure 5-27

4. Move the cursor down to the second line, over **User Pos L/L?** (figure 5-28).



Figure 5-28

5. Press ENT. The display will change to a format like figure 5-29.



Figure 5-29

6. Use the right inner knob to select N for north or S for south (figure 5-30).



Figure 5-30

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7. Use the right outer knob to move the cursor, and the right inner knob to select the proper numbers to complete the latitude entry (figure 5-31).

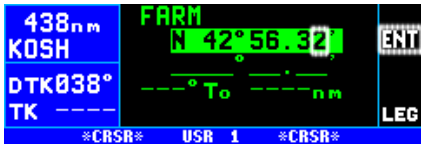


Figure 5-31

8. Press ENT. The cursor will move to the longitude field.

9. Enter the longitude in the same manner as the latitude (figure 5-32).

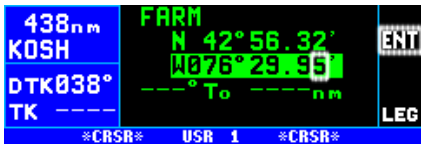


Figure 5-32

10. Press ENT to approve this position. The cursor will automatically turn off (figure 5-33).

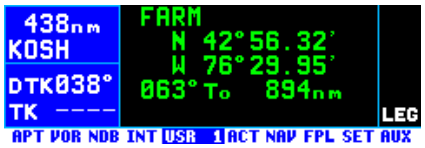


Figure 5-33

5.4.3. 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. From any user waypoint (USR) page, turn on the cursor (CRSR). It will be over the first character in the waypoint identifier field.

2. Use the right inner knob to select the first character of the identifier. Remember that when the cursor is on, the right inner knob changes the character and the right outer knob moves the cursor around.

3. Spell out the rest of the identifier using the right inner and outer knobs (figure 5-34).



Figure 5-34

4. Move the cursor down to the third line, over **User Pos R/D?** (figure 5-35).



Figure 5-35

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5. Press ENT. The display will change to a format like figure 5-36 with the cursor over the reference waypoint field.

6. Use the right inner and outer knobs to select the identifier of the desired reference waypoint (figure 5-37).

7. Press ENT. The waypoint page for the waypoint you just entered will be displayed (figure 5-38).

8. Press ENT again to approve the waypoint. You will be returned to the waypoint creation page.

9. Use the right inner and outer knobs to select the desired radial. Notice that you may enter the angle down to the tenth of a degree (figure 5-39).

10. Press ENT to approve the radial. The cursor will move to line 4.

11. Use the right inner and outer knobs to select the desired distance from the reference waypoint (figure 5-40).

12. Press ENT to approve the distance. The cursor will automatically be removed from the screen.



Figure 5-36



Figure 5-37

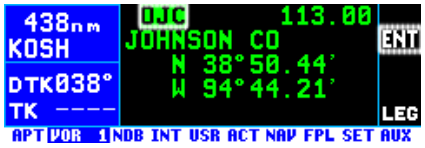


Figure 5-38



Figure 5-39



Figure 5-40

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5.5. NAVIGATION MODES

The KLN 94 allows you to choose how the course to the active waypoint is defined. This is done by selecting between the two course modes, LEG and OBS. The LEG mode means that the course to the active waypoint is selected by the KLN 94, and is the default mode when the KLN 94 starts up. The other course mode, OBS, is the mode that allows you to select the course to or from the active waypoint. In this mode, the KLN 94 operates very much like a VOR receiver. This is the mode that you will use quite often if you conduct non-precision approaches with a course reversal (procedure turn or holding pattern) using the KLN 94.

The KLN 94 also has three modes that are associated with approach operations. These are En route, Approach Arm and Approach Active. These modes will be explained in Chapter 6.



Figure 5-41

The course mode is annunciated in the bottom right corner of the screen. When in the Leg mode, it displays **LEG** (figure 5-41), and when in the OBS mode, it displays **OBS** (figure 5-42).



Figure 5-42

5.5.1. SELECTING THE LEG MODE OR THE OBS MODE

To change course modes:

1. Press the OBS button.
2. If the KLN 94 was previously in the Leg mode, it will now be in the OBS mode, and vice versa.

5.5.2. THE LEG MODE

The following are the characteristics of the Leg Mode:

1. The default course deviation indicator (CDI) sensitivity for en route mode is plus and minus five nautical miles, full scale. This applies to the CDI on the NAV 1 page as well as any external CDIs or HSIs interfaced to the KLN 94. If the CDI or HSI has five dots left and right of the center position, then each dot represents one nautical mile of deviation.
2. Navigation is provided along the great circle path between two waypoints. As you probably know, great circle navigation is the shortest

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distance between two points located on the earth's surface. In the case of Direct To operation, the "from" waypoint is not displayed but it is the point where Direct To operation was initiated. The course to fly while in this mode is referred to as the desired track **(DTK**). Knowing the proper course to be flown is so important that the desired track is displayed on the left side of the screen (third line) on every page except the message page. To fly a great circle course between two points, the desired track may be constantly changing. A good way to illustrate this concept is with a world globe and a piece of string. You can determine the great circle path between Denver, Colorado and Manila, Philippines by stretching the string over the globe between these two points. Notice that you would start the flight with a northwesterly desired track, which gradually becomes due westerly, and finally southwesterly by the time you reach Manila. Of course, your trips with the KLN 94 will be substantially shorter and the desired track will probably change only a few degrees.

3. Automatic waypoint sequencing is provided during flight plan operation. As you reach a waypoint in your flight plan, the next leg of the flight plan automatically becomes active. There are some situations during approach operations in which automatic leg sequencing is automatically disabled. See Chapter 6.

4. Turn anticipation may be utilized in flight plan operation as described in section 4.2.2.

5. The Minimum En route Safe Altitude (ESA) displayed on the ALT 1 page is the highest MSA sector altitude from the present position to the destination waypoint along the active flight plan or Direct To route (whichever is in use). See section 5.1. "Altitude Pages" for a description of ESA and MSA.

5.5.3. THE OBS MODE

The following are characteristics of the OBS mode.

1. The course deviation indicator (CDI) sensitivity for en route mode is plus and minus five nautical miles, full scale. This applies to the CDI on the NAV 1 page as well as any external CDIs or HSIs interfaced to the KLN 94. If the CDI or HSI has five dots left and right of the center position, then each dot represents one nautical mile of deviation.

2. The course is defined by the active waypoint and the selected magnetic course. A course "to" or "from" the active waypoint may be selected.

3. The course selection is normally made by changing the selected course displayed on an external indicator such as an HSI or CDI.

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When this is done, the pilot must verify that the proper course has been selected by confirming the digital selected course readout displayed on the KLN 94. In the OBS mode the selected course is always displayed on line 3 of the left side of the KLN 94 screen (in place of DTK). In many installations, two or more navigation sources can be displayed on one indicator. In these situations there is a switch in the aircraft panel which will determine what navigation source is displayed. For the KLN 94 to properly read the external indicator the KLN 94 must be the displayed navigation source on the external indicator.

4. There is no automatic leg sequencing or turn anticipation.

5. The Minimum En route Safe Altitude (**ESA**) displayed on the ALT 1 page is the highest MSA sector altitude between the present position and the active waypoint. See section 5.1. for an explanation of ESA and MSA. Other waypoints in the active flight plan do not affect the ESA.

6. When the active waypoint is a VOR, and the AUTO magnetic variation mode is active (see section 5.16), the published magnetic variation for the VOR is utilized rather than the calculated magnetic variation, so that the KLN 94 indication will be identical to a NAV receiver indication.

When the KLN 94 is not the displayed navigation source on the external indicator, it is possible to change the selected course from the KLN 94 screen using the procedure below.

To change the selected course in OBS mode (not connected to external CDI):

1. If the KLN 94 is not in OBS mode, select OBS mode by pressing the OBS button. The cursor will automatically be turned on over the OBS selected course field (figure 5-43). If already in OBS mode, turn on the cursor(CRSR).



Figure 5-43

2. Turn the right inner knob until the correct selected course is displayed (figure 5-44).

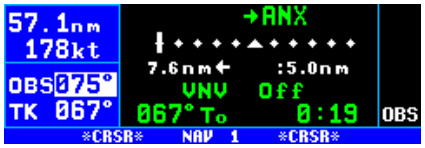


Figure 5-44

3. Turn off the cursor (CRSR).

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5.5.4. SWITCHING FROM THE LEG MODE TO THE OBS MODE

The following mode transition occurs if the KLN 94 is in the Leg mode and the mode is changed to the OBS mode:

1. The waypoint that was active in Leg mode prior to the mode change remains the active waypoint in OBS mode.

2. The selected course is defined by two different methods depending on the installation and the status of the unit.

   i. If the KLN 94 is the displayed navigation source when the change is made to OBS mode, then the selected course becomes whatever was set on the external indicator prior to changing to the OBS mode. This value should normally be the desired track to the active waypoint if you had the external indicator set to the correct value prior to switching to the OBS mode.

   ii. If the KLN 94 is not displayed on the external indicator, then the selected course is chosen such that the deviation from the selected course remains the same.

3. If the OBS value chosen by default from rule 2 above is unacceptable, you can always define the desired course by the methods described in section 5.5.3.

5.5.5. EFFECTS OF SWITCHING FROM OBS MODE TO LEG MODE

The following mode transition occurs if the KLN 94 is in the OBS mode with a TO indication and the mode is switched to the Leg mode:

1. The waypoint that was active while in the OBS mode remains the active waypoint when the Leg mode is activated. The system does not attempt to orient itself on a leg of the active flight plan unless the TO/FROM indicator is indicating FROM. In the FROM case, the KLN 94 will reorient on the active flight plan.

2. The selected course (**OBS**) that was active in the OBS mode prior to switching to Leg mode becomes the desired track (**DTK**) in the Leg mode, unless the mode change was made on the "from" side in which case the KLN 94 will calculate the correct desired track for the new leg.

3. With the exception of #2 above, the characteristics of normal Direct To operation apply.

4. If the active waypoint was part of the active flight plan (FPL 0), the system will revert to normal flight plan operation once the active waypoint is reached.

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5.5.6. GOING DIRECT TO A WAYPOINT WHILE IN THE OBS MODE

The direct-to function will select the OBS value that will take the aircraft from the present position direct to the active waypoint when the KLN 94 is not the displayed navigation source on the external indicator.

If the KLN 94 is the displayed navigation source on an HSI or CDI it is not possible for the KLN 94 to change the OBS value. In these situations the KLN 94 will provide a scratchpad message that will tell you what OBS value should be selected to go direct to the active waypoint (figure 5-45).



Figure 5-45

5.5.7. ACTIVATING A WAYPOINT WHILE IN THE OBS MODE

While in the OBS mode, when the KLN 94 is not the displayed navigation source on the external indicator, you may activate another waypoint by using the normal Direct To method or by using a second method. This second method activates another waypoint without changing the selected course (OBS). In other words, when the new waypoint is activated, the D-Bar is not necessarily recentered. In figure 5-46 the KLN 94 is in the OBS mode and the selected course is 149°. You have just crossed ARG and desire to activate the next waypoint in the flight plan, GQE, without recentering the D-Bar.



Figure 5-46

To activate a waypoint in OBS mode without changing the selected course (not connected to external CDI):

1. Press [D→] (figure 5-47). The rules described in section 3.10, "Direct To Operation", dictate which waypoint identifier will be initially displayed on the Direct To page.



Figure 5-47

2. Press [D→] a second time. The annunciation **DIRECT TO** changes to **ACTIVATE** (figure 5-48). Repeated presses of [D→] cause the annunciation to alternate between **DIRECT TO** and **ACTIVATE**. Make sure **ACTIVATE** is displayed.



Figure 5-48

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3. If the desired waypoint is not the one that was suggested by the KLN 94, enter the desired identifier. Press ENT.

4. Press ENT to approve the waypoint page and activate the waypoint (figure 5-49). The selected course does not change, therefore this method does not center the D-Bar like a Direct To operation does.



Figure 5-49

5.6. CHANGING THE CDI SCALE FACTOR

The CDI scale factor can be changed by using the NAV 1 page. In normal operations it is possible to select a CDI scale factor which is plus or minus 5 NM, 1 NM or 0.3 NM full scale deflection. This means that if the scale factor was ± 5 NM and the needle was deflected four dots to the right, the aircraft would be 4 NM left of course. The default CDI scale factor is ± 5 NM. The default scale factor is automatically selected each time the KLN 94 is turned on. Changing the scale factor on the NAV 1 page also changes the scale factor on the remote CDI or HSI.

To change the CDI scale factor:

1. Select the NAV 1 page.

2. Turn on the cursor (CRSR). It will appear over the CDI scale number below the right side of the CDI.

3. Rotate the right inner knob to select the desired CDI scale factor (figure 5-50). The valid choices are 5.0 NM, 1.0 NM, and 0.3 NM or 9.3 km, 1.9 km, and .56 km.



Figure 5-50

4. Turn off the CRSR. The CDI scale factor change is complete.

***NOTE**: The KLN 94 will automatically select a scale factor as part of the GPS approach process. When the KLN 94 selects a CDI scale factor it is not possible to select a scale factor that is less sensitive than what the KLN 94 has automatically chosen. For example, as you will see in the next chapter, the approach-arm (or terminal) mode usually has a scale factor of ± 1 NM. While in the approach-arm mode it is not possible for you to select the ± 5 NM scale factor. This is to ensure proper operation of the approach modes.*

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5.7. AVIONICS BUS VOLTAGE ALERTING

The SET 9 page serves as a monitor of your avionics power bus. It gives you a digital readout of the voltage supplied to your avionics, down to tenths of volts. You will find this feature valuable as an extra layer of security in cases of electrical or charging system problems.

A voltage alert feature is also available on this page, to warn you of an electrical system problem, regardless of whether you are viewing the SET 9 page or not. It is set up so that the avionics bus voltage must drop below the alert limit for a certain length of time. This time delay is so that brief power interruptions don't trigger the voltage alert.

The alert voltage and the alert delay are set at the time of installation and stored in the KLN 94 configuration module. As the pilot, your two options are to have the voltage alert disabled, or to have it enabled with the predefined voltage and time delay values.

To enable the voltage alert feature:

1. Select the SET 9 page (figure 5-51) and turn on the cursor (CRSR).
2. Turn the right inner knob one step to enable the alert feature. The alert voltage and alert delay will be displayed on lines 2 and 3 (figure 5-52).
3. Turn off the cursor (CRSR).



Figure 5-51



Figure 5-52

If the avionics bus voltage drops below the alert voltage for the specified delay time, the message

Low Bus Voltage
Check Charging System

will be displayed. This message may be indicative of a problem with the aircraft's charging system. Consult your aircraft's Pilot Operating Handbook to troubleshoot the problem. You may desire to turn off some of the aircraft's electrical devices which are non-essential for your particular phase(s) of flight, so that the battery will not discharge as quickly.

Appropriate alert voltage and alert delays will vary from aircraft to aircraft. If your KLN 94 is frequently giving you this alert message, it may become a nuisance, and you may desire to have your Honeywell Service Center adjust the voltage alert parameters.

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5.8. THE AUXILARY (AUX) PAGES

The KLN 94 may have up to 21 Auxiliary pages which are used for a multitude of miscellaneous functions. The table below summarizes the function of these pages.

Page	Function
AUX 1 and AUX 2	GPS Status
AUX 3	RAIM Prediction
AUX 4 and AUX 5	Calculator pages -Trip Planning
AUX 6	Calculator page – Pressure Altitude
AUX 7	Calculator page – Density Altitude
AUX 8	Calculator page – True Airspeed
AUX 9	Calculator page - Wind
AUX 10	Calculator page - Timed Alarm
AUX 11	Calculator page – Sunrise/Sunset
AUX 12	View and delete User waypoints
AUX 13	View and delete APT 6 page and USR 3 page remarks
AUX 14	Software status
AUX 15 – AUX 19	Fuel Management
AUX 20 – AUX 21	Air Data

The AUX 15 – AUX 19 pages only appear if a compatible fuel management system is installed with the KLN 94. The AUX 20 – AUX 21 pages only appear if a compatible air data system is installed with the KLN 94. If no fuel management system is installed but there is an air data system, the air data pages become AUX 15 and AUX 16.

5.9. DETERMINING THE STATUS OF THE GPS SIGNALS

The Auxiliary (AUX) 1 and AUX 2 pages may be viewed at any time to determine the status of the GPS receiver and the GPS satellites being received. This includes which satellites are being tracked, the satellites' health, the signal strength for each of these satellites, the elevation of each satellite above the horizon, the azimuth of each satellite referenced to your present position, the estimated position error, and the present GPS-derived altitude.

The GPS receiver in the KLN 94 is capable of using signals from up to eight satellites to determine its position. A valid position may be determined using as few as four satellites alone or three satellites with a valid electronic altitude input. However, four satellites alone or three satellites with an altitude input do not necessarily ensure that navigation can take place. The satellites must be positioned relative to your location such that

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sufficient “geometry” exists to determine an accurate position. The satellite constellation geometry 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.

A representative AUX 1 page is shown in figure 5-53. The AUX 1 page displays the GPS receiver state and the system’s estimate of the position error expressed in nautical miles or kilometers.

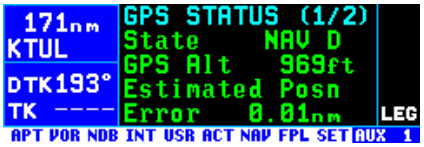


Figure 5-53

The GPS state is indicated on line 2. The possibilities are:

INIT	initialization
ACQ	acquisition
TRAN	transition
NAV	navigation
NAV A	navigation with altitude aiding
NAV D	navigation with data collection
DEGRD	navigation with position degradation
FAILR	receiver failure

In the initialization state the GPS receiver is in the process of initializing itself, collecting information such as the date, time, and last present position. Next, the receiver collects data from its own memory to determine which satellites should be visible. After completing the initialization process the receiver begins the acquisition process. During this time, the visible satellites are being acquired and data is obtained from them.

The transition state indicates an adequate number of satellites for navigation has been acquired and is being tracked but no position data can yet be produced.

Normal navigation is indicated by a **NAV**, **NAV A**, or **NAV D** GPS state. **NAV A** indicates that the altitude input is being used in the position solution. **NAV D** indicates that besides calculation position, the receiver is collecting and storing in its memory additional data from the satellites (called ephemeris and almanac data).

Line 3 of the AUX 1 page displays the present GPS-derived altitude, that is, the altitude that is being indicated by the GPS position solution.

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WARNING: Do not use the GPS-derived altitude for navigation. Due to many factors, the GPS altitude may be 300 feet or more in error, which is unacceptable for navigation.

Lines 4 and 5 of the AUX 1 page display the KLN 94's estimated position error. The KLN 94's position error depends upon such factors as the number of satellites being received, the strength of the GPS signals, and the geometry of the satellites presently being used for navigation.

Figures 5-54, 5-55 and 5-56 show a representative example of a set of AUX 2 pages. There will be three AUX 2 pages if more than six satellites are being received as in this example.

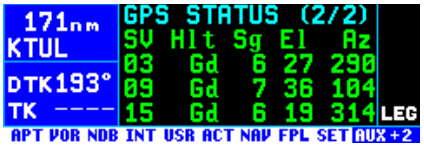


Figure 5-54

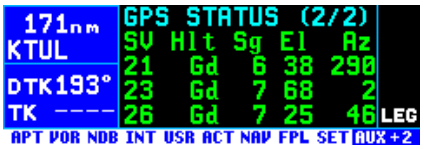


Figure 5-55

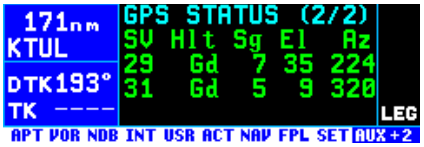


Figure 5-56

The following information is displayed for each satellite on the AUX 2 pages:

- The specific GPS satellites or "space vehicles" **(SV**) being received are displayed in the left column. Each satellite has its own identification number. A * symbol to the right of the satellite number indicates this particular satellite is not presently being tracked by the receiver.

***NOTE**: At some times, you may desire to deselect certain satellites if you know them to be inaccurate, so that they are not used to determine the GPS position. Should a satellite be inaccurate, it could cause a RAIM failure, rendering the system unusable for primary IFR navigation. To deselect a specific satellite, turn on the cursor (CRSR) and move it over the desired SV number (figure 5-57). Turn the right inner knob to deselect (or reselect) the desired satellite.*

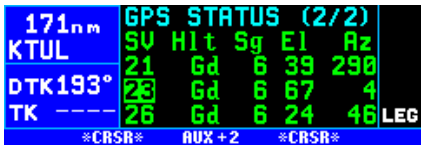


Figure 5-57

- The satellite's "health" (**Hlt**) is indicated to the right of the satellite number. The health of the satellite can be described as **Gd** for Good, **Wk** for Weak, and **Bd** for Bad. **Ds** indicates the satellite was deselected by the pilot. **Fd** indicates the receiver detected a fault and excluded that satellite.

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- The signal strength (**Sg**) for each satellite is displayed next and indicates the signal strength for each satellite in the range of 0 (zero) to 9 (nine). The higher the value the stronger the signal.
- The elevation (**El**) above the horizon for each satellite is provided in the right column and will range from 5° to 90°.
- The local azimuth (**Az**) of the satellite relative to your present position, referenced to true north (rather than magnetic north). For example, in figure 5-57 satellite (SV) number 26 has an azimuth of 46° and is therefore northeast of you.

***NOTE**: The AUX 3 page predicts if and when RAIM (Receiver Autonomous Integrity Monitoring) capability will be available when you are ready to shoot a non-precision approach at your destination airport. If the unit is configured for VFR use only the AUX 3 page will display **No RAIM Function In This Unit**. See section 6.2.14 for more information on using AUX 3 page.*

5.10. CALCULATOR (AUX 4 – AUX 11) PAGES

The AUX 4 – AUX 11 pages are calculator pages used for trip planning and calculation of a variety of flight-related information. They are convenient both on the ground before you begin your flight, and in the air.

Data entered on any of the these pages has no effect on navigation data provided on any Navigation (NAV) or Flight Plan (FPL) pages. You may perform trip calculations without disturbing ongoing navigation.

***NOTE**: The AUX 4 – AUX 11 pages rely on pilot enterable inputs for groundspeed, fuel flow, fuel reserve requirements, altitudes, temperature, airspeed, etc. These pages do not utilize inputs from fuel flow or air data sensors.*

5.10.1. THE AUXILARY 4 (AUX 4) TRIP PLANNING PAGE

The AUX 4 page allows you to do distance, bearing, time, and minimum en route safe altitude (ESA) calculations that you might otherwise need a chart, ruler, and pocket calculator for. The KLN 94 will perform these calculations either from present position to waypoint, waypoint to waypoint, or for one of your flight plans (active or stored).

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To calculate distance, bearing, time, and ESA from present position to another waypoint:

1. From the AUX 4 page (figure 5-58), turn on the cursor (CRSR). It will appear over a field that either displays **Ppos**, **Fpl**, or **Wpts**.

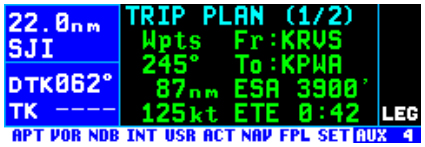


Figure 5-58

2. Turn the right inner knob to change this field to **Ppos**.
3. Turn the right outer knob to move the cursor over the **To** waypoint field (figure 5-59)

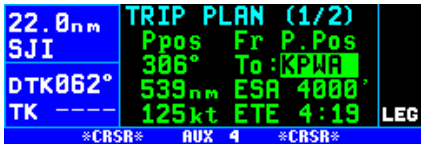


Figure 5-59

4. Enter the desired "to" identifier and press ENT. You will be shown the waypoint page for the waypoint you entered. Press ENT again to approve.
5. Select your estimated ground-speed for the trip. As you change it, the estimated time en route (**ETE**) calculation will be updated (figure 5-60).

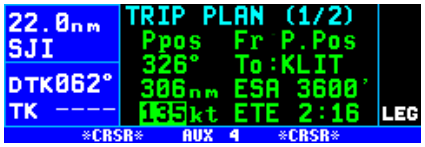


Figure 5-60

To calculate distance, bearing, time , and ESA from waypoint to waypoint:

1. From the AUX 4 page, turn on the cursor (CRSR) and use the right inner knob to select **Wpts** (figure 5-61).



Figure 5-61

2. Turn the right outer knob clockwise to move the cursor to the "from" waypoint in the upper right corner of the screen (figure 5-62).
3. Enter the desired identifier for the "from" waypoint and press ENT. You will be shown the waypoint page for the waypoint you entered. Press ENT again to approve.



Figure 5-62

4. With the cursor over the "to" waypoint, enter the desired identifier (figure 5-63) and press ENT twice. The bearing will be dis-

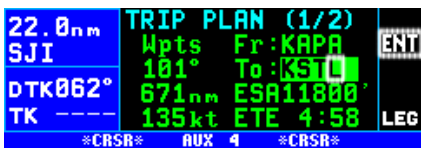


Figure 5-63

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played on line 3, and the distance will be displayed on line 4.

5. Use the right outer knob to move the cursor over the groundspeed field on line 5.

6. Select your estimated groundspeed for the trip. As you change it, the estimated time en route (**ETE**) calculation will be updated (figure 5-64).

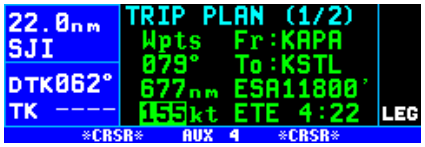


Figure 5-64

To calculate distance, time and ESA for a flight plan:

1. From the AUX 4 page, turn on the cursor (CRSR) and use the right inner knob to select **Fpl** (figure 5-65).

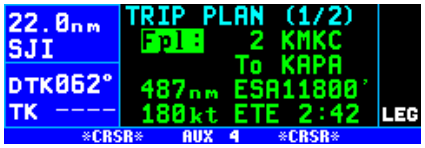


Figure 5-65

3. Turn the right outer knob clockwise to place the cursor over the flight plan number. As you cycle through the flight plans by turning the right inner knob, the first and last waypoints of each flight plan will be displayed, along with the total distance and the minimum en route safe altitude for the flight plan (figure 5-66).



Figure 5-66

4. Once you have selected the desired flight plan, move the cursor to the groundspeed field on line 5.

5. Select your estimated groundspeed for the trip. As you change it, the estimated time en route (**ETE**) calculation will be updated (figure 5-67).

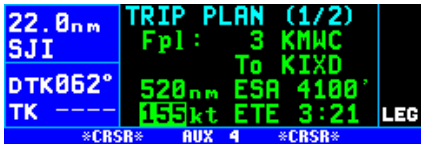


Figure 5-67

5.10.2. THE AUXILARY 5 (AUX 5) TRIP PLANNING PAGE

The AUX 5 page is for calculating fuel requirements for the trip selected on the AUX 4 page. To use this page, 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. Like with the AUX 4 page, the fuel calculations can be done from present position to waypoint, waypoint to waypoint, or for one of your flight plans.

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To calculate fuel requirements:

1. The waypoints entered on the AUX 4 page are automatically brought forward on the AUX 5 page. You may also change the trip planning type and the specific waypoints on the AUX 5 page in the same way they were selected on the AUX 4 page.

2. Turn on the cursor with the CRSR button and use the right outer knob to move the cursor to the groundspeed field on line 3.

3. Select your estimated groundspeed for the trip (figure 5-68).



Figure 5-68

4. Move the cursor to the fuel flow rate field and use the right inner knob to select the desired value (figure 5-69). 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.

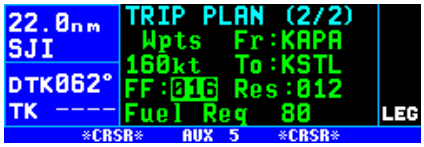


Figure 5-69

5. Move the cursor to the fuel reserve requirement field and enter the desired value. As you do, watch the calculation of fuel required on line 5 change (figure 5-70).

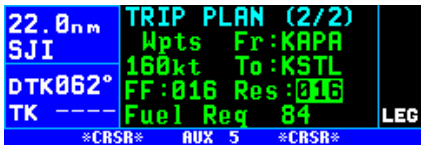


Figure 5-70

5.10.3. THE AUXILARY 6 (AUX 6) PRESSURE ALTITUDE PAGE

The AUX 6 page is used to determine pressure altitude.

To calculate the pressure altitude:

1. Turn on the cursor (CRSR).

2. Enter the altitude indicated on the aircraft's altimeter (**Ind**) to the nearest hundred feet or ten meters by using the right inner knob to select the desired value (figure 5-71).



Figure 5-71

3. Use the right outer knob to move the cursor to the **Baro** field, and then use the right inner knob to enter the current altimeter setting (figure 5-72). The pressure altitude (**Prs**) is now displayed.



Figure 5-72

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***NOTE**: The altimeter baro set units may be changed between inches, millibars and hectopascals on the SET 12 page).*

5.10.4. THE AUXILARY 7 (AUX 7) DENSITY ALTITUDE PAGE

The AUX 7 page is used to determine density altitude.

To calculate the density altitude:

1. Turn on the cursor (CRSR).
2. The pressure altitude (**Prs**) displayed will be either the last entered pressure altitude on this page, or the last calculated pressure altitude from the AUX 6 page. If you desire to change it, enter the current pressure altitude to the nearest hundred feet or ten meters by using the right inner knob (figure 5-73).
3. Use the right outer knob to move the cursor to the first **Temp:** field, and then use the right inner and outer knobs to enter the outside air temperature (degrees Celsius) (figure 5-74). The first digit of the temperature is either "0" if the temperature is above zero or "-" if the temperature is below zero. For maximum accuracy, 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 density altitude (**Den**) is now displayed.

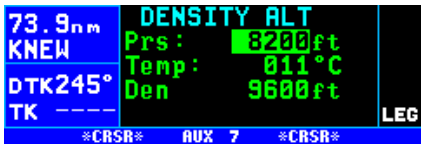


Figure 5-73

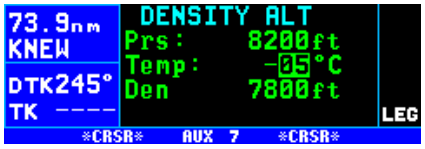


Figure 5-74

***NOTE**: If a compatible air data system is interfaced to the KLN 94, the AUX 21 page displays pressure and density altitude directly for the present conditions.*

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5.10.5. THE AUXILARY 8 (AUX 8) TRUE AIRSPEED PAGE

The AUX 8 page is used to determine the true airspeed (**TAS**) of the aircraft.

To calculate the true airspeed (TAS):

1 Turn on the cursor (CRSR).

2. Enter the aircraft's calibrated airspeed by using the right inner knob (figure 5-75). 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.



Figure 5-75

3. Use the right outer knob to move the cursor to the **Prs** field, and then use the right inner knob to enter the aircraft's pressure altitude. If the pressure altitude was previously calculated on the AUX 6 page, or entered on the AUX 7 page, it will already be displayed.

4. Move the cursor to the first **Temp** position, and then enter the outside air temperature (degrees C) by using the right inner and outer knobs (figure 5-76). The first digit of the temperature is either "0" if the temperature is above zero or "-" if the temperature is below zero. For maximum accuracy, the total air temperature should be entered. This is the temperature of air including the effect of heating due to the aircraft's movement through the air. The temperature read on a standard outside air temperature gauge found on most piston aircraft is "total air temperature". Since the difference between static air temperature and the observed air temperature (or "total air temperature") is usually negligible, any temperature entered on the AUX 7 page is transferred to this page. The true airspeed (**TAS**) is now displayed.



Figure 5-76

***NOTE**: If a compatible air data system is interfaced to the KLN 94, true airspeed (**TAS**) is displayed directly on the AUX 20 page for the present conditions.*

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5.10.6. THE AUXILARY 9 (AUX 9) WIND PAGE

The AUX 9 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:

1. Turn on the cursor (CRSR).

2. Enter the aircraft's true airspeed by using the right inner knob (figure 5-77). If the AUX 8 page was previously used to calculate true airspeed, it will already be displayed.



Figure 5-77

3. Use the right outer knob to move the cursor to the **Hdg** field, and then use the right inner knob to enter the aircraft's heading (figure 5-78). The headwind or tailwind and the wind direction and speed are now displayed. The wind direction is relative to true North.

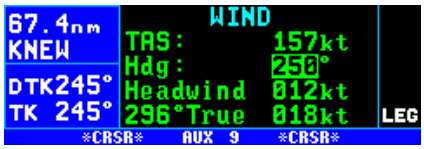


Figure 5-78

***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.*

***NOTE**: If the KLN 94 is interfaced with a compatible source of heading input, this heading is automatically used in the wind calculation displayed on the AUX 9 page. If the KLN 94 is interfaced with a compatible air data system in addition to a compatible heading source, the AUX 20 page displays wind information directly.*

5.10.7. THE AUXILARY 10 (AUX 10) ALARM PAGE

The AUX 10 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! Line 2 of the AUX 10 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). Line 5 displays the elapsed time since the KLN 94 was turned on.

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To set the alarm:

1. Turn on the cursor (CRSR). If necessary, change the system time zone to the desired one on line 2 of the AUX 10 page.

2. To set the alarm to activate at a certain time, move the cursor to the **at**: field on line 3. Select the desired hours, and then minutes (figure 5-79). Notice that as you change it, the interval from present time to alarm time is updated on line 4.



Figure 5-79

3. To set the alarm to activate in a certain length of time, move the cursor to the in: field on line 4 and select the desired hours and minutes, up to 9 hours and 59 minutes (figure 5-80). Turn off the cursor.



Figure 5-80

4. When the alarm goes off, the KLN 94 will display the message page message:

   ***Timer expired**

5.10.8. THE AUXILARY 11 (AUX 11) SUNRISE/SUNSET PAGE

The AUX 11 page is used to determine the times of sunrise and sunset for any waypoint in the published or user database.

To calculate sunrise/sunset times:

1. Select the AUX 11 page (figure 5-81). The first time the AUX 11 page is selected after the KLN 94 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 are displayed at the bottom of the page.

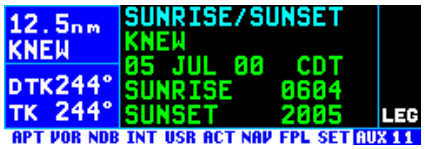


Figure 5-81

***NOTE**: The time zone initially displayed is the system time zone. This is the same as the one on the SET 2 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.*

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2. Turn on the cursor (CRSR).

3. If desired, select another waypoint identifier using the right inner and outer knobs. Press ENT to view the waypoint page for the waypoint entered. Press ENT again to approve the waypoint page (figure 5-82).

4. If desired, select another date using the right inner and outer knobs. You must press ENT to enter the date (figure 5-83).

5. If desired, select another time zone. The sunrise and sunset times for the selected waypoint, date, and time zone are now displayed (figure 5-84).

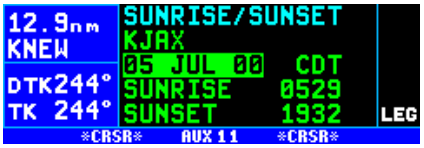


Figure 5-82



Figure 5-83

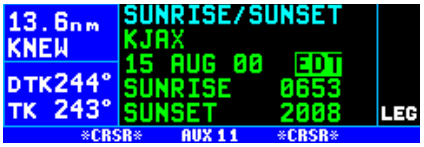


Figure 5-84

5.11. VIEWING AND DELETING USER WAYPOINTS AND WAYPOINT REMARKS (AUX 12 AND AUX 13 PAGES)

The AUX 12 and AUX 13 pages list the user-defined waypoints and waypoint remarks, respectively, which are currently stored in the KLN 94's memory.

5.11.1.THE AUX 12 PAGE

An example of an AUX 12 page is shown in figure 5-85. All currently stored user-defined waypoints are listed in alphanumeric order. If the user-defined waypoint is the active waypoint, an arrow (→) follows the identifier. If the waypoint is used in one or more flight plans, then the number of the first flight plan in which it is used is displayed on the right side. If there are more than four user waypoints in storage, you can see the rest of the list by turning on the cursor (CRSR) and turning the right outer knob to scroll through the list.



Figure 5-85

To delete a user-defined waypoint from the AUX 12 page:

1. Turn on the cursor and position it over the desired waypoint (figure 5-86). If there are more than four



Figure 5-86

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user-defined waypoints, you will have to scroll the cursor down the list.

2. Press CLR. The KLN 94 will ask if you wish to delete that user-waypoint (figure 5-87). If the waypoint is active or used in a flight plan, the deletion will not be allowed and you will receive a scratchpad message telling you this (figure 5-88).

3. Press ENT to approve the deletion (figure 5-89).



Figure 5-87



Figure 5-88



Figure 5-89

5.11.2. THE AUX 13 PAGE

An example of an AUX 13 page is shown in figure 5-90. All waypoints with remarks are listed in alphanumeric order. Remarks can be stored for airports (on the APT 6 page) or user-defined waypoints (on the USR 3 page). If the waypoint is an airport, then an "**A**" is displayed on the right side; likewise, a "**U**" represents a user-defined waypoint. If there are more than four waypoints, you can see the rest of the list by turning on the cursor (CRSR) and turning the right outer knob to scroll through the list.



Figure 5-90

To delete a waypoint remark from the AUX 13 page:

1. Turn on the cursor and position it over the desired waypoint (figure 5-91). If there are more than four airports with remarks, you will have to scroll the cursor down the list.

2. Press CLR. The KLN 94 will ask if you wish to delete that remark (figure 5-92).

3. Press ENT to approve the deletion.



Figure 5-91



Figure 5-92

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5.12. VIEWING THE KLN 94 SOFTWARE STATUS (AUX 14 PAGE)

The AUX 14 page (figure 5-93) shows the application software revision (line 1), the software status of the KLN 94 host computer (line 2), graphics engine computer (line 3), the GPS receiver (line 4), aeronautical database (line 5), and land – cartographic database (line 6).

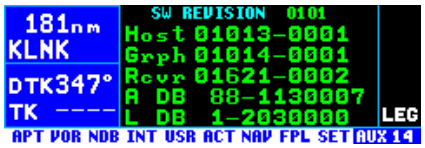


Figure 5-93

5.13. THE FUEL MANAGEMENT (AUX 15 – AUX 19)PAGES

Certain models of fuel management computers manufactured by Shadin Company, ARNAV Systems, Inc., and Sheltech Ltd. May be interfaced with the KLN 94. The primary benefit of having the KLN 94 interfaced with a “real time” fuel management computer is that the system can continuously compute the amount of fuel required to reach the destination and the amount of fuel that will be on board upon reaching the destination. The concept is the following. The fuel management computer continuously sends the rate of fuel flow and the amount of fuel remaining to the KLN 94. The KLN 94 continuously calculates the aircraft’s distance, groundspeed, and estimated time en route (ETE) to the destination waypoint. The fuel required to reach the destination waypoint is the ETE multiplied by the current rate of fuel flow. The amount of fuel that will be remaining at the destination is the amount of fuel presently remaining minus the fuel required to reach the destination.

CAUTION: The KLN 94 fuel calculations are based on the present rate of fuel flow, the present groundspeed, the present distance to destination along the programmed route, and the amount of fuel presently remaining. Before take-off, the fuel flow computer must be properly initialized with the amount of fuel on board (FOB) the aircraft. For some Shadin fuel computers without display units, you may enter the initial FOB during the KLN 94 Turn-on and Self Test (see section 3.2). Since many factors influence the required amount of fuel to reach the destination, it is the pilot’s responsibility to view the fuel management pages often to check for any significant changes. Some factors affecting the amount of fuel required are power changes, altitude changes, headwind/tailwind component changes, fuel/air mixture adjustments, and routing changes.

The AUX 15 – AUX 19 pages are used to display fuel management information for KLN 94s interfaced with compatible fuel management computers. If there is no fuel management computer interface, these fuel management pages are not displayed.

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5.13.1. THE AUXILARY 15 (AUX 15) FUEL MANAGEMENT PAGE

***NOTE**: The AUX 15 – AUX 19 pages are only displayed when the KLN 94 is interfaced with a compatible fuel management system.*

The AUX 15 page displays the following information (figures 5-94):

- The destination waypoint (the final waypoint in FPL 0 or a direct to waypoint if the waypoint is not included in FPL 0). An arrow is displayed to the left of the identifier if the waypoint is the active waypoint.

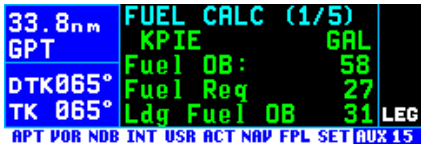


Figure 5-94

- The fuel units as received from the fuel management computer.

GAL	gallons
LB	pounds
IMP	imperial gallons
L	liters
KG	kilograms

- The fuel presently on board (**Fuel OB**). In most installations this is defined by using the fuel flow computer's control unit. However, if the KLN 94 is interfaced with a compatible Shadin fuel flow computer, it is possible to define the fuel on board by using the KLN 94. In these installations it is not required to have the fuel flow computer's control head installed in the aircraft.

To change the present fuel on board:

1. Select the AUX 15 page and turn on the cursor [CRSR].
2. If it is possible to enter the present fuel on board by using the KLN 94 there will be a colon (**:**) following **Fuel OB** on the display. If the colon exists press the left [CRSR] (figure 5-95), if the colon does not exist it is not possible to change the fuel on board through the KLN 94.

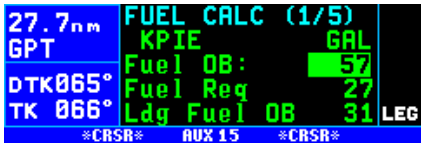


Figure 5-95

3. Enter the current fuel on board using the right inner knob. Make sure the amount entered is consistent with the units used by the fuel flow computer.

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- The fuel required to reach the destination waypoint at the current rate of fuel flow and the present groundspeed (**Fuel Reqd**).
- The landing fuel on board (**Ldg Fuel OB**) is the fuel presently on board minus the fuel required to reach the destination.

5.13.2 THE AUXILARY 16 (AUX 16) FUEL MANAGEMENT PAGE

The AUX 16 page (figure 5-96) displays:



Figure 5-96

- The desired fuel reserve. You may enter here the amount of reserve fuel you wish to have upon landing. The fuel must be entered in the same units as displayed on the first line. To enter the reserve, press the CRSR and use the right inner knob to select the desired value. Turn off the CRSR when finished.
- The calculated extra fuel. This is the landing fuel on board minus the fuel reserve you entered.

5.13.3. THE AUXILARY 17 (AUX 17) FUEL MANAGEMENT PAGE

The AUX 17 page displays the following information (figure 5-97):



Figure 5-97

- The desired fuel reserve. Same as displayed on the AUX 16 page. Changing the reserve on one of the two pages also changes it on the other page.
- The endurance in hours and minutes. The endurance is calculated based on the amount of fuel remaining after subtracting out the reserve you entered on the AUX 16 or the AUX 17 page from the present fuel on board.
- The range, which is the distance (nautical miles or kilometers) that could be flown based on the endurance calculated above and the present groundspeed.
- The fuel efficiency in nautical miles or kilometers per fuel unit (gallons in this case), which is the groundspeed divided by the present fuel flow.

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5.13.4. THE AUXILARY (AUX 18) FUEL MANAGEMENT PAGE

The AUX 18 page displays rate of fuel flow. It has two formats depending on whether the aircraft is a twin engine (figure 5-98) or a single engine (figure 5-99).

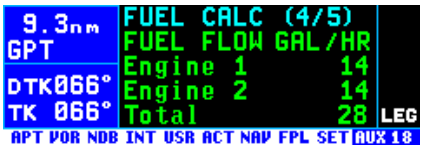


Figure 5-98

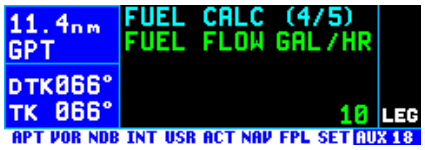


Figure 5-99

5.13.5. THE AUXILARY (AUX 19) FUEL MANAGEMENT PAGE

The AUX 19 page displays the amount of fuel used. If interfaced with the ARNAV fuel management computer, this page displays dashes since the ARNAV system does not output fuel used. There are two formats depending on whether the aircraft is a twin engine (figure 5-100) or a single engine (figure 5-101).



Figure 5-100



Figure 5-101

5.14. THE AIR DATA (AUX 20 – AUX 21) PAGES

Specific models of Shadin Company air data systems may be interfaced to the KLN 94. When interfaced with one of these systems, the KLN 94 will display real time air data parameters such as true airspeed (TAS), static air temperature (SAT), total air temperature (TAT), Mach number, density altitude, and pressure altitude. With a TAS input from an air data computer and a compatible heading input, the KLN 94 will calculate and display real time wind data (magnitude and direction).

***NOTE**: Heading information inputs to the KLN 94 must be in a format which is different than available from most mechanical compass systems, including the Bendix/King KCS 55A (KI 525A HSI with bootstrap heading synchro) and KCS 305 compass systems. However, the compatible Shadin air data system will convert three wire analog heading information from these mechanical systems into the proper format.*

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The Auxiliary 20 and Auxiliary 21 (**AUX 20** and **AUX 21**) pages are used to display air data information if both a fuel management system and an air data system are interfaced to the KLN 94. If there is no fuel management system, air data information is displayed on the AUX 15 and AUX 16 pages. If there is no air data system interface, these pages are not displayed.

***NOTE**: These air data pages receive inputs from air data sensors and display real time air data information. They are independent of the AUX 6, AUX 7, AUX 8, and AUX 9 pages which rely on manual pilot inputs to calculate air data information.*

5.14.1. THE AUXILARY 20 (AUX 20) AIR DATA PAGE

Without a fuel management system this becomes the AUX 15 page. The following information is displayed (figure 5-102):



Figure 5-102

TAS True airspeed (the true speed of an aircraft through the surrounding air mass).

Mach Mach number (the ratio of the true airspeed to the speed of sound at a particular flight condition).

If a compatible source of heading information is provided to the KLN 94, the following wind data is also displayed (figure 5-103):



Figure 5-103

Tailwind Tailwind component of the wind.

Headwind Headwind component of the wind.

Wind The wind direction relative to true North and the wind speed.

5.14.2. THE AUXILARY 21 (AUX 21)AIR DATA PAGE

Without a fuel management system this becomes the AUX 16 page. The following information is displayed (figure 5-104):

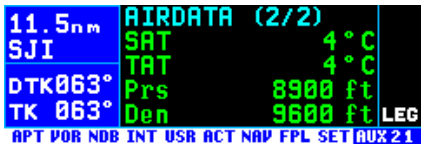


Figure 5-104

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SAT Static air temperature (the actual temperature of the surrounding air mass).

TAT Total air temperature (the air temperature including heat rise due to compressibility. This is the temperature measured directly by the outside air temperature (OAT) probe.

Prs Pressure altitude (to nearest 100 feet or 10 meters).

Den Density altitude (to nearest 100 feet 10 meters).

5.15 VIEWING AND SETTING THE DATE AND TIME PAGE

The KLN 94 system time and date should seldom, if ever, require updating because they are automatically updated when at least one satellite is received. In addition, the KLN 94 contains an internal battery powered calendar/clock to keep system time and date when the unit is not being used. You will normally check to make sure the KLN 94 is set to the correct time and date shortly after you turn the unit on while you verify the Initialization Page. You can, however, also check the time and date on the Setup 2 (SET 2) page anytime you desire. There are several pages as well as some internal functions of the KLN 94, such as magnetic variation and proper use of database information, that depend on having the proper time and date.

***NOTE**: You will not be able to update the time or date if the KLN 94 is receiving a time and date from a satellite.*

To set the date on the SET 2 page:

1. Select the SET 2 page (figure 5-105).



Figure 5-105

2. Turn on the cursor. The cursor will be over the entire date field (figure 5-106).
3. Select the correct day of the month with the right inner knob.



Figure 5-106

4. Move the flashing part of the cursor to the month field (middle three dashes) with the right outer knob, and select the proper month (figure 5-107).



Figure 5-107

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5. Move the flashing part of the cursor to the tens digit of the year field, and select the proper number (figure 5-108).



Figure 5-108

6. Repeat step 5 for the ones digit of the year field.

7. Press ENT to start the KLN 94 using the newly entered date (figure 5-109).



Figure 5-109

To set the time on the SET 2 page:

1. Select the SET 2 page if it is not already selected.

2. Turn on the cursor and move it to the time zone field (figure 5-110).



Figure 5-110

3. Change the time zone with the right inner knob, if desired (figure 5-111). A listing of the time zones and their abbreviations is contained in section 3.2, “Turn-on and Self Test”.



Figure 5-111

4. Move the cursor to the time field. The hours and minutes will appear in inverse video.

5. Select the correct hour (figure 5-112). Remember, the KLN 94 uses 24 hour time. If it is 1:00 P.M. or later, add 12 hours (for example, 2:30 P.M. becomes 14:30).



Figure 5-112

6. Move the flashing part of the cursor to the tens of minutes, select the proper number (figure 5-113), then move on to the last digit and set it.



Figure 5-113

7. Press ENT to start the clock.

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5.16. MANUAL MAGNETIC VARIATION SELECTION

The KLN 94's primary coverage area is from N 74° to S 60° as was shown in figure 3-1. Magnetic variation is automatically computed within this coverage area when Mag Var is in the default AUTO mode on the SET 2 page. Navigation outside this area is automatically referenced to true North unless a manual input of magnetic variation is made on the SET 2 page. The following message will be displayed on the Message page:

***Magnetic Var Invalid**
Nav Data Referenced
To True North

A user-defined magnetic variation may be entered on the SET 2 page. When a user-entered magnetic variation of 0 degrees is being used, the following message will be displayed on the Message page:

***Nav Data Referenced**
To True North

When a user-defined magnetic variation other than 0 degrees is being used, the following message will be displayed:

***Nav Data Referenced To**
User-Defined Mag Var

There are two exceptions when a user-defined magnetic variation will not be used for navigation. When the active waypoint is part of an approach procedure, the magnetic variation for the published approach will be used and the following message will be displayed:

***Mag Var for Published**
Approach Being Used

Also, when the unit is in the OBS mode and the active waypoint is a VOR, the magnetic variation associated with the VOR station will be used and the following message will be displayed:

***Mag Var for Published**
VOR Being Used

***NOTE**: A user-entered magnetic variation will not be retained if power is off for more than 5 minutes. Use of automatically computed magnetic variation will be restored if power is off for more than 5 minutes and the unit is within the primary coverage area.*

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To enter the local magnetic variation manually on the SET 2 page:

1. Turn on the cursor (CRSR).
2. Move the cursor over the field on line 4 (figure 5-114).
3. Turn the right inner knob to change the magnetic variation field from **Auto** to **Manual** if required (figure 5-115).
4. Use the right outer knob to move the cursor over the numerical value on line 5.
5. Use the right inner and outer knobs to select the magnetic variation, from 0 to 99 degrees.
6. Move the flashing part of the cursor to the E/W (east/west) field and select whether the magnetic variation is easterly or westerly (figure 5-116).



Figure 5-114



Figure 5-115



Figure 5-116

7. Press ENT to approve and turn the cursor (CRSR) off.

5.17. SETTING THE UNITS OF MEASURE



Figure 5-117

The SET 12 page (figure 5-117) is used to set the unit of measure for various parameters. The altimeter barometric setting can be set to inches of Mercury (“), millibars (mB), or hectopascals (hP). Altitude, airport elevation, and runway lengths can be set to feet (ft) or meters (m). Finally, distances and velocities can be set to nautical miles (NM) and knots (kt) or kilometers (km) and kilometers/hour (k/h). To change a unit of measure: select the SET 12 page; turn on the cursor (CRSR) and move it over the desired unit of measure using the right outer knob; turn the right inner knob to select the desired unit of measure; and turn the cursor off again.

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6. APPROACHES AND DP/STARS

This is the last chapter on the operation of the KLN 94. In this chapter you will learn how to use the KLN 94 for non-precision approach procedures as well as departure (DP) and arrival (STAR) procedures. Note that only KLN 94s which are configured for IFR approaches are capable of performing the procedures discussed in this chapter. KLN 94s which are configured for en route and terminal operations only will give you access to DP/STAR procedures but not non-precision procedures. All of these procedures require that you are comfortable with the operation of the unit as presented up to this point. In particular, you need to be comfortable with flight plan operation (sections 4.1. and 4.2.) and the Navigation modes (section 5.5).

6.1. PROCEDURE (PROC) PAGES

The two Procedure pages (PROC 1 and PROC 2) are used to initiate loading approach, departure (DP), and arrival (STAR) procedures into the active flight plan (FPL 0). Examples of these pages are shown in figure 6-1 and 6-2. A single press of the Procedure button (PROC) is used to display the PROC 1 page. The right outer knob is used to move the cursor over the desired option and then the ENT button is pressed to bring up a PROC 2 page. When the PROC 1 page is displayed, pressing the PROC button a second time returns the display to the page that was previously being viewed. When the PROC 2 page is being displayed, pressing the PROC button returns the display to the PROC 1 page.

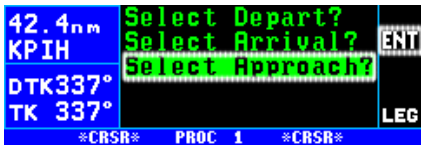


Figure 6-1



Figure 6-2

The PROC pages provide a quick and efficient means of accessing the desired airport's APT 7 page (for a DP or a STAR) or the APT 8 page (for an approach). If radar vectors are being provided for intercepting the course to the final approach fix, the PROC 1 page is used for "activating" vectors-to-final. Examples of using the PROC pages and PROC button are provided throughout this chapter.

If the KLN 94 is configured for VFR use only it is not possible to gain access to the approach, DP, and STAR procedures and pressing the PROC button will bring up a PROC 1 page as shown in figure 6-3. If the

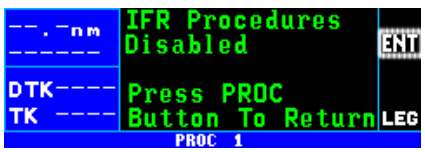


Figure 6-3

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KLN 94 is configured for IFR en route only, pressing the PROC button allows access to DP and STAR procedures but not approaches (figure 6-4).

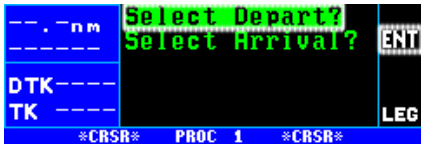


Figure 6-4

6.2. NON-PRECISION APPROACH OPERATIONS

Flying non-precision approaches using the KLN 94 is not in itself very difficult. However, the procedures are different than using traditional equipment such as VORs and NDBs. With this in mind, make sure that you practice with the KLN 94 in VFR weather with a check pilot before attempting to use the KLN 94 in actual IFR conditions.

CAUTION: The KLN 94 obtains approach information from the database.Therefore, it is extremely important that the database is current. The KLN 94 is approved for IFR non-precision approaches only when the database is current. If you select an approach when the database is out of date, you will be given the scratchpad message: "D Base Expire" in the bottom left portion of the screen as a reminder.

The following sections assume that your KLN 94 is properly installed in the aircraft with all of the necessary accessories to fly non-precision approaches. This will include an external HSI or CDI at a minimum and may include some external annunciator/switches. In many installations the aircraft will have a NAV/GPS switch to select which navigation source is displayed on the primary HSI or CDI.

The NAV 4 page has been specifically designed to provide most of the functions needed for non-precision approaches. This page provides an interface that presents pertinent navigation information, a way to access the flight plan waypoints, and a graphic presentation of the present position relative to the flight plan waypoints. You will find this page to be a good friend while performing GPS based non-precision approaches.

***NOTE**: There are a small number of approach procedures in the world that are not suited for the operational characteristics of the KLN 94. These procedures are not included in the database. Therefore it is not possible to use the KLN 94 for these approaches. It is good preflight practice to ensure that the KLN 94 contains anticipated procedures for the flight.*

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6.2.1. APPROACH MODE ANNUNCIATIONS

In addition to the two course modes (Leg and OBS) described in section 5.5, there are also two approach related modes. At the time of the KLN 94 installation in the aircraft these two modes may be configured to be annunciated as one of the following two ways:

APR ARM	(approach arm)
APR ACTV	(approach active)
OR	
TERM	(terminal)
APR	(approach)

These annunciations are displayed on the right side annunciator section of the KLN 94 display.

***NOTE**: Approach arm is exactly the same as terminal mode and approach active is exactly the same as approach mode. In this pilot's guide APR ARM / APR ACTV will be used for consistency but your KLN 94 may annunciate TERM / APR.*

One difference of these modes from the normal en route mode is that the CDI scale factor changes from ±5 NM for en route mode to ±1.0 NM for APR ARM and to ±0.3 NM when in the APR ACTV mode. Another difference between these modes and the en route mode is that the GPS integrity monitoring (RAIM) is set to a tighter level.

The APR ARM mode will be selected automatically by the KLN 94 when the aircraft is within 30 NM of an airport and an approach is loaded in the flight plan for that airport. The APR ACTV mode can only be engaged automatically by the KLN 94 when 2 NM inbound to the final approach fix (FAF).

***NOTE**: If an optional external GPS approach switch is installed it is possible to arm the approach mode at a distance greater than 30 NM from the airport by pressing the external GPS approach switch, but the KLN 94 will not change the CDI scale factor until the aircraft reaches the 30 NM point. If the external GPS approach switch is pressed while the approach mode is armed, then the KLN 94 will disarm the approach and change back to en route mode. The approach can be re-armed by simply pressing the GPS APR switch again. If the KLN 94 is in the APR ACTV mode, pressing the external GPS APR switch will change the mode to APR ARM. Once past the FAF, it is not possible to return to the approach active mode without conducting a missed approach and flying back to the FAF.*

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6.2.2. GENERAL PROCEDURE FOR NON-PRECISION APPROACHES

Non-precision approaches will all have the general flow of events as follows. Refer to figure 6-5.

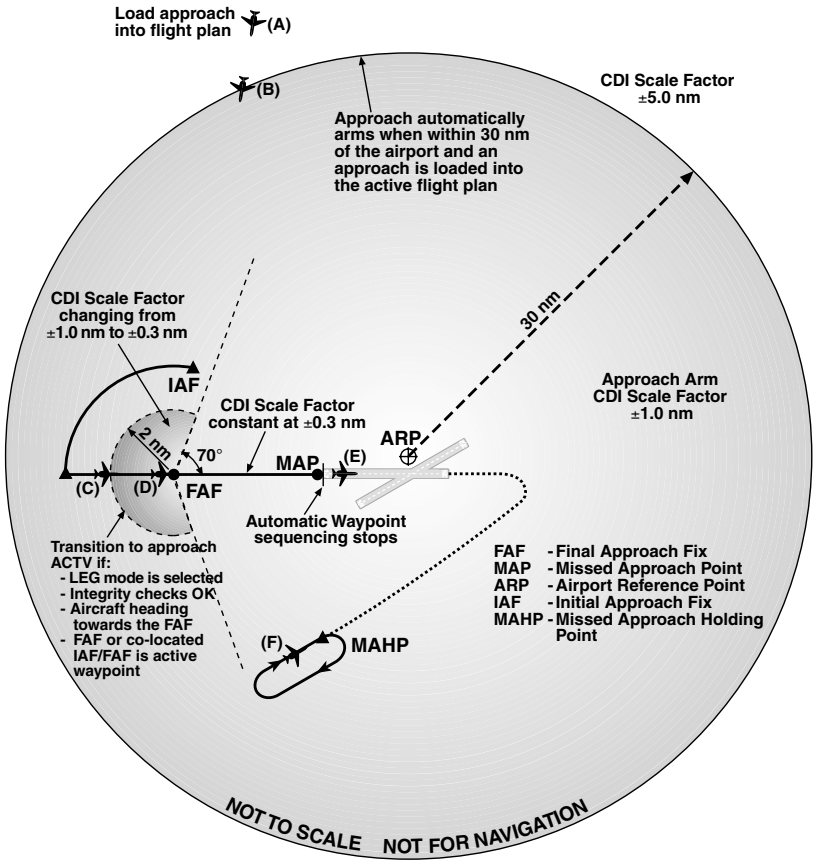


Figure 6-5

1. **Select and load the approach into the active flight plan.** Approaches are always conducted from FPL 0. The approach can be loaded at almost any time but must be completed before reaching the Final Approach Fix and should be done as soon as possible. This corresponds to point A in figure 6-5. If the aircraft is greater than 30 NM from the airport, then the CDI scale factor will remain at the default ±5 NM full scale deflection. Only one approach can be loaded in FPL 0.

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2. **Transition to the approach arm mode.** This will occur automatically when the aircraft is within 30 NM of the airport and there is an approach loaded into the flight plan (position B in figure 6-5). The CDI scale factor will change to ±1.0 NM over the next 30 seconds and the annunciator will indicate **APR ARM** (or **TERM** - see first note in section 6.2.1).

3. **Get established on the final approach course.**
   - Radar vectors (select "Vectors" as an IAF, leave unit in Leg mode)
   - NoPT arrival route (leave unit in Leg mode)
   - DME arc (leave unit in Leg mode)
   - Procedure turn or holding pattern (requires OBS mode)

4. **Transition to the approach active mode.** This mode change is automatic and occurs at position C in figure 6-5 when:
   - the aircraft is 2 NM from the FAF and the approach mode is armed
   - the LEG mode is selected
   - the aircraft is heading towards the FAF
   - the FAF or a co-located IAF/FAF is the active waypoint
   - the KLN 94 confirms that adequate integrity monitoring is available to complete the approach.
   - RAIM is available at FAF & MAP

If any of these conditions are not met, the KLN 94 will not transition to the approach active mode and a missed approach will be required if the conditions do not change before reaching the FAF. If all of these conditions are met then the CDI scale factor will start to change to ±0.3 NM and the annunciator will indicate **APR ACTV** (or **APR** – see first note in section 6.2.1).

5. At the FAF (position D in figure 6-5) the CDI scale factor will be at ±0.3 NM and will remain at this scale factor until you manually cancel the approach mode by either initiating a direct to operation, by loading another approach, by changing to OBS mode, or by pressing the optional external GPS APR button to change to the **APR ARM** mode.

WARNING: It is not approved to conduct the final portion of the approach unless the KLN 94 is in the approach active mode.

6. **Fly to the Missed Approach Point.** (position E in figure 6-5).

7. **If necessary conduct the missed approach procedure.** The KLN 94 will not automatically sequence to the next waypoint. You must manually change to the appropriate waypoint according to the

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situation. By default, the KLN 94 will nominate the first waypoint of the published missed approach procedure when you have flown past the MAP and the [D►] button is pressed. Remember to always refer to the paper chart when conducting a missed approach. The OBS mode is often needed at some point during a missed approach and is always required to fly the holding pattern (position F in figure 6-5).

The details of the above operations as well as several examples of how to conduct non-precision approaches using the KLN 94 are given in the following sections.

6.2.3. SELECTING AND LOADING AN APPROACH

The [PROC] button is used to initiate loading an approach into the active flight plan. The following example will use the RNAV Rwy 17 approach to New Century Aircenter airport (KIXD) in Olathe, KS.

To select and load an approach into the active flight plan (FPL 0):

1. Press the [PROC] button to bring up the PROC 1 page (figure 6-6). The cursor will already be over **Select Approach?**.

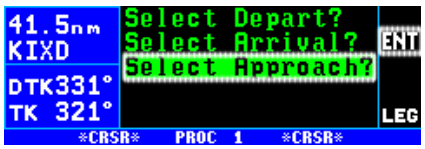


Figure 6-6

2. Press the [ENT] button to display the PROC 2 page (figure 6-7). The PROC 2 page shows a list of up to 7 airport identifiers. The list includes:

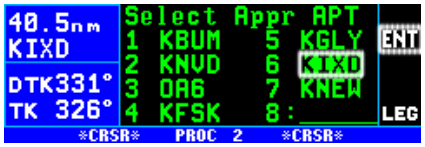


Figure 6-7

   - Airports in FPL 0 (up to 6)
   - A Direct To airport not in FPL 0 (if one exists)
   - Other airports closest to the aircraft's present position. Therefore, if you have to execute a missed approach at your intended destination airport or in case on an en route emergency, the PROC 2 page lists nearby airports with instrument approaches.
   - The airports are listed in the order of closest proximity to the aircraft. All of the airports shown have an approach in the database, although not necessarily one approved for GPS.

***NOTE**: While on the PROC 1 page, pressing the PROC button will return the display to the page that was previously being displayed. While on the PROC 2 page, pressing the PROC button will return the display to the PROC 1 page.*

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3. The cursor will normally already be over the desired airport but if you wish to select another airport from the list use the right outer knob to move the cursor to the desired airport. Press ENT.

***NOTE**: If the desired airport is not in the list, turn the right outer knob clockwise to move the cursor to the blank position at the end of the list. Enter the airport identifier of the airport where the approach is to be conducted. Press the ENT button once to view the APT 1 page and a second time to approve it.*

4. The APT 8 page is displayed showing a list of approaches for the selected airport (figure 6-8). Those approaches approved for GPS have the letters **GPS** to the right of the approach name. The cursor will be on the first approach in the list. Use the right inner knob to move the cursor over the desired approach. If there are more than 4 approaches for the airport, the first three approaches and the last one are initially shown. Turn the right outer knob to move the cursor through the entire list and over **RNAV 17** (figure 6-9). Press ENT.

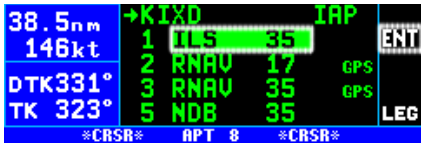


Figure 6-8

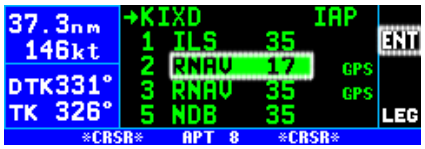


Figure 6-9

***NOTE**: Those approaches not having the letters **GPS** to the right of the approach name are not approved for GPS. Therefore, the KLN 94 may ONLY be used to provide situational awareness and monitoring for these approaches. When a non-approved approach is selected a page is displayed for the pilot to acknowledge by pressing the ENT button (figure 6-10). When a non-approved approach is selected the unit will remain in approach arm mode (or terminal mode) and will not transition to the approach active mode.*



Figure 6-10

5. A list of initial approach fixes (IAFs) for the RNAV 17 approach in shown (figure 6-11). In most cases **Vectors**, used when radar vectors will be received, is the first choice in the list. In this example we want the MIFEV IAF. Select this by



Figure 6-11

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pressing ENT when the cursor is over **MIFEV** (figure 6-12).

***NOTE**: If there is only one IAF for a procedure, then the KLN 94 will skip this step and go on to the next step*



Figure 6-12

6. The KLN 94 next presents a list of waypoints that make up the approach. If desired, review these waypoints to make sure that you have selected the correct IAF. If there are more than three waypoints in the approach you can move the cursor up to "scroll" the other waypoints into view by rotating the right outer knob (figure 6-13).



Figure 6-13

7. Move the cursor over **ADD TO FPL 0?** (figure 6-14) and press ENT.



Figure 6-14

8. The KLN 94 will then bring up the FPL 0 page and put the sequence of approach waypoints in front of the associated airport identifier (figure 6-15). If an approach is loaded for an airport not in FPL 0 the approach is added to the end of the flight plan and does not include the associated airport identifier.



Figure 6-15

***NOTE**: While on the APT 8 page showing the list of IAFs or the list of approach waypoints (figure 6-11 or 6-14), you may back up one step in the selection process by pressing the CLR button. Anytime you want to start over in the approach selection process, press the PROC button.*

***NOTE**: When FPL 0 is modified in any way, including adding an approach, the KLN 94 reorients itself on the nearest leg of the modified flight plan. When the approach is added to FPL 0, check to make sure the desired leg of the flight plan is active. If necessary, do a Direct To operation to the desired waypoint.*

The waypoints that make up the approach procedure are loaded into the active flight plan. At the top of the list of approach waypoints is a "header" that describes the approach that follows. An example of this is shown on line 1 of figure 6-15, which indicates that the RNAV 17 approach for KIXD is in the active flight plan (FPL 0).

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After the approach has been entered into the flight plan the KLN 94 checks to make sure that the resulting flight plan "makes sense". If the KLN 94 detects any waypoints that are in both the en route portion of the flight plan and the portion that makes up the approach, then the following message will be given:

***Redundant Wpts in FPL**
Edit En Route Wpts
As Necessary

Examine the flight plan and delete those en route waypoints that are not necessary.

***NOTE**: Approaches can only be entered into FPL 0, the active flight plan. If the KLN 94 is turned off for more than 5 minutes, then the approach is deleted when power is turned back on.*

You can get a good idea as to whether you will receive radar vectors for the approach by viewing the APT 3 page. An (**R**) is displayed on the right side of line 4 when the approach/departure is in a radar environment. If you're not sure whether you will receive radar vectors, select an actual IAF when the approach is loaded into FPL 0. You can easily activate vectors from the PROC 1 page even when an actual IAF (other than **Vectors**) was selected.

6.2.4. INTERPRETING WHAT YOU SEE

You may have noticed that some waypoints in the approach have a small letter at the end of the waypoint name. The small letter is an aid that we have added to the name of some waypoints to help you recognize important points in the approach. These suffixes are displayed on many of the KLN 94 pages. The definitions of these suffixes are:

i - The Initial Approach Fix (IAF) of the approach.

f - The Final Approach Fix (FAF) of the approach

m - The Missed Approach Point (MAP) of the approach

h - The Missed Approach Holding Point (MAHP) for the approach

Every approach will have a FAF and a MAP. Almost all will have an IAF and missed approach holding point. You may see the same waypoints multiple times in an approach, each with a different suffix letter. For example, an approach could include the waypoints ABCi, ABCm, and ABCh which would indicate that the waypoint ABC is used as an IAF, the MAP, and the MAHP. It is important that you select the correct usage of the waypoint. So if you are cleared direct to ABC as an IAF, make sure you select ABCi when doing the direct to operation.

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Figure 6-16

Another item that you should notice in the flight plan is the line that has ***NO WPT SEQ** on it (figure 6-16). This is what is referred to as a fence and the purpose of this line is to tell you that the KLN 94 will not automatically sequence past the waypoint that precedes the fence. The waypoint before the fence is always the missed approach point. The reason that waypoint sequencing is not allowed is that many missed approach procedures require specific actions before going to the missed approach holding point (e.g., climbing on a fixed heading until reaching an altitude).

You may notice waypoints with somewhat strange names. For example LAX18 has a name that is not normal for a waypoint. This is an example of what are called “terminal” waypoints. These are waypoints that are associated with a specific airport. They are used to define a spot on the ground that does not have a normal waypoint name. In the case of “LAX18” this point is 18 NM from the LAX VOR on the 68° radial. Another waypoint, MA25B, is also a type of terminal waypoint. In this case this point is the missed approach point for runway 25. This approach applies to both the left and right runways so the letter B is used to mean “both”.

There are a few other types of terminal waypoints that will help you to fully understand GPS non-precision approaches. The naming convention for these waypoints are as follows:

Fxyyy	• F stands for Final Approach Fix
Ixyyy	• I stands for Intermediate Fix
Cxyyy	• C stands for Course Fix
Mxyyy	• M stands for Missed Approach Point
RWzzz	• RW stands for Runway Fix. This is usually the MAP for the approach • zzz will be a runway number possibly including L for Left, R for Right, C for Center, or B for Both.
Daaab	• D stands for DME arc waypoint. Some DME arc way points use the following convention for waypoint names while other DME arc waypoints use normal five letter identifiers. • aaa is the radial that the fix is on from the reference VOR

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- b will be a letter corresponding to the distance from the reference VOR. For example, G is the seventh letter of the alphabet so D234G would be a point on the 234° radial 7 NM from the reference VOR. DME arcs greater than 26 NM will have waypoints where the first two char acters are the first two letters of the DME identifier. The next three characters will be the radial that the arc way point is on.

In the rules above x and yyy are defined as follows. For runways with only one approach, x will be replaced with an "A" or a "F". For runways that have multiple approaches, x will be replaced with "V" for VOR, "N" for NDB, or "R" for RNAV. The letters yyy will be replaced with either the runway identifier (e.g., FF25L is the FAF for runway 25L) or, for circling approaches, the inbound course to the missed approach point (e.g., MA259).

Waypoints along a given radial will be named such that the first three letters are the reference VOR/DME and the next two are the DME distance. If the distance is greater than 100 NM the order is reversed. For example, LAX18 is 18 NM from LAX while 26FLW is 126 NM from FLW.

If the aircraft is not too far from the destination airport, the NAV 4 page can be used to determine where some of these waypoints are relative to others in the approach. At the time of this writing most of the Jeppesen charts and some of the NOS charts show the special terminal waypoints that are required for GPS approaches. For this reason it is a good idea to understand what the special waypoints are used for and what they mean.

6.2.5. CHANGING OR DELETING AN APPROACH ONCE LOADED INTO THE FLIGHT PLAN

The sequence of waypoints that are retrieved from the database of the KLN 94 define the approach procedures as they are charted. To ensure that the proper path over the ground is followed, it is not possible to either delete or add waypoints to the approach section of the flight plan. To help you see which waypoints are en route waypoints and which are approach waypoints, the KLN 94 does not display a colon next to the waypoint number on the FPL 0 page if the waypoint is an approach waypoint.

It is only possible to replace the existing approach with another one, or delete the entire approach from the flight plan. FPL 0 can only contain one approach. The procedure for replacing an approach in FPL 0 is virtually the same as initially loading an approach. Use this procedure whether you are changing the IAF for the approach already loaded, for changing to a different approach at the same airport, or selecting an approach at another airport.

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To replace an existing approach:

1. Press the PROC button. If necessary move the cursor over **Select Approach?** and press ENT to bring up the PROC 2 page.
2. The cursor will already be over the airport associated with the approach loaded in FPL 0. If you wish to select another airport for an approach move the cursor over the desired airport identifier in the list. Or, you always have the option of moving the cursor to the blank field at the end of the list and entering another airport identifier. Press ENT.
3. Select the desired approach and IAF as before.
4. The APT 8 page showing the approach waypoints now displays **REPL FPL 0 APR?** at the bottom of the page (figure 6-17). Press ENT to acknowledge and load the new approach into the active flight plan.



Figure 6-17

An approach is deleted from the active flight plan using the FPL 0 page. It is also possible to replace an existing approach from this page.

To delete an existing approach:

1. With the active flight plan (FPL 0) page being displayed, turn the cursor on by pressing CRSR (figure 6-18).



Figure 6-18

2. Move the cursor so that it covers the approach header at the top of the approach procedure. Once the cursor comes over the approach header, it will automatically change to read **CHANGE APPR?** (figure 6-19). If you press ENT in this condition the KLN 94 will bring up the APT 8 page that corresponds to the current approach. At this point it is possible to select a different approach procedure for this airport, a different IAF, or both.



Figure 6-19

3. If you press the CLR button while the cursor is over the approach header it will change to read **DELETE APPR?** (figure 6-20). If you press ENT now, the KLN 94 will remove the entire approach



Figure 6-20

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procedure from the active flight plan. If the KLN 94 was in the approach arm or the approach active mode, then deleting the approach will cause the KLN 94 to change back to en route mode. This means that the CDI scale factor will change back to the default ±5.0 NM scale.

6.2.6. GPS APPROACH EXAMPLES

Now that you know the basics of inserting an approach into the flight plan, we can now show the approach operation of the unit by using examples of actual approaches. There are four basic categories of GPS approach. Or more specifically, there are four basic procedures used to get established inbound to the final approach fix (FAF):

- No procedure turn
- Radar vectors to the FAF inbound course
- A course reversal (procedure turn or holding pattern)
- DME arc

GPS approaches for the four categories are the same from the FAF to the missed approach point (MAP). Examples of each of these categories of approach will now be presented. More detail is included in the first example so read it first.

***NOTE**: If necessary for visual clarity during an approach, declutter Land and Aero from the map by using the CLR button (section 3.11.4.10) or the SET 7 and SET 8 pages (sections 3.11.4.4 and 3.11.4.6).*

6.2.7. APPROACH EXAMPLE 1: NO PROCEDURE TURN

The KLN 94 will remain in the familiar Leg mode for this category of approach from the IAF to the MAP so there will be no need to change between Leg and OBS. The RNAV 17 approach at KIXD (figure 6-21) is an example of the classic "T" approach utilizing terminal arrival areas (TAA) where there is normally no procedure turn required to get established on the inbound course to the FAF. This is the approach that was loaded into the flight plan in section 6.2.3. Another example of where no procedure turn is required is shown in the NDB or GPS 15 approach at KMSV (figure 6-22). No procedure turn is required when arriving from the Hancock (HNK) VOR IAF according to the "NoPT" nomenclature on the chart.

We will use the RNAV 17 approach at KIXD as an example to show how the KLN 94 sequences through an approach and what type of annunciations and scale factor changes can be expected. Refer to the approach

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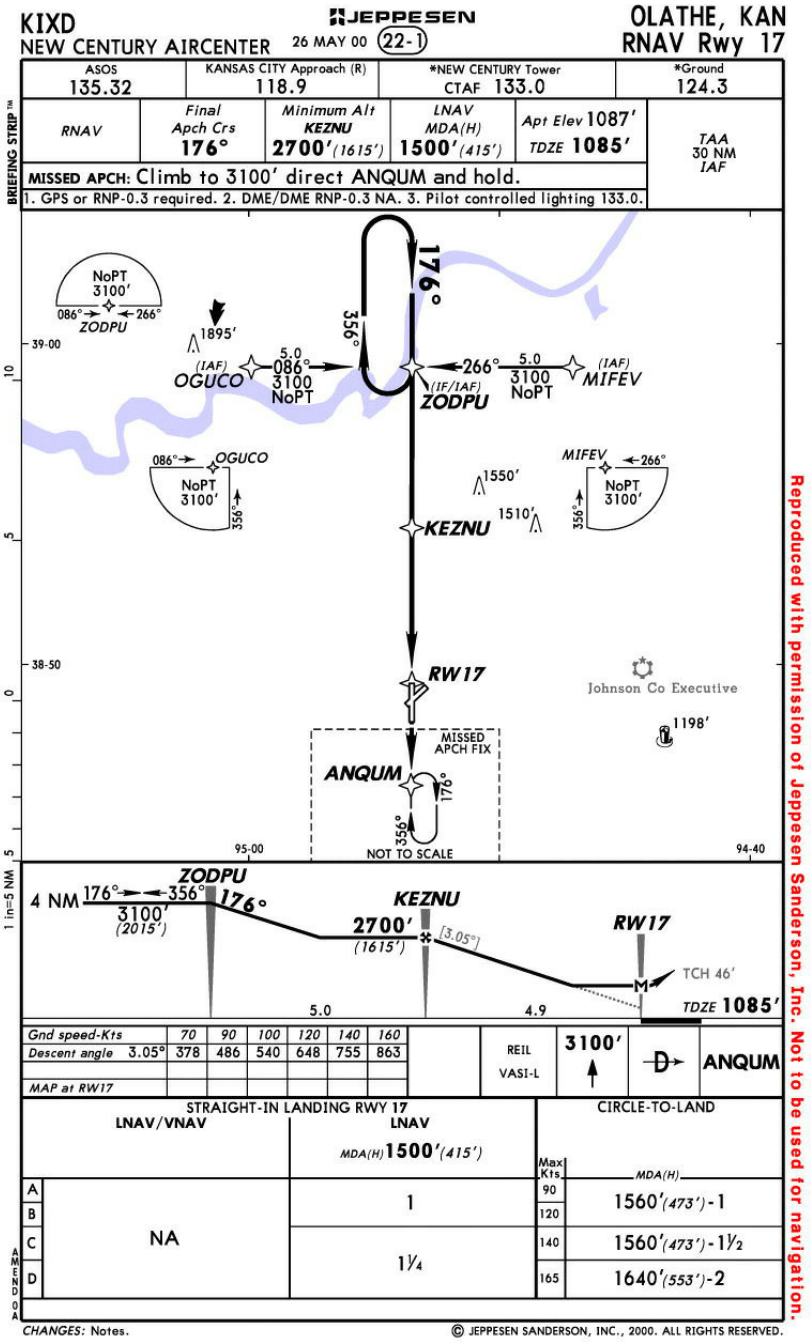


Figure 6-21

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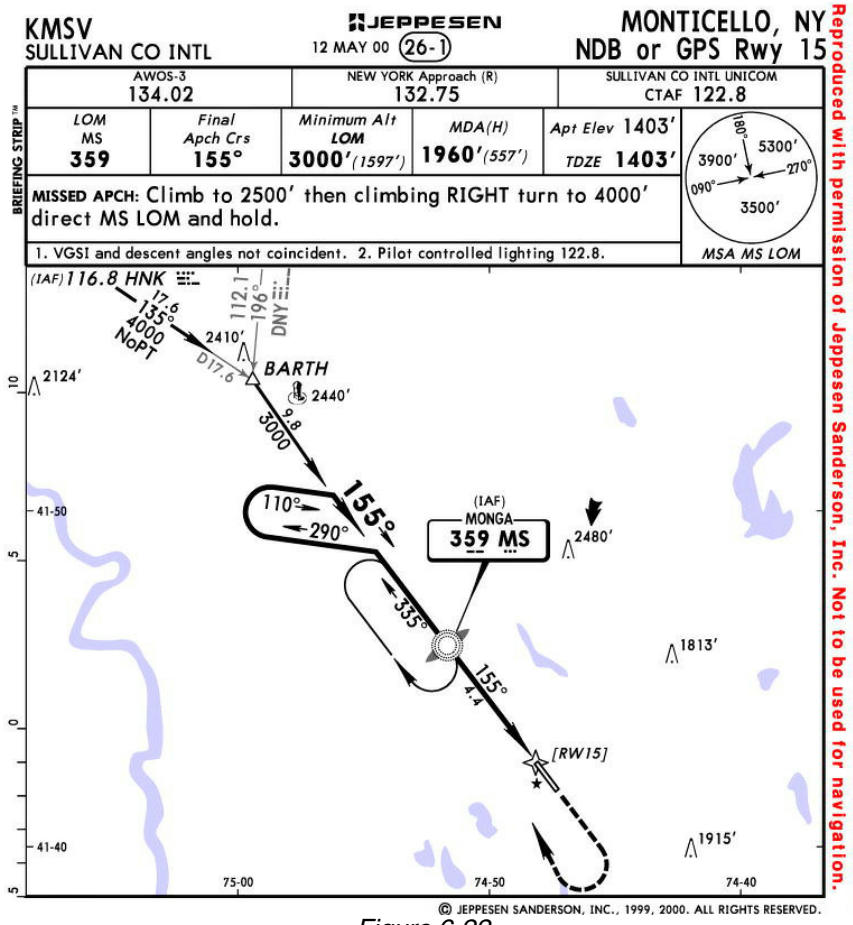


Figure 6-22

plate for this approach (figure 6-21) to see what the procedure looks like.

For this example it is assumed that you are on an active flight plan from Lakefront airport (KNEW) in New Orleans, LA with the final destination being the New Century Aircenter (KIXD) in Olathe, KS. Approximately 40 NM southeast of the airport you are told to expect the RNAV 17 approach.

1. Load the RNAV 17 approach to KIXD as demonstrated in section 6.2.3. Since we are arriving from the southeast, MIFEV is selected as the IAF. The approach waypoints are automatically added before the airport identifier in FPL 0 (figure 6-23).



Figure 6-23

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***NOTE**: When FPL 0 is modified in any way, the KLN 94 orients itself on the nearest leg of the modified flight plan. In this case the leg from KNEW to MIFEV has become active. Since we have not yet been cleared to MIFEV it is necessary to do a Direct To operation to KIXD. The easiest way to do this is normally using the waypoint scan feature of the map (see section 4.2.4.1.)*

2. When you are within 30 NM of the airport (not the IAF), the KLN 94 will automatically arm the approach mode and provide the following message:

   ***Press ALT To Set Baro**

The message acts as a reminder to make sure the KLN 94 is using the correct barometric pressure. If the barometric information is not correct, then the integrity monitoring provided by the KLN 94 may not be as good as it could be. Press [ALT] to bring up the ALT 1 page and verify that the barometric pressure is correct.

***NOTE**: If the KLN 94 is interfaced with a compatible air data computer that provides the correct barometric pressure to the KLN 94, then the previous message is not displayed and it is not necessary to update the barometric pressure.*

At this time the KLN 94 will smoothly change the CDI scale factor to ±1.0 NM. **APR ARM** (or **TERM** see first note in section 6.2.1.) is now annunciated (figure 6-24).



Figure 6-24

3. Approximately 8 NM from KIXD you are cleared direct to MIFEV, the IAF. You are probably already viewing the Nav 4 map page but if not, now is a good time to display the map by momentarily pressing either portion of the ⊜ button (figure 6-25). Once viewing the map page, press and hold the ⊜ button for 2 seconds to select auto scaling (figure 6-26). Auto scaling is especially useful during an approach. Remember, you can press the [CLR] button, if necessary, to temporarily declutter the map.

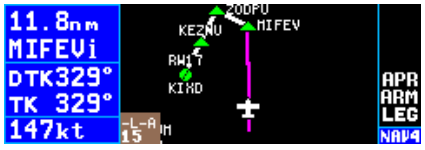


Figure 6-25



Figure 6-26

4. Approximately 3 NM from MIFEV you are cleared for the approach. It is a good idea to check over the status of the KLN 94. Look at the

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KLN 94 screen to verify that LEG sequencing is selected. If the KLN 94 shares an HSI or CDI with other NAV sources, it is also good to verify that the NAV/GPS switch is set to GPS.

As you approach MIFEV, the KLN 94 will provide waypoint alerting as indicated by the flashing WPT annunciation on the right side of the screen and the flashing waypoint identifier on the left side of the screen (figure 6-27). Turn anticipation will occur just prior to reaching MIFEV; the DTK will change to 266° and the WPT annunciation will stop flashing and be steadily annunciated. This is the time to begin the turn to intercept the 266° course to the next waypoint in the approach, ZODPU. Once you pass MIFEV the KLN 94 will automatically sequence to ZODPU. If the course selected on the external CDI or HSI is not within 10° of the 266° desired track, the DTK value on the KLN 94 will flash and a message will be provided telling you to set the external Nav indicator to the correct value.



Figure 6-27

5. As the aircraft approaches the ZODPU waypoint, the KLN 94 will again provide waypoint alerting and turn anticipation. As the aircraft passes ZODPU it will sequence to KEZNU. Select 176° on the external Nav indicator.

6. As the aircraft approaches KEZNU, the final approach fix, it is a good idea to check the status of the KLN 94 one more time. Make sure that LEG mode is selected and that the NAV/GPS switch is set to GPS. Remember, the KLN 94 will not transition to the approach active mode if the OBS mode is selected.

7. By the time the aircraft is 2 NM from KEZNU (figure 6-28), the FAF, the KLN 94 will make a prediction to see if integrity will be available at the FAF and at the MAP. If the prediction indicates that integrity monitoring will be available, and RAIM is currently available, the KLN 94 will annunciate **APR ACTV** (or **APR**). At this time the KLN 94 will also start to change the CDI scale factor. By the time the aircraft reaches the FAF the CDI scale factor will be down to ±0.3 NM full scale deflection.



Figure 6-28

8. Normal waypoint alerting will occur approaching KEZNU and the KLN 94 will sequence to RW17 passing KEZNU.

9. The KLN 94 will again provide waypoint alerting as you approach RW17, the missed approach point (MAP).

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The following steps would need to be performed if a missed approach is required.

10. Upon reaching RW17 and not seeing the runway you decide to perform a missed approach. Remember, the KLN 94 will not automatically sequence past the missed approach point. This is shown on the NAV 4 page by not showing any lines connecting waypoints that are past the MAP. Until the missed approach procedure is initiated the KLN 94 will continue to provide guidance along the 176° FAF to MAP course and the To/Fr indicator will indicate "From." To perform the published missed approach procedure, press [D►] to bring up the direct-to page. The default waypoint will usually be the first waypoint of the missed approach procedure. In this case the first waypoint is the missed approach holding point ANQUM. Confirm this waypoint as the direct to waypoint and press [ENT].

***NOTE**: If ATC gives you instructions for a missed approach that is different from the published missed approach procedure, it is always possible for you to select a different direct to waypoint than the default direct to waypoint.*

11. Since you are going to enter a holding pattern at ANQUM it is necessary to use the OBS mode. Press the OBS button to enter the OBS mode. In the OBS mode the KLN 94 uses the course selected on the external CDI or HSI. Since the external indicator was already set to 176° for the final approach course it is set to provide guidance to ANQUM.

***NOTE**: A message is provided 4 NM from ANQUM if the KLN 94 is still in Leg mode as a reminder: "**If Required Select OBS**".*

12. Upon reaching ANQUM select the 356° inbound course on the external HSI or CDI and enter the holding pattern using standard entry procedures. Since the unit is in OBS mode you will fly as if using a VOR receiver to hold at a VOR. When passing inbound over ANQUM there will be no waypoint sequencing and the To/From indicator on the HSI or CDI will change to "From." When leaving the holding pattern for another approach or another airport, remember to put the unit back into Leg mode.

***NOTE**: If another attempt at the approach is desired after holding, it is necessary to manually change the active waypoint. On approaches where the FAF and the missed approach holding point are at the same place then the KLN 94 will automatically change the active waypoint to the FAF when you change from OBS to LEG. Make sure to make this change as soon as possible to ensure you get into the approach active mode.*

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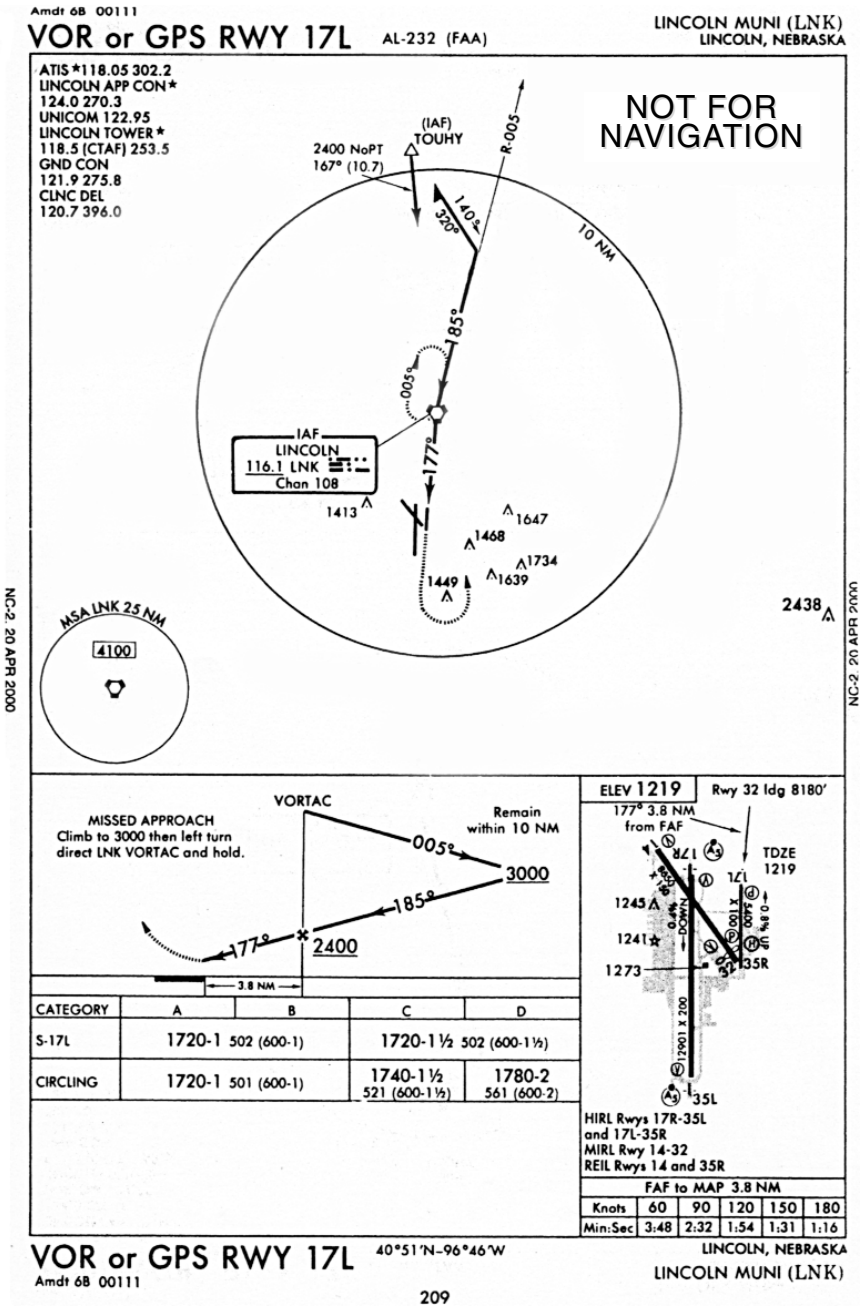


Figure 6-29

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6.2.8. APPROACH EXAMPLE 2: RADAR VECTORS

When airports have an approach control that is in a radar environment it is likely you will receive radar vectors from the approach controller to intercept the course inbound to the final approach fix (FAF). The KLN 94 makes it easy to conduct approaches where vectors are provided. There is no need to change to OBS mode in order to get established inbound to the FAF.

We will use the VOR 17L approach at Lincoln Municipal (KLNK) as an example of an approach where vectors are provided (figure 6-29). Notice that Lincoln VOR (LNK) is the FAF and that the inbound course to LNK is 185° and the course from LNK to RW17L, the MAP, is 177°. The ATC controller will provide vectors to intercept the 185° course to LNK.

Loading an approach in FPL 0 where vectors are going to be provided is similar to the example of loading an approach provided in section 6.2.3. However, there are a few minor differences so we'll go through an example of loading an approach for radar vectors.

To select an approach for radar vectors:

1. Press the PROC button to bring up the PROC 1 page (figure 6-30). The cursor will already be over **Select Approach?**.

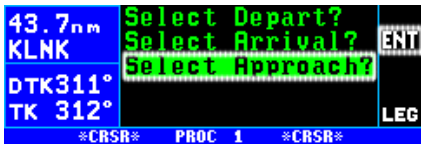


Figure 6-30

2. Press ENT to display the PROC 2 page (figure 6-31). If KLNK is in FPL 0 or is our Direct To waypoint then KLNK will be in the list. Use the right outer knob to move the cursor over KLNK if it is not already there.



Figure 6-31

3. Press ENT to display a list of approaches for KLNK. Use the right outer knob to move the cursor over VOR 17L (figure 6-32).



Figure 6-32

4. Press ENT to display a list of initial approach fixes (IAFs). The cursor is already over **Vectors** (figure 6-33).



Figure 6-33

***NOTE**: If you know radar vectors will be provided, select **Vectors**. If you are not sure, select the IAF waypoint appropriate for your route. If you later*

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find out that vectors will be provided you can still easily activate the Vectors feature of the KLN 94 with the waypoint IAF loaded in FPL 0.

5. Press ENT to display the list of waypoints for the approach (figure 6-34). When Vectors is selected the first waypoint will be the FAF.



Figure 6-34

6. Press ENT to load the approach into FPL 0. As before, the approach waypoints are inserted prior to the airport identifier (figure 6-35). The vectors-to-final (**VTF**) annunciation is now displayed on the right side of the screen. The VTF annunciation is white at this time to indicate that a radar vector approach has been loaded into FPL 0 but has not yet been activated.



Figure 6-35

Now that the approach has been loaded into the active flight plan you can return to the map page. If your clearance is to KLNK, you will have to do a Direct To KLNK. As you near the Lincoln area you are eventually given vectors (headings) to fly that will get you established on the charted inbound course to the FAF. We are now ready to conduct the approach.

1. When you are within 30 NM of the airport, the KLN 94 will automatically arm the approach mode and provide the following message: ***Press ALT To Set Baro**. At this time the KLN 94 will smoothly change the CDI scale factor to ±1.0 NM. **APR ARM** (or **TERM**) is now annunciated (figure 6-36).



Figure 6-36

2. When you start receiving vectors for the approach it is time to "activate vectors." Press the PROC button to display the PROC 1 page (figure 6-37). If you chose vectors from the IAF list then the cursor will already be over **Activate Vectors?** on line 4 as well as over the FAF (LNK in this case) and inbound course to the FAF on line 5.

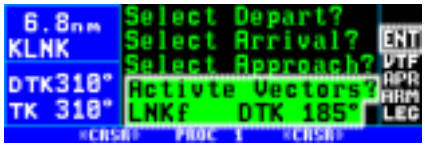


Figure 6-37

***NOTE**: If a waypoint IAF (instead of Vectors) was initially selected when the approach was loaded into FPL 0 it will be necessary to use the right outer knob to move the cursor over lines 4 and 5.*

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3. Press ENT to activate vectors. Activating vectors makes the FAF the active waypoint with the proper inbound course to the FAF (figure 6-38). The **VTF** annunciation turns green when vectors has been activated. At this time the external Nav indicator should be set to 185° and the NAV/GPS switch checked to make sure it is set to GPS.



Figure 6-38

4. Fly the headings given by the controller in a normal manner and intercept the course to the FAF.

5. By the time the aircraft is 2 NM from LNK (figure 6-39), the FAF, the KLN 94 will make a prediction to see if integrity will be available at the FAF and at the MAP. If the prediction indicates that integrity monitoring will be available and RAIM is currently available, the KLN 94 will annunciate **APR ACTV** (or **APR**). At this time the KLN 94 will also start to change the CDI scale factor. By the time the aircraft reaches the FAF the CDI scale factor will be down to ±0.3 NM full scale deflection.



Figure 6-39

6. Normal waypoint alerting and turn anticipation will occur prior to reaching LNK. The DTK will change from 185° to 177° and the new course should be selected on the external Nav indicator. The KLN 94 will sequence to the missed approach point, RW17L, upon passing LNK. The **VTF** annunciation will return to white.

7. The KLN 94 will again provide waypoint alerting as you approach RW17L, the missed approach point (MAP).

8. Upon reaching RW17L and not seeing the runway you decide to perform a missed approach. Remember, the KLN 94 will not automatically sequence past the missed approach point. This is shown on the NAV 4 page by not showing any lines connecting waypoints that are past the MAP. Until the missed approach procedure is initiated the KLN 94 will continue to provide guidance along the 177° FAF to MAP course and the To/Fr indicator will indicate “From.”

9. After declaring the missed approach you request vectors to try the approach again. Press the PROC button to bring up the PROC 1 page and press ENT to re-activate vectors for another try. The **VTF** annunciation turns green to indicate that vectors-to-final is once again activated.

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10. After a second missed approach you may select another approach at Lincoln or some other airport by pressing the PROC button to display the PROC 1 page. Since you don't want to activate vectors this time use the right outer knob to move the cursor over **Select Approach?** and load an approach in the normal manner.

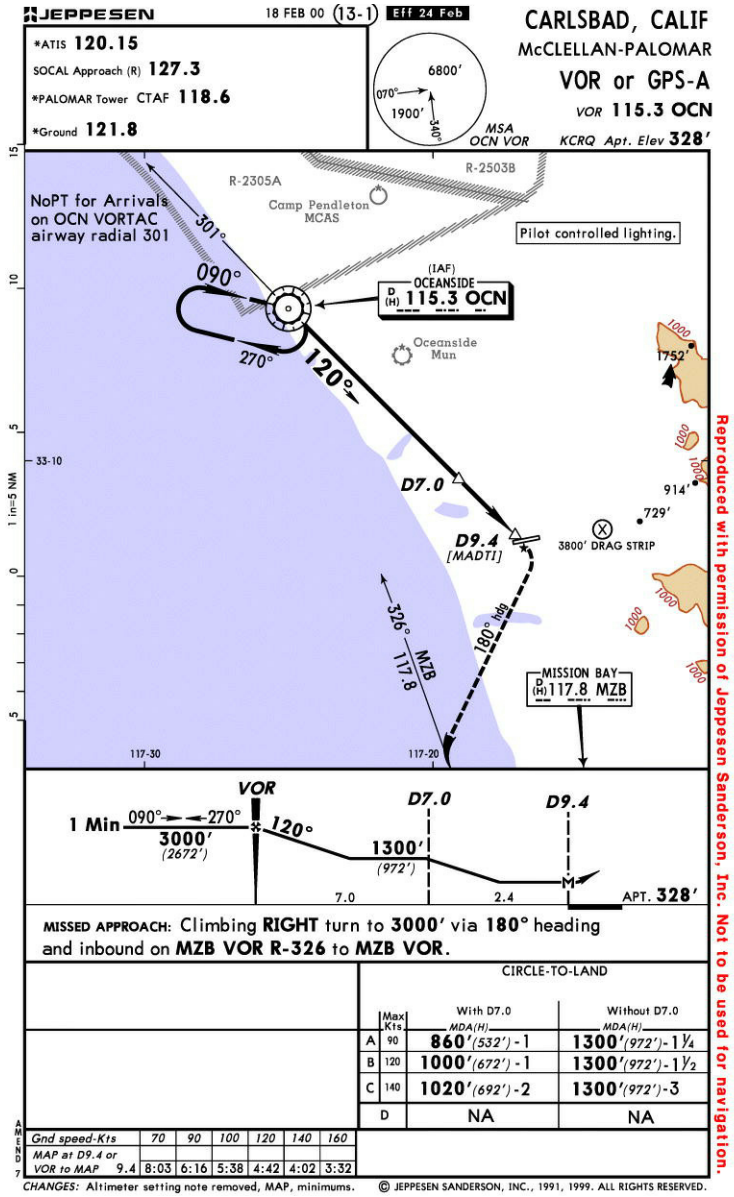


Figure 6-40

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6.2.9. APPROACH EXAMPLE 3: COURSE REVERSAL WITH OFF-AIRPORT IAF

In the previous two approach examples we were able to leave the KLN 94 in the Leg mode all the way to the missed approach point. However, when the approach procedure includes a course reversal in order to get established inbound to the FAF it is necessary to utilize the OBS mode. Remember, when the unit is in the OBS mode it acts similar to a VOR receiver in that it uses the OBS course selected on the external Nav indicator (CDI or HSI) and there is no waypoint sequencing. Both approach example 3 and example 4 demonstrate how to use the KLN 94 when a course reversal is required.

An approach that is quite common is an approach that is based off of an off-airport IAF with a course reversal. An example of this is the VOR - A approach to McClellan-Palomar airport, KCRQ. To fly this procedure as published use the following steps and refer to figure 6-40 for the procedure. For this example assume that the aircraft is approaching from the east.



Figure 6-41

1. Load the approach into the flight plan as described in section 6.2.3. Select OCN as the IAF (figure 6-41).

2. When you are within 30 NM of the airport, the KLN 94 will automatically arm the approach mode and provide the following message: ***Press ALT To Set Baro**. At this time the KLN 94 will smoothly change the CDI scale factor to ±1.0 NM. **APR ARM** (or **TERM**) is now annunciated.

3. Approaching the area ATC tells you to go direct-to the OCN VOR and clears you for the VOR or GPS 22 approach to KCRQ. This is easy to do from the NAV 4 page by pulling out on the right inner knob and scanning through the active flight plan by turning the inner knob. Since OCN is both the IAF and the FAF make sure you select the IAF which is indicated by the "i" suffix after OCN (**OCNi**). Once OCN is displayed in the scanning window (figure 6-42), press [D►] and then [ENT] to initiate a direct to operation to the OCN IAF.



Figure 6-42

4. At a distance of 4 NM to the OCN VOR, the KLN 94 will give the following message:

   ***If Required Select OBS**

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This message provides a reminder that to fly a course reversal the OBS mode needs to be selected. Note from the approach chart that there is a NoPT Arrival for this approach if arriving on airway radial 301. If you are approaching OCN along this airway radial there is no need to perform a course reversal and you need to ignore this message. The NoPT sector is not stored in the database so it is not possible for the KLN 94 to know if a course reversal is required or not; as a result, the KLN 94 will always give this message whenever an IAF waypoint could be used for a course reversal. If arriving along the airway radial the KLN 94 will properly sequence to the FAF to MAP leg and transition to the approach mode when 2 NM from the OCN IAF/FAF.

If, however, you are approaching from any other direction a course reversal is required and the OBS mode will need to be selected by pressing the OBS button. If the OBS mode is not selected before reaching OCN the KLN 94 will automatically sequence to the missed approach point. This is not desirable when performing a course reversal so the OBS mode must be selected before reaching OCN.

***NOTE**: The KLN 94 will only remind you to select OBS mode if the IAF is the active waypoint. Therefore if a course reversal is required, make sure the IAF is the selected waypoint. For ORS 02 and higher units the holding pattern will be displayed on the map (figure 6-42a) if configured to do so on the SET 7 page. See section 3.11.4.12 for information on displaying holding patterns on the map.*

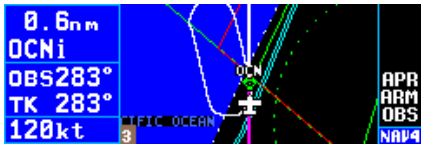


Figure 6-42a

5. Upon reaching OCN perform the appropriate holding pattern entry and set the inbound course on the external CDI or HSI. In this example the inbound course is 90°. At this point the KLN 94 works very similar to a conventional VOR/DME.

6. Once established on the inbound course of 90°, switch back to the Leg mode. When Leg mode is selected the FAF is automatically made the active waypoint when the IAF and the FAF are at the same waypoint. This is indicated by the active waypoint with an "f" suffix (**OCNf**).

***NOTE**: It is mandatory that the unit be in LEG mode with the FAF as the active waypoint before crossing the FAF to activate the approach active mode and change to ±0.3 NM scale factor. The CDI scale factor changes from ±1.0 NM to ±0.3 NM over the two miles to the FAF. Delaying the switch from OBS to Leg mode compresses the scale factor change. This will make the transition more abrupt. If the switch from OBS to Leg is delayed too long it will not be possible for the KLN 94 to change to the approach active mode.*

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7. When the aircraft is 2 NM from the FAF, the KLN 94 will verify that the proper integrity is available. If integrity monitoring is available for the approach, then the KLN 94 will change to the Approach Active mode. This will be annunciated on the right side of the KLN 94 by **APR ACTV** (or **APR**). The CDI scale factor will also start to change from ±1.0 NM to ±0.3 NM.

8. Upon reaching OCN, the KLN 94 will automatically sequence to MADTI, the missed approach point. Notice that there is a 30° course change at OCN to 120° inbound. The DTK will flash on the left side of the KLN 94 until the external Nav indicator is reset to 120°.

9. The step down fix at 7 DME from OCN along the final approach course is not included in the waypoints that come from the database. Since the distance that the KLN 94 is giving you is distance to MADTI, the MAP, you will need to determine when the aircraft has reached this point by looking at the along track distances given in the profile view of the approach. In this case the fix is 2.4 NM from MADTI. Upon reaching this distance you can descend to the MDA for this approach.

If a missed approach is required for this approach, then the following steps would be required.

10. The published missed approach procedure for this approach is to make a climbing right turn to 3000 feet via a180° heading and then inbound on the MZB 326° radial to MZB. After flying past the MAP press [D►] to display MZB as the default direct to waypoint. Press [ENT] to make MZB the active waypoint.

11. Since the published procedure is to intercept the MZB 326° radial (146° inbound) it is necessary to put the KLN 94 into the OBS mode and select 146° on the external Nav indicator. Fly a heading of 180° until the needle centers and track to MZB.

***NOTE**: If ATC gives you instructions for a missed approach that are different from the published missed approach procedure, it is always possible for you to select a different direct to waypoint than the default direct to waypoint.*

6.2.10. APPROACH EXAMPLE 4: COURSE REVERSAL WITH ON-AIRPORT IAF

Another common type of approach is an approach that is based on an on-airport IAF. These are typically GPS overlays of VOR or NDB approaches. An example of this type of approach is the NDB 35 approach to Mount Pleasant, TX (figure 6-43). The airport identifier for this airport is KMSA.

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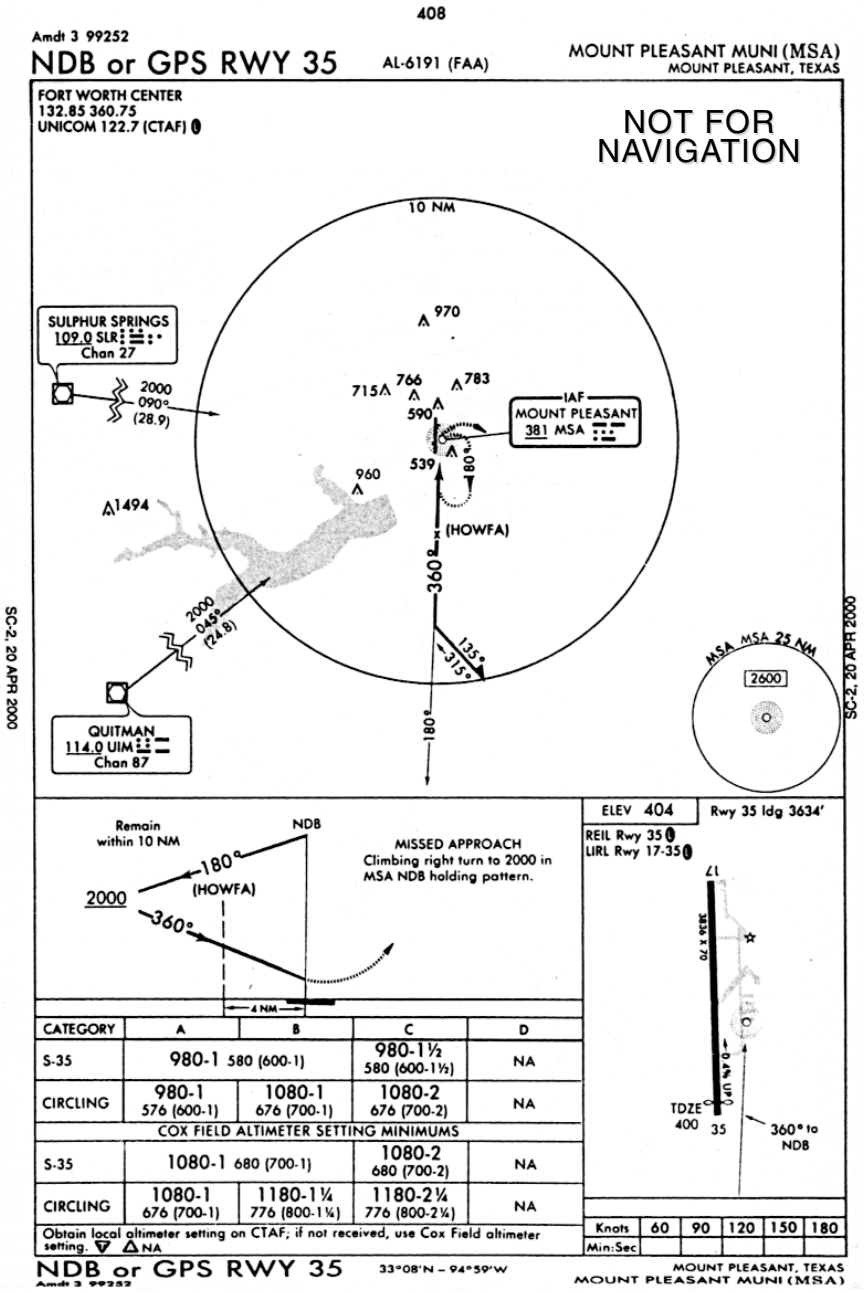


Figure 6-43

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For this example assume that the aircraft is approaching KMSA from the southwest.

1. Approximately 40 NM from the airport, load the approach using the procedure described in section 6.2.3.

2. When the distance from the present position to the destination airport reaches 30 NM, the KLN 94 will automatically arm the approach mode. The CDI scale factor will transition to ±1.0 NM and the KLN 94 will provide tighter integrity monitoring. You also press [ALT] to update the barometric information.

3. About 15 NM out you are cleared Direct MSA, cleared for the NDB or GPS 35 approach. From the Nav 4 map page you pull the right inner knob out and turn the knob to display **MSAi**, the IAF. Note that MSA is also used for the missed approach point (MAP) and the missed approach holding point so if **MSAm** or **MSAh** is displayed you've got the wrong waypoint! With the knob out, press [D►] to bring up the Direct To page with **MSAi** already displayed and then press [ENT] to proceed direct to the IAF.

4. When the aircraft is 4 NM from the MSA IAF, the KLN 94 will give a message reminding you to select the OBS mode. Press the [OBS] button to select the OBS mode. The OBS mode is required for the procedure turn. After passing MSA, select the outbound course of 180° on the external CDI or HSI.

5. The aircraft is now headed outbound for the procedure turn. As soon a practical, you will need to change the active waypoint to HOWFA, the final approach fix. From the map page this is done by pulling out on the right inner knob and scanning until HOWFA is displayed in the window (figure 6-44). Then press [D►] and then press [ENT]. The OBS course will still be what is selected on the external CDI or HSI, 180°.



Figure 6-44

***NOTE**: HOWFA was added as an FAF for using GPS receivers for this approach. The basic NDB approach has no FAF. On some approaches like this one where the IAF is based on a navaid on the airport, the FAF is identified by nomenclature such as "FF35" instead of a 5 letter waypoint name.*

6. With the OBS mode selected and HOWFA as the active waypoint, it is possible to fly the procedure turn.

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***NOTE**: For ORS 02 and higher units the procedure turn will be displayed on the map (figure 6-44a) if configured to do so on the SET 7 page. See section 3.11.4.12 for information on displaying procedure turns on the map.*



Figure 6-44a

Allow enough distance past HOWFA to complete the procedure turn and still be 2 NM away before reaching the FAF. Remember to remain within 10 NM of MSA per the chart. After completing the outbound portion of the procedure turn, change the selected course to the inbound course of 360° on the external CDI or HSI.

7. Once established on the inbound course press the OBS button to select the Leg mode so that proper approach operation and waypoint sequencing will occur.

***NOTE**: It is mandatory that the unit be in LEG mode with the FAF as the active waypoint before crossing the FAF to activate the approach active mode and change to ±0.3 NM scale factor. The CDI scale factor changes from ±1.0 NM to ±0.3 NM over the two miles to the FAF. Delaying the switch from OBS to Leg mode compresses the scale factor change. This makes the transition more abrupt. If the switch from OBS to Leg is delayed too long it will not be possible for the KLN 94 to change to the approach active mode.*

8. When the aircraft is 2 NM from the FAF, the KLN 94 will verify that the proper GPS integrity is available. If integrity monitoring is available for the approach, then the KLN 94 will change to the Approach Active mode. This will be annunciated on the right side of the KLN 94 by **APR ACTV** (or **APR**). The CDI scale factor will also start to change from ±1.0 NM to ±0.3 NM.

9. Normal waypoint alerting will occur as the aircraft passes the final approach fix. The leg from the final approach fix to the missed approach point (**MSAm**) will become active and the CDI scale factor will remain at ±0.3 NM. If the AUTO scale factor was selected on the NAV 4 page, then the scale factor will zoom in on the airport as the aircraft gets closer and closer to the missed approach point. Eventually the map scale changes to 1/2 NM.

The following steps are followed if a missed approach is required.

10. The missed approach instructions call for a climbing right turn to 2000' in the MSA holding pattern. After passing the MAP press the D► button to bring up the direct to page showing the first waypoint in the

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missed approach procedure. In this case the waypoint N35HP is displayed. This is a point located on the outbound leg of the holding pattern. We will not use it in this example. Pull the right inner knob out and turn it to display **MSAh**, the missed approach holding point. Press [ENT] to activate MSA as the hold point.

11. Press [OBS] to put the unit in OBS mode and select 360° on the external Nav indicator.

***NOTE**: On some approaches, an additional waypoint is added to the missed approach sequence by the provider of the navigation data for the database. At the time this pilot's guide is written, this waypoint is not depicted on either Jeppesen or NOS charts. It may be used as an aid in establishing the holding pattern, especially where the MAP and MAHP are the same waypoint. To use N35HP in this example put the unit in the OBS mode and select 180° on the external Nav indicator. After passing N35HP activate MSAh and select 360° on the external Nav indicator.*

6.2.11. APPROACH EXAMPLE 5: DME ARC

DME arc procedures with the KLN 94 are completely different from using traditional VOR and DME equipment. Don't worry though because DME arc procedures using the KLN 94 are also much easier than using traditional equipment. This is because the KLN 94 provides left/right guidance around the arc. No more having to watch distance in one place and radial in another!

In many cases you do not actually fly to the beginning of an arc, especially in a radar environment. Instead, the flight path of the aircraft generally intersects the arc at some point. Once the aircraft is near the arc, it is then possible to turn so that the arc distance is maintained until time to turn to the inbound fix.

The following example will show how DME arc procedures are flown using the KLN 94. This example approach will be to use the VOR/DME 22 approach at Rocky Mount, NC (KRWI). The approach plate for this approach is in figure 6-45. Assume that the aircraft is approaching from the southeast of TYI VOR and it includes TYI in FPL 0 (figure 6-46**)**.



Figure 6-46

1. ATC assigns the VOR/DME RWY 22 approach. Press the [PROC] button to bring up the PROC 1 page. The cursor is already over **Select Approach** so press [ENT] to bring up the PROC 2 page. Select KRWI

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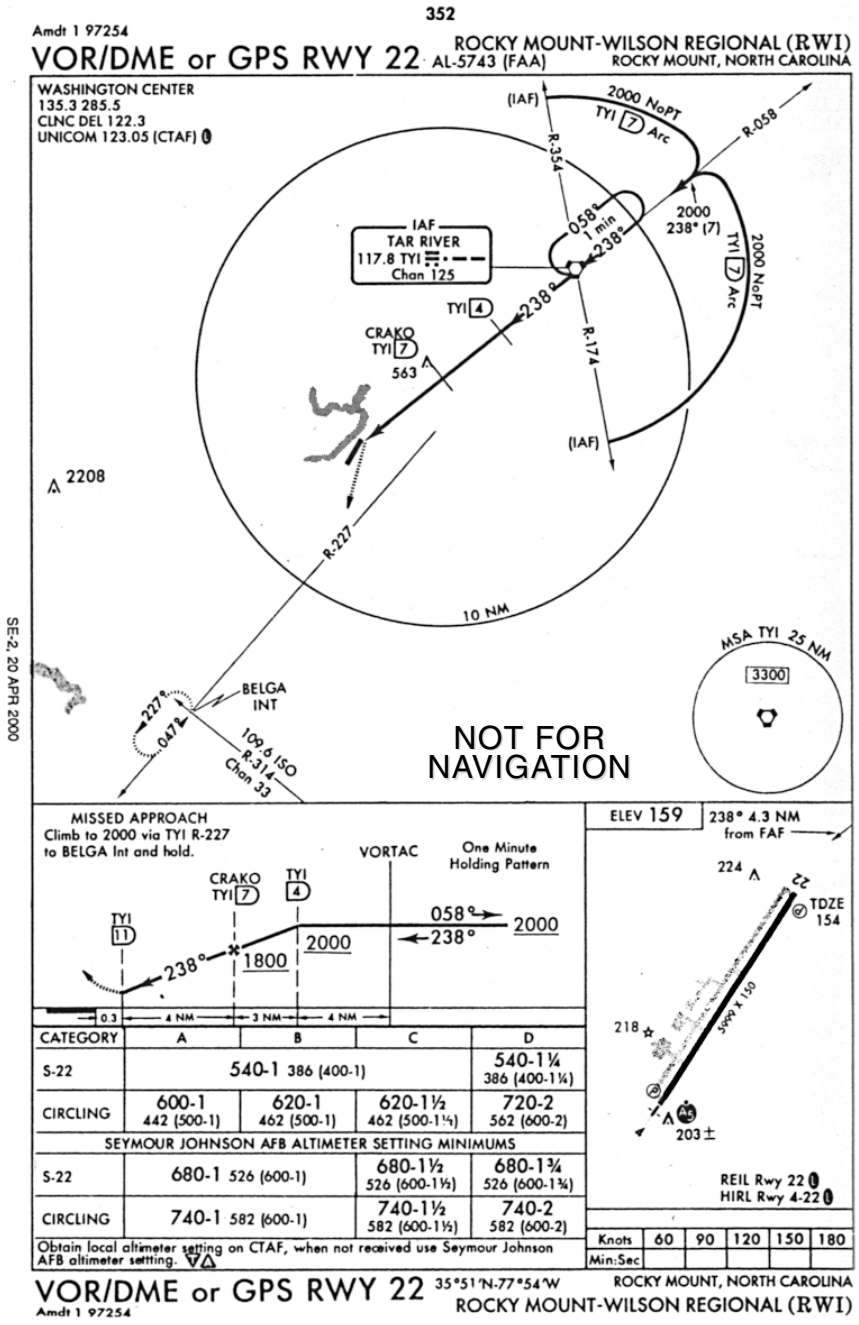


Figure 6-45

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and press ENT to display the list of approaches for KRWI. Move the cursor over **VOR/D 22** and press ENT to bring up the list of IAFs (figure 6-47).



Figure 6-47

2. There are four choices for the IAF including Vectors. Two of these choices you can recognize but the other two, D174G and D354G, are unfamiliar and not shown on this chart (however they shown on the respective Jeppesen chart). These two waypoints are the database identifiers for the ends of the arc as explained in section 6.2.4. D174G means DME arc point, 174 is the radial on which the waypoint lies, and G indicates the distance of the arc. G is the seventh letter of the alphabet so the G indicates that this is a 7 DME arc. In a similar manner D354G can also be decoded. In this example the aircraft is approaching from the south-east so the D174G IAF will be selected.

3. The KLN 94 knows that this point is associated with a DME arc. Once an arc IAF waypoint is chosen, the KLN 94 determines what radial of the reference VOR the aircraft is presently located on. A waypoint is created that is located at the intersection of the present radial and the DME arc. This waypoint is first in the list of waypoints presented on the APT 8 page before loading the approach into the flight plan (figure 6-48). Since the aircraft was located on the 132 radial of TYI when the approach was loaded into FLP 0, the waypoint loaded into the approach is D132G. This waypoint is named using the same convention discussed earlier.



Figure 6-48

***NOTE**: If the present radial from the reference VOR is outside of the defined arc, then the KLN 94 will default to the beginning of the arc.*

CAUTION: The KLN 94 does not take into account the geometry of the active flight plan when determining the arc intercept point. This point is defined solely on the present radial and the defined arc distance from the reference VOR. For this reason it is better to delay selecting approaches that contain DME arcs until the aircraft is closer to the destination.

4. With the cursor over **ADD TO FPL 0?**, Press ENT. The approach will be loaded into the active flight plan just like any other approach would be.

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5. After the approach is loaded into the flight plan the KLN 94 may give the message:

   ***Redundant Wpts In FPL**

   Edit En Route Wpts

   As Necessary

   This message is given because very often it will be necessary to edit the active flight plan to ensure that proper waypoint sequencing occurs. Examine the flight plan and, if practical, observe the NAV 4 page to make sure that the sequence of waypoints does not have any unnecessary legs in it. In our example TYI was in the original flight plan and TYI was added as one of the approach waypoints. Delete the en route TYI from the flight plan.

6. The KLN 94 will now provide guidance to the arc intercept point, D132G. The NAV 4 page displays the entire arc on the screen. The portion that is between the beginning of the arc and the arc intercept is drawn with a dashed line. The part that is between the arc intercept point and the end of the arc is drawn with the normal solid line (figure 6-49).

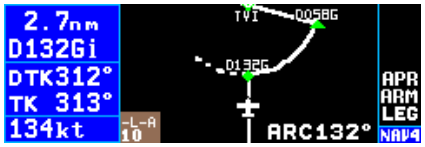


Figure 6-49

7. In some cases ATC may provide radar vectors to the arc. The KLN 94 provides a means to define a new intercept point based on where the aircraft's current track over the ground intercepts the DME arc. This can be done from either the NAV 4 page or from the FPL 0 page. The dashed line displayed on the NAV 4 page will help you to determine if ATC is giving you correct vectors.

   • From the NAV 4 page, pull out the right inner knob to bring up the waypoint scanning window.

   • Turn the right inner knob until the first waypoint of the arc is displayed, **D132Gi** in this example. For approaches this will have a small "i" appended to the waypoint name since it's serving as an IAF. If the recalculation is to be done from the FPL 0 page, then turn on the cursor and move it over the first waypoint of the arc.

   • From either page press CLR. This will change the waypoint to read **MOVE?** (figure 6-50). To recompute the arc intercept point then press ENT. If a new arc intercept point is not desired then press CLR again.



Figure 6-50

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- If ENT was pressed, then the KLN 94 will calculate an arc intercept point based on the point where the aircraft's present track over the ground intercepts the DME arc. If necessary, do a Direct To operation to the new arc intercept point.

***NOTE**: If the present track does not intercept the arc, then the KLN 94 will display **No Intcpt** in the scratchpad area of the screen.*

8. When the aircraft approaches the arc the KLN 94 will provide waypoint alerting and turn anticipation to join the arc.
9. Once established on the arc the KLN 94 provides left/right guidance relative to the curved arc. Distance to the active waypoint is the distance from the present position to the active waypoint, NOT the distance along the arc. Refer to Appendix A for the geometry of the arc.
10. During the arc, the desired track will be constantly changing. To help you keep the orientation, pay close attention to the DTK on line 3. The value displayed for the desired track will flash when the difference between the CDI or HSI and the current desired track is greater than 10°.
11. Some DME arcs have defined radials that serve as step down fixes. These points are not stored in the database. To help you determine your position relative to these step-down points along the arc, the KLN 94 will display a new value in the bottom right corner of the display on the NAV 4 page. This new bit of information is denoted by the letters **ARC** followed by three numbers. The three numbers represent the current radial that you are on relative to the reference VOR/DME. The arc radial is forced into this position when the aircraft is 30 NM from the arc. The **ARC** display is shown in figure 6-49. Just watch this value and when it reads the same as one of the step-down points you can descend as necessary. This particular example does not have such points, but there are quite a few approaches that do.

***NOTE**: Autopilot performance may not be satisfactory if coupled in the NAV mode while flying the arc. Many autopilots were never designed to fly curved paths. If autopilot performance is not satisfactory while flying DME arcs, select the HDG mode and keep changing the heading bug to keep the D-bar centered.*

12. As the aircraft approaches the turn-in point of the arc (D058G), the KLN 94 will provide waypoint alerting and turn anticipation to the next leg to TYI.

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13. Passing TYI the KLN 94 will sequence to CF22 which is depicted on the U.S. Government chart as 4 NM from TYI. The CF22 designation is shown on the Jeppesen chart.

14. After passing CF22 the KLN 94 will sequence to CRAKO the FAF.

15. When the aircraft is 2 NM from CRAKO, the KLN 94 will transition to the approach active mode. Since the DME arc procedure is flown entirely in the LEG mode the only possible problem would be if the integrity monitoring did not check out.

16. Passing CRAKO the KLN 94 sequences to MA22, the MAP.

If a missed approach is needed use the following steps:

17. The KLN 94 will not automatically sequence past the MAP. After passing the MAP press the [D►] button to bring up the Direct To page with BELGA already entered. Press [ENT] to activate BELGA.

18. Press [OBS] to put the KLN 94 into the OBS mode and select 227° on the external Nav indicator.

19. After crossing BELGA, select 47° on the external Nav indicator and enter the holding pattern in the conventional manner.

***NOTE**: If ATC gives you instructions for a missed approach that is different from the published missed approach procedure, it is always possible for you to select a different direct to waypoint than the default direct to waypoint.*

6.2.12. ILS AND OTHER NON-APPROVED APPROACHES

The KLN 94 may be used to provide situational awareness for approaches, such as an ILS, not approved for GPS. Using the map with the approach loaded can provide the same excellent orientation that it provides for an approved approach. Operation of the approach is similar to approved GPS non-precision approaches with the following differences:

- On the APT 8 page showing the list of approaches, remember that non-approved approaches do not have the letters "GPS" after the approach name. In figure 6-51, the ILS 01L and the VOR 01L approaches are not approved for GPS.



Figure 6-51

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- When a non-approved approach is selected, a page as shown in figure 6-52 is displayed to remind you that the KLN 94 can only be used to provide situational awareness for monitoring the approach. You must acknowledge the page by pressing ENT. Approved navigation equipment such as VOR/ILS, DME, ADF, etc. must be used as the primary source of navigation.



Figure 6-52

- Since another navigation source is providing primary navigation guidance, the KLN 94 may not be driving the CDI or HSI. One consequence of this is that if the OBS mode is used, such as for a missed approach procedure, the selected OBS course will have to be manually entered by pressing CRSR and using the right inner knob to enter the desired value.

- The unit will NOT enter the approach active mode. It will remain in approach arm (**APR ARM**) or terminal (**TERM**) mode depending on how the unit has been configured (see section 6.2.1).

6.2.13. USING GPS DISTANCE AS A SUBSTITUTE FOR DME ON LOCALIZER-TYPE APPROACHES

The FAA allows the use of GPS distance as a substitute for DME on localizer-type approaches when the DME facility is stored in the GPS database. The KLN 94 stores DME's associated with localizer-type approaches using the navaid identifier of the approach. For example, the DME facility associated with the ILS DME Rwy 33 approach for Burlington International airport is stored in the KLN 94's database as **IVOE** (figure 6-53). These DME's are stored in the intersection part of the database.

***NOTE**: Approach DME facilities are not stored as waypoints that are part of an approach procedure so you can not gain access to them by calling up the associated approach. For example, IVOE is not included in the waypoints that would be loaded into FPL 0 if you selected the ILS 33 for Burlington International. To get distance from the IVOE DME facility enter IVOE as a normal flight plan waypoint or direct to waypoint.*

***NOTE**: If outside the U.S. check with authorities for compliance with local regulations.*

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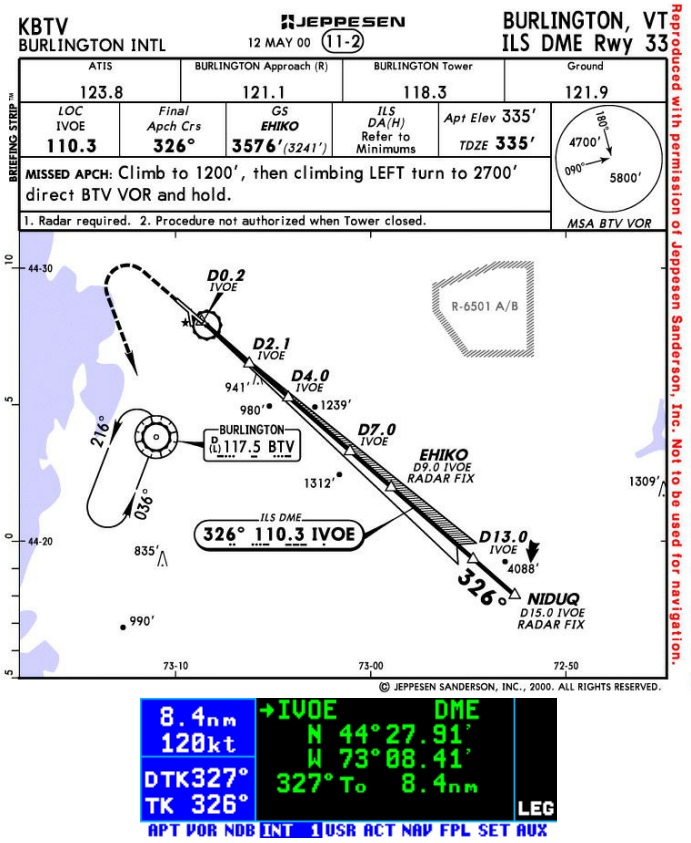


Figure 6-53

6.2.14. APPROACH PROBLEMS

Very rarely there will be a problem with the integrity of the GPS system while you are conducting non-precision approaches with the KLN 94. In some cases the KLN 94 will determine that there will not be sufficient integrity monitoring for the leg between the FAF and the MAP, or RAIM is not currently available. In these cases the KLN 94 will not go into the approach active mode and will present the following message:

***RAIM Not Available**
APR Mode Inhibited
Predict RAIM on AUX 3

In these cases you will not be able to finish the approach because there is insufficient integrity monitoring. The AUX 3 (Auxiliary 3) page provides a means for you to predict when RAIM will be available if the KLN 94 is configured for IFR approach operation.

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To perform a RAIM prediction on the AUX 3 page three pieces of information are needed. The first is the location that the prediction will be for and the second is the time for the prediction.

The destination waypoint will, by default, be the missed approach point of an approach loaded in the flight plan. If there is no approach in the flight plan, then the default waypoint is the last waypoint in the active flight plan. Of course it is possible for you to enter any waypoint in this field.

The time used for the RAIM prediction will be the current ETA to the destination airport or the MAP. This time is automatically updated by the KLN 94 so there is usually no need to enter a value. If you are making a RAIM calculation for planning purposes, it is also possible to enter a time in this field. An important point about this time is that the time used for RAIM prediction is always in the future and limited to 24 hours from the present time. For example, if the time is now 19:30 and the time entered for the ETA is 18:30, then the prediction will be made for the next day not one hour ago.

The third piece of information is to deselect a satellite (**SV**) if you know from some official source that it is unusable. A satellite entered on the AUX 3 page is ONLY deselected for RAIM prediction.

To perform a manual RAIM calculation:

1. Turn the left outer and inner knobs to select the AUX 3 page.
2. Press CRSR. The cursor will be over the **RAIM @Dest** field.
3. If the default waypoint is not the one desired, enter the desired waypoint identifier by using the inner and outer knobs just like you do for any other waypoint entry.
4. Once the desired waypoint identifier is entered (figure 6-54), press ENT. Press ENT again to approve the waypoint page.



Figure 6-54

5. The cursor will now be over the ETA field. Use the inner knob to enter the desired hour. Note that the system time zone is displayed next to the ETA field. Use the outer knob to move the cursor over the minutes field. Use the inner and outer knobs to select tens of minutes and single minutes as required. When the desired time is selected press ENT. The RAIM calculations will start.

***NOTE**: If you wish to deselect a satellite from the RAIM calculation, move the cursor to the **Deselect SV** field and turn the right inner knob to select the satellite (SV) number. Unless you know otherwise, leave this field as **NONE**.*

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6. Turn the cursor off.

7. The RAIM calculation will usually take a few seconds before an answer is reached. During this time the AUX 3 page will be as shown in figure 6-55.

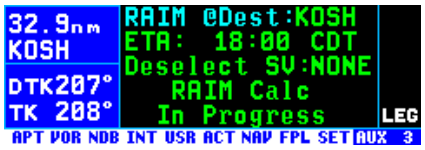


Figure 6-55

8. Once the RAIM calculation is complete, the AUX 3 page will indicate the results of the test graphically in a bar graph format. The center of the graph represents the ETA. Each bar represents five minutes of time. The RAIM calculation is good for ±15 minutes of ETA. Bars above the line indicate RAIM is available and bars below the line indicate when RAIM is not available.

An example is shown in figure 6-56. There can be two AUX 3 pages if necessary to display all the information. RAIM is not available from 15 minutes before ETA until 5 minutes before ETA. However, RAIM is predicted to be available from then until 15 minutes after the ETA. By showing the times when RAIM will be available it is possible for you to alter your ETA to ensure that there will not be any RAIM problems.



Figure 6-56

Even more rare will be the case when the KLN 94 cannot provide sufficient integrity monitoring or if there is an actual satellite failure while the aircraft is on the leg from the FAF to the MAP. In these cases the KLN 94 will FLAG the navigation solution and a missed approach will have to be flown. The KLN 94 will provide the following message:

***Press PROC Button Now For NAV**

This message is telling you to cancel the approach mode by pressing the PROC button. This will change the unit to the approach-arm (or TERM) mode and navigation information will usually be restored.

6.3. DP/STAR PROCEDURES

The KLN 94 allows access to navigation DPs (Departure Procedures) and STARs (Standard Terminal Arrival Routes) by DP/STAR name. DP/STAR procedures stored in the database can only be considered accurate as long as the database is current. Even though the database contains DP and STAR procedures, there is a lot of information that is not included in the database. Therefore, the paper chart is still the primary source of information. For example, many procedures require the aircraft to fly to a certain altitude, along a heading until intercepting a course, and many other procedures that the KLN 94 can not automatically accomplish. Many

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procedures require pilot action to ensure that the proper path is flown over the ground. The main purpose of loading a DP or a STAR into the active flight plan is to provide you with a quick way of loading a potentially large number of waypoints.

It is mandatory that you are comfortable with the operation of the KLN 94 before attempting to fly DP and STAR procedures. In particular, flight plan operation and the OBS mode should be second nature to you.

***NOTE**: There are some DP/STAR procedures in the world that are not suited for the operational characteristics of the KLN 94. These procedures are not included in the database and therefore the waypoints that make up these procedures would have to be entered manually. It is good preflight practice ensure that the KLN 94 contains anticipated procedures for the flight.*

DP and STAR procedures are accessed through the Procedure (PROC) pages using the PROC button. The PROC pages provide quick access to the APT 7 pages where the DP and STAR procedures are stored with the airport for which they apply.

DP and STAR procedures are defined in three parts. The parts are the DP or STAR name (e.g., PORTE3), a transition (e.g., Fellows), and a runway specific component (e.g., RW 01L). The PROC and APT 7 pages lead you through the selection process.

6.3.1. SELECTING A DP

Use the following procedure to select a DP. Some steps may not be necessary depending on the procedure that you wish to fly. For this example, the PORTE three departure from San Francisco International (KSFO) will be used.

To select a DP:

1. Make sure the departure airport has been entered as the first waypoint in FPL 0.
2. Press the PROC button to bring up the PROC 1 page. Turn the right outer knob counter-clockwise to position the cursor over **Select Depart?** (figure 6-58).
3. Press ENT to display the PROC 2 page (figure 6-59).

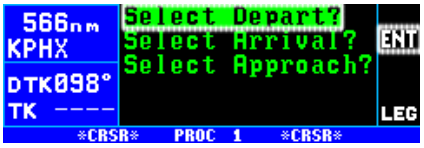


Figure 6-58



Figure 6-59

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***NOTE**: Normally, the desired departure airport will already be displayed with the cursor on it. In case it is not, move the cursor over the desired airport or, if necessary, enter the airport identifier in the blank field on the page and press ENT once to bring up the waypoint page for the airport and a second time to approve it. If an airport is entered that doesn't have a DP the scratchpad message **No DP at APT** will be displayed.*

4. Press ENT to bring up the APT 7 page for KSFO which displays a list of DPs for KSFO. At the time of this writing there are 11 DPs for KSFO. Rotate the right outer knob until the cursor is over **PORTE3** (figure 6-60). With the cursor over **PORTE3**, press ENT.



Figure 6-60

5. The KLN 94 will now ask which runway that you will be using. For this example select **RW01B** (figure 6-61) and press ENT. The "**B**" stands for "Both" so selecting **RW01B** means it is applicable to runways 1L and 1R.



Figure 6-61

6. The last bit of information needed to define this DP is the transition. This example uses the Fellows transition. To select the Fellows transition, move the cursor down to **FLW** (figure 6-62) and press ENT.



Figure 6-62

7. The KLN 94 now presents a list of waypoints that make up the DP (figure 6-63). Review these waypoints if desired. If the waypoints look correct then press ENT with the cursor over **ADD TO FPL 0?** to load the DP into the active flight plan.



Figure 6-63

8. The KLN 94 will then add the DP procedure after the airport reference point in the active flight plan (figure 6-64). If the airport reference point is not included in the active flight plan, then the KLN 94 will ask to add this waypoint to the active flight plan.



Figure 6-64

Section 6.3.4 gives the actions required to fly this DP.

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6.3.2. SELECTING A STAR

The steps required to select a STAR are very similar to those required to select a DP. The only difference is the order of the steps to define the STAR and where the STAR is loaded into the flight plan. The steps required to define the Glen Rose Five arrival (coded JEN5) with the Wink transition serve as an example of how to select a STAR. This STAR is to the Dallas/Fort Worth International airport (KDFW).

To select a STAR:

1. Make sure the arrival airport, KDFW, is in FPL 0 or is the direct to waypoint.
2. Press the PROC button to display the PROC 1 page. Turn the right outer knob counter-clockwise to position the cursor over **Select Arrival?** (figure 6-65).

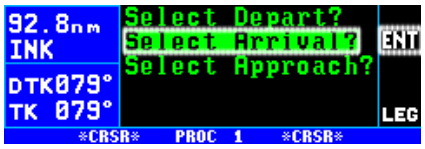


Figure 6-65

3. Press ENT to display the PROC 2 page.

***NOTE**: Normally, the desired arrival airport will already be displayed with the cursor on it. In case it is not, move the cursor over the desired airport or, if necessary, enter the airport identifier in the blank field on the page and press ENT once to bring up the waypoint page for the airport and a second time to approve it. If an airport is entered that doesn't have a STAR the scratchpad message **No STAR at APT** will be displayed.*

4. With the cursor over KDFW, press ENT. The APT 7 page for KDFW is displayed showing a list of STARs for KDFW (figure 6-66).



Figure 6-66

5. Rotate the outer knob to move the cursor over **JEN5** (figure 6-67). Press ENT.



Figure 6-67

6. The KLN 94 will now ask which transition you want to use. For this example we want INK so move the cursor over **INK** (figure 6-68). Press ENT.



Figure 6-68

7. In cases such as this one, the STAR procedure requires you to select a specific runway. In this example we will land on

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runway 17R so move the cursor over **RW17R** (figure 6-69). Press ENT. If the STAR does not require a specific runway the KLN 94 skips this step.



Figure 6-69

8. The KLN 94 now presents a list of waypoints that make up the STAR (figure 6-70). Review these waypoints if desired and then press ENT to load the STAR into the active flight plan.

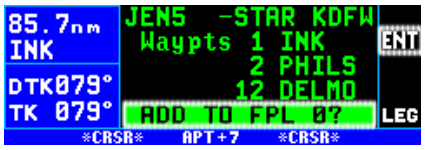


Figure 6-70

9. The KLN 94 will then add the STAR procedure before the airport identifier in the active flight plan (figure 6-71). If the airport is not included in the active flight plan, then the KLN 94 will ask to add this waypoint to the active flight plan.



Figure 6-71

***NOTE**: It is not possible to load a DP or STAR into a flight plan other than FPL 0. Furthermore, DP and STAR procedures are deleted from FPL0 after the power is off for more than 5 minutes.*

6.3.3. EDITING A DP OR STAR

From the proceeding two examples you may have noticed that DP and STAR procedures have procedure "headers" just as approaches do. It is possible to use these headers to delete and change the entire procedure just like is done with approach procedures. One difference between DP and STAR procedures and approaches is that it is possible to add waypoints to and delete waypoints from the published procedure. To help you differentiate between approaches (no adding or deleting waypoints allowed) and DP or STAR procedures (adding and deleting waypoints allowed) the waypoint number for a DP or STAR waypoint has a period (.) next to it instead of a blank space. The period also differentiates a DP or STAR waypoint from a "regular" waypoint that has a colon (:) next to the waypoint number.

To add an individual waypoint in the DP or STAR procedure:

1. Use the right knobs to select the FPL 0 page.
2. Turn the cursor on by pressing the CRSR. Rotate the right outer knob as necessary to position the cursor over the waypoint identifier which you desire to follow the waypoint being added.

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3. Use the right inner and outer knobs in the normal manner to define the desired waypoint.

4. Press [ENT] to display the waypoint page for this identifier. If the waypoint is correct, then press [ENT] a second time to confirm the waypoint page. The new waypoint is added to the waypoints that make up the DP or STAR procedure.

To delete an individual waypoint in a DP or STAR procedure:

1. Use the right knobs to select the FPL 0 page.

2. Rotate the right outer knob to place the cursor over the waypoint to be deleted.

3. Press [CLR]. The letters **DEL** (delete) will appear to the left of the identifier and a question mark will appear to the right of the identifier.

4. If this is the desired waypoint to delete, then press [ENT]. If it is not the desired waypoint, press [CLR].

***NOTE**: Adding waypoints to or deleting waypoints from DP or STAR procedures does not change the way that they are stored in the published database.*

To delete an entire DP or STAR procedure from the active flight plan:

1. Use the right knobs to select the FPL 0 page.

2. Turn the cursor on by pressing the [CRSR]. Move the cursor over the DP or STAR procedure header by using the left outer knob. When the cursor is moved over the header it changes to read **CHANGE STAR?** or **CHANGE DP?**.

3. With the cursor over the procedure header, press [ENT] to change the DP or STAR, or press [CLR] and then [ENT] to delete the entire procedure.

***NOTE**: Any waypoints manually added to a DP or STAR will be deleted if the DP or STAR is changed or deleted using the above procedure.*

To change a DP or STAR procedure in the active flight plan:

1. Press the [PROC] button to bring up the PROC 1 page. Move the cursor over **Select Depart?** or **Select Arrival?** as appropriate. Press [ENT] to display the PROC 2 page.

2. With the cursor over the desired airport, press [ENT] to display the APT 7 page showing the list of DPs or STARs. Select the new DP or STAR, transition, and runway in the normal manner.

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3. When the list of DP or STAR waypoints is displayed, the bottom of the page will now show **REPL FPL 0 DP?** for a DP or **REPL FPL 0 STAR?** for a STAR. Press [ENT] to replace the DP or STAR in FPL 0.

6.3.4. EXAMPLE OF A DP PROCEDURE

To illustrate the use of the KLN 94 with a DP, the Porte Three departure loaded into the flight plan in section 6.3.1 will be used. Remember that "RW01B" was selected meaning that the procedure is applicable to both runways 1L and 1R. The Fellows (FLW) transition was also selected. This procedure is one of the more difficult that you may encounter. Most procedures are not this difficult, but this DP serves as a good example for what steps to take when you encounter a difficult procedure.

To fly this procedure use the following steps and refer to the chart for this DP (figure 6-72):

1. Load the DP as described in section 6.3.1.
2. The procedure states "Intercept and proceed via SFO R-350, cross the 4 DME fix at or above 1600'...". To accomplish this portion of the DP, put the KLN 94 into the OBS mode with SFO as the active waypoint and make 350° the selected course on the external Nav indicator. It is easiest to accomplish these steps before take-off. After take-off intercept the SFO 350° radial and climb to 1600' as required by the DP.
3. Once the aircraft reaches the SFO 4 DME fix, turn left to a heading of 200°. At this point it is necessary to manually change the active waypoint to "PORTE". This is done easily from either the NAV 4 page or from the FPL 0 page. In either case, once PORTE is highlighted by the cursor, press [D►] to bring up the direct to page.
4. Press [ENT] to confirm PORTE as the direct to waypoint.
5. Change the selected course on the HSI or CDI to the new value of 135°. As required by the DP, continue flying a heading of 200° until the HSI or CDI needle centers and then fly to keep the needle centered and fly to PORTE.
6. Before reaching PORTE, change back to the Leg mode to enable automatic waypoint sequencing. Once the aircraft reaches PORTE the KLN 94 will automatically sequence to the next waypoint, PESCA.
7. After passing PESCA, the procedure calls for a 090° heading until intercepting the 116° course to WAGES intersection. To do this with the KLN 94, change back to the OBS mode and make sure that WAGES is the active waypoint. Set the selected course to 116° on the HSI or CDI.

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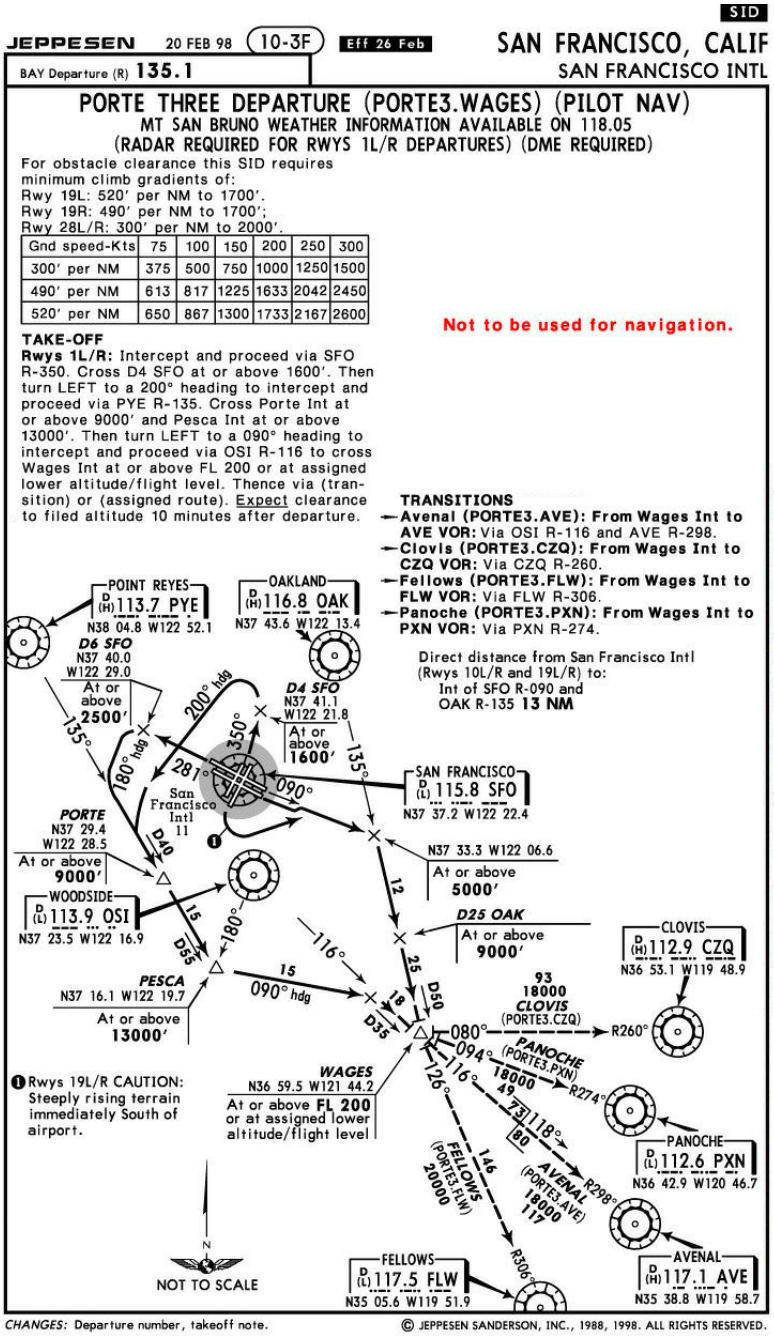


Figure 6-72

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8. Before reaching WAGES change to the Leg mode. This will allow automatic waypoint sequencing upon reaching WAGES.

9. Once the aircraft reaches FLW, proceed on with the rest of the flight plan as required.

6.3.5. EXAMPLE OF A STAR PROCEDURE

To illustrate the use of the KLN 94 with STAR procedures the steps required to fly the Glen Rose Five arrival to Dallas/Fort Worth International will be shown in this section. This procedure, while lengthy, is considerably simpler than the previous DP example.

For this example assume that the aircraft departs from El Paso, Texas and files for the Glen Rose Five arrival (coded JEN5) with the Wink transition. Use the following steps to fly this procedure with the KLN 94 and refer to the chart for this STAR (figure 6-73):

1. Load the STAR into the flight plan as described in section 6.3.2. Remember, we selected runway 17R when we selected the STAR.

2. For this STAR the KLN 94 will automatically guide the aircraft along the proper route from INK until the JEN VOR.

3. Long before reaching JEN examine this procedure and notice that landing south, turbojets fly to DELMO intersection while non-turbojets fly to CURLE intersection. The database in the KLN 94 has the sequence of waypoints for the turbojet procedure NOT the sequence for non-turbojets.

***NOTE**: It is rare to have a different path over the ground for turbojets and non-turbojets, but be sure to cross check with your paper charts.*

If the aircraft you are flying in is a turbojet, then fly the STAR all the way to DELMO with no changes to the flight plan. Remember you can edit DPs and STARs by adding and deleting waypoints.

4. If the aircraft is not a turbojet you may wish to delete DELMO from FPL 0. To do this, turn on the cursor and rotate the right outer knob until the cursor is over DELMO.

5. Press [CLR] and then [ENT] to delete a waypoint.

6. The rest of the STAR can now be flown.

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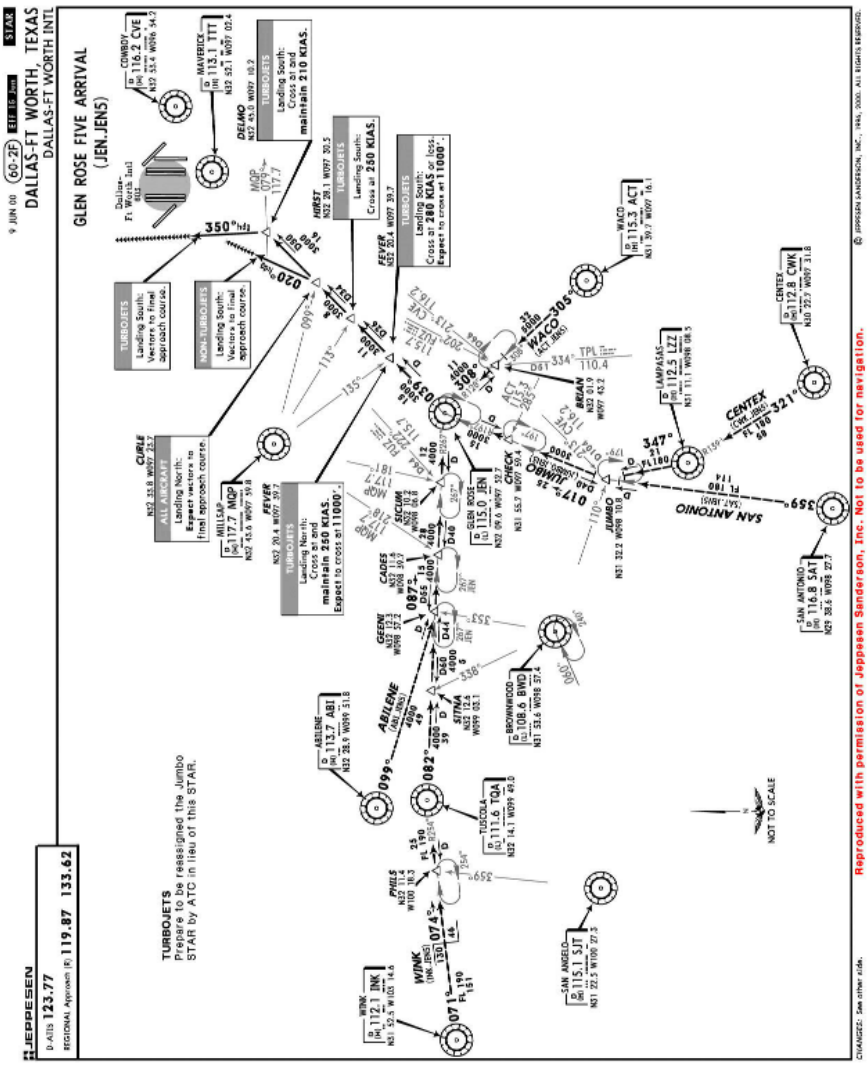
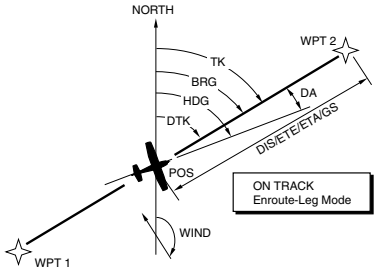


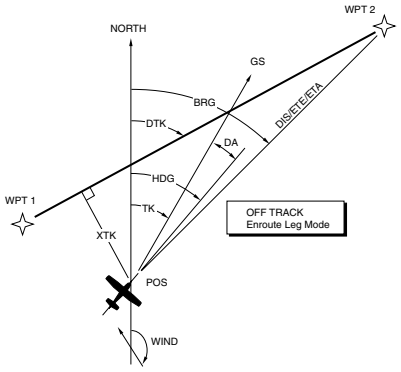
Figure 6-73

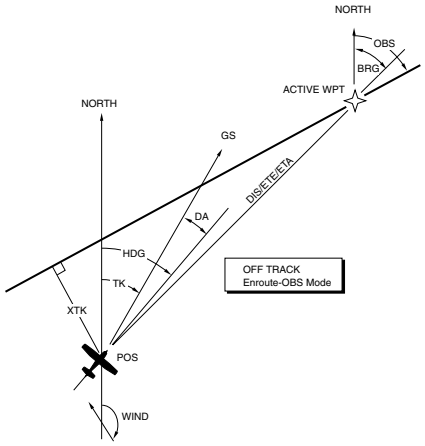
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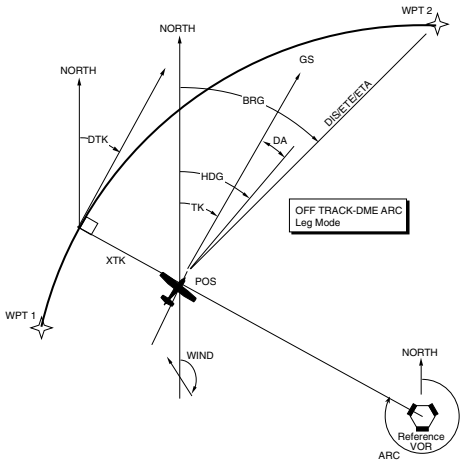
APPENDIX A - NAVIGATION TERMS

ARC - Radial from reference VOR when executing an approach procedure with a DME arc.
BRG - Bearing to waypoint (degrees)
DA - Drift Angle (degrees)-not displayed on KLN 94
DIS - Distance to waypoint (nm)
DTK - Desired Track (degrees)
ETE - Estimated Time Enroute (hrs:min)
ETA - Estimated Time of Arrival
GS - Groundspeed (nm/hr)
HDG - Heading (degrees)
OBS - Selected Course
POS - Present position
TK - Actual Track (degrees)
WPT - Waypoint
XTK - Cross Track Error Correction (nm) displayed as "FLY L 2.3 nm"









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APPENDIX B - MESSAGE PAGE MESSAGES

XXXXX Deleted
From FPL 0 - The displayed waypoint has been deleted from the active flight plan (FPL 0) when an approach, DP or STAR was added to FPL 0. The pre-existing waypoint was deleted because adding the APR/DP/STAR to the flight plan caused the same waypoint to be listed consecutively in FPL 0. If the APR/DP/STAR is later deleted from FPL 0 the original waypoint can only be restored by manual re-entry.

Adj Nav Crs to XXX° - (Adjust navigation indicator course to XXX°) When this message appears, you should select the suggested course on the HSI or CDI. When the KLN 94 is in the Leg mode, this message occurs during turn anticipation (prior to reaching the active waypoint) if the upcoming course change is greater than 5° and anytime the indicator's selected course needs to be adjusted to match the KLN 94 desired track. This message will only be displayed if the KLN 94 is installed such that it can "read" the selected HSI or CDI course. See section 4.2.2.

Aero Database Outdated,
All Data Must be
Confirmed Before Use - This message appears when the aeronautical database is out of date as a result of a date and time entered on the SET 2 page or Self-Test page or as a result of a pilot-entered date being over-ridden by a date from the GPS receiver.

Airspace Alert
[name and type of special use airspace]
[altitude boundaries]
[responsible ATC facility] — This message appears when the estimated time to enter a special use airspace (SUA) is approximately 10 minutes or when the distance from an area of special use airspace is less than two nautical miles. See section 3.13.

All Wpt Remarks Used,
Delete on AUX 13 Page - This message will be displayed if you attempt to enter a waypoint remark and the user database already contains 100 waypoint remarks.

Altitude Fail - This message will be displayed if the altitude input becomes invalid during operation.

APR ACTV Annunciator
Fail — This message appears when there is a failure of the KLN 94 external ACTV annunciator drive circuitry. Service unit as soon as possible.

APR ARM Annunciator
Fail — This message appears when there is a failure of the KLN 94 external ARM annunciator drive circuitry. Service unit as soon as possible.

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Arm GPS Approach — If the approach ARM mode has been disarmed with the optional external GPS Approach switch, the KLN 94 will remind you to arm the approach mode when the aircraft is 3 nautical miles from the Final Approach Fix (FAF). Arm the approach mode with the GPS Approach switch if it is desired to use the KLN 94 for conducting an approach.

Bad Satellite Geometry And RAIM Not Available — This message appears only when the KLN 94 is in the approach active mode, RAIM is not available and the satellite geometry has further degraded to cause more uncertainty of the aircraft position. This message may be followed by a NAV flag (in a couple of minutes) if conditions continue to degrade.

Bad Satellite Geometry See EPE on AUX 1 page — This message appears following a message that RAIM is not available. This means that the geometry of the satellites is such that the possible error in position is greater than allowed for IFR use. Cross check the position of the aircraft with other means of navigation every 15 minutes to verify that the position is still accurate.

Check APR ACTV Annunciator — This message appears when an overcurrent condition is detected on the external ACTV annunciator output. It is usually indicative of a failure of the wiring between the KLN 94 and the ACTV annunciator. Have the installation checked to determine the problem.

Check APR ARM Annunciator — This message appears when an overcurrent condition is detected on the external ARM annunciator output. It is usually indicative of a failure of the wiring between the KLN 94 and the ARM annunciator. Have the installation checked to determine the problem.

Check MSG Annunciator — This message appears when an overcurrent condition is detected on the external MSG annunciator output. It is usually indicative of a failure of the wiring between the KLN 94 and the MSG annunciator. Have the installation checked to determine the problem.

Check Real Time Clock — This message appears when a possible fault is detected with the KLN 94's internal real time clock. This condition does not require immediate service. Manually initialize the time on the Initialization Page to minimize the time to first fix (see section 3.7).

Check WPT Annunciator — This message appears when an overcurrent condition is detected on the external WPT annunciator output. It is usually indicative of a failure of the wiring between the KLN 94 and the WPT annunciator. Have the installation checked to determine the problem.

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Database Error: AERO
Data Not Useable - This message appears if the aeronautical database fails an internal test when the KLN 94 is turned on.

Database Error: LAND
Data Not Useable - This message appears if the land database fails an internal test when the KLN 94 is turned on

Enable Turn Anticipation For GPS Approach - This message is displayed if an approach has been loaded into FPL 0, the aircraft is within 30 NM of the approach airport, AND turn anticipation has been disabled on the SET 10 page. For proper approach operation, enable turn anticipation on the SET 10 page per section 4.2.2.

GEN RS-232 Data In
Error — This message appears when an error is detected in the received RS-232 data such as from a fuel management or air data system.

GPS Course is XXX° — This message is displayed to notify the user that the GPS desired track (DTK) has changed. This message will only be displayed when the KLN 94 is not "reading" selected course from an external HSI or CDI. When the KLN 94 is in Leg mode, this message occurs if the course change is greater than 5°.

If Required Select OBS — This message appears when the aircraft is 4 nautical miles from a waypoint which could be used as the basis for either a procedure turn or a holding pattern and the KLN 94 is in the LEG mode. Select the OBS mode when flying procedure turns or holding patterns. This message is advisory only. If no procedure turn is required then no action is required.

If Using Procedure
Turn Reduce Speed
To Remain Within
Protected Area— The aircraft's flight path may extend beyond the protected airspace for the procedure turn if the aircraft's present ground speed is maintained. It is always the pilot's responsibility to stay within the airspace specified on the instrument approach chart for the procedure turn.

Inside SUA
[name and type of special use airspace]
[altitude boundaries]
[responsible ATC facility] — (Inside Special Use Airspace) This message appears when the aircraft is inside special use airspace (SUA). See section 3.13.

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Internal Battery Low:
Service Required to
Prevent Data Loss— This message appears when the KLN 94's internal battery is low and needs replacing at an authorized Bendix/King service center. The battery should be replaced within a week to prevent the loss of all user-defined data including waypoint, airport remarks, flight plans, etc. Typical battery life is approximately three to five years.

Low Bus Voltage
Check Charging System — This message appears when the voltage on the aircraft power bus drops below the alert voltage for longer than the alert delay time. Both the alert voltage and alert delay time are displayed on the SET 9 page and set at the time of KLN 94 installation. In addition, the SET 9 page displays the present power bus voltage. This message may be indicative of a problem with the aircraft's charging system. Consult your aircraft's Pilot Operating Handbook to troubleshoot the problem. You may desire to turn off some of the aircraft's electrical devices which are non-essential for your particular phase(s) of flight, so that the battery will not discharge as quickly.

Magnetic Var for Published
Approach Being Used -This message appears when a user-defined magnetic variation has been selected on the SET 2 page and an approach waypoint is active. The KLN 94 will use the magnetic variation association with the approach waypoint.

Magnetic Var Invalid
Nav Data Referenced
To True North - This message appears when the magnetic variation is invalid due to operation outside of the database magnetic variation area without having a pilot-entered magnetic variation. See section 5.16.

Mag Var for Published
VOR Being Used - This message appears when a user-defined magnetic variation has been selected on the SET 2 page; the unit is in OBS mode: and the active waypoint is a VOR. In this case, the magnetic variation associated with the VOR station will be used.

MSG Annunciator Fail — This message appears when there is a failure of the KLN 94 external MSG annunciator drive circuitry. To determine if there are any messages to be viewed you will need to look at the internal KLN 94 message display because the annunciator will not be working if this message has been given. Service the KLN 94 as soon as possible.

Nav Data Referenced
To True North - This message appears when a user-defined magnetic variation of 0 degrees is being used for navigation data.

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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.

NAV Super Flag Failure — This message appears when an internal test fails for a specific NAV flag output. The KLN 94 is still usable, but anything connected to the super flag (such as some HSIs and autopilots) should not be used with the KLN 94.

No Database Card. LAND
Data Removed On Map.
Insert Card And
Cycle Power.— This message appears if the database card is removed while the KLN 94 is operating. The land data (rivers, roads, cities, etc.) will no longer be displayed on the map with the card removed. However, the aeronautical data (airports, navaids, special use airspace, flight plan waypoints, etc.) will continue to be properly displayed on the map and the unit will otherwise work normally. To display land data the database card must be re-inserted and the power must be turned off and then back on. Applicable to ORS 02 and higher units only.

No GEN RS-232 In Data — This message appears when no input is received on the RS-232 input (such as from a fuel management or air data system).

No GPS Receiver Data - This message appears when the KLN 94 fails a specific internal test for the GPS receiver. This failure will prevent the unit from providing any navigation capability.

OBS Waypoint > 200nm - (or **OBS Waypoint >370 km**) This message is displayed when the KLN 94 is in the OBS mode and the distance to the active waypoint is more than 200 nautical miles or 370 kilometers.

Other WPTs Deleted - (Other waypoints deleted) This message is displayed whenever more than 10 waypoints used in a flight plan (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 database.

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.

Press ALT To Set Baro — This message appears when the approach mode is armed. Press the ALT button to update the barometric pressure for proper integrity monitoring.

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Press PROC Button Now For Navigation — This message appears after the NAV flag has been set due to a RAIM problem while the KLN 94 is in the approach mode. By pressing the Procedure (PROC) button, the KLN 94 may be able to restore navigation information so that you can conduct a missed approach based on navigation information provided by the KLN 94.

RAIM Not Available
APR Mode Inhibited
Predict RAIM on AUX 3 — This message appears when integrity monitoring (RAIM) is predicted to not be available at either the FAF or the MAP. The KLN 94 will not go into the approach active mode until conditions improve. Turn to the AUX 3 (Auxiliary 3) page to perform a RAIM prediction. The AUX 3 page will give an indication of how long it will be until RAIM is available so that the approach can be flown using the KLN 94 (see section 6.2.14 on performing a RAIM prediction).

RAIM Not Available
Cross Check Position — This message appears when there are not enough received GPS satellite signals to compute integrity (RAIM). Cross check the position of the aircraft with other means of navigation every 15 minutes to verify that the position is still accurate.

RAIM Position Error
Cross Check Position — This message appears when the KLN 94 has detected a problem with one of the satellites and the position can not be assured to be within IFR limits for the particular mode of flight. Cross check the position of the aircraft with other means of navigation every 15 minutes to verify that the position is still accurate.

RCVR HW Error:_____— (Receiver Hardware Error) This message appears when the KLN 94 fails a specific internal test for the GPS receiver. The blanks will contain a value which may provide assistance to maintenance personnel.

Recycle Power to Use
Valid Database Data — This message appears when the date entered on the Initialization page is before the database effective date and the date entered later on the SET 2 page is after the database effective date, or vice versa. Turn the KLN 94 off and back on so that the correct database data is utilized.

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Redundant WPTs In FPL
Edit Enroute WPTs
As Necessary — This message appears after the pilot inserts an approach, DP, or STAR in the flight plan and the KLN 94 determines that some waypoints that were in the flight plan are no longer needed. Examine the active flight plan and remove those waypoints that occur both in the en route and the approach/DP/STAR sections of the flight plan.

Search the Sky — The message appears when the GPS receiver is unable to locate satellites in the normal startup mode. It may take an extended period of time (15-20 minutes) to reach navigation capability.

Timer Expired — This message appears when the alarm time on the AUX 10 page is reached.

User Database Lost — This message appears when the KLN 94 determines that the internal memory backup battery is dead or that some other internal failure has occurred which has caused user-entered waypoints, flight plans, and waypoint remarks to be lost.

User Data Lost — This message appears when the KLN 94 determines that the internal memory backup battery is dead or that some other internal failure has occurred which has caused user data such as page setups to be lost.

Using Emergency Battery — This message appears when an emergency back-up battery is installed and it is supplying power to the KLN 94.

Vnv Alert — (Vertical Navigation Alert) This message appears when a VNAV operation has been programmed on the ALT 2 page and the estimated time to start the climb or descent is approximately 90 seconds. This message serves as notification to view VNAV status so that the VNAV operation may be executed. VNAV status can be displayed on the NAV 1, NAV 4, and ALT pages.

WPT Annunciator Fail — This message appears when there is a failure of the KLN 94 external WPT annunciator drive circuitry. To determine if waypoint alerting is being given you will need to look at the KLN 94 display because the annunciator will not be working if this message has been given. Service the KLN 94 as soon as possible.

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 database. The blank space is filled in with the waypoint identifier. The waypoint is deleted from flight plans in which it was used.

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APPENDIX C - SCRATCHPAD MESSAGES

Active
Wpt - (Active Waypoint) Appears when you attempt to delete a user-defined waypoint on the AUX 12 page if the waypoint is the active waypoint (the waypoint you are navigating to). Another waypoint must be made the active waypoint before this waypoint can be deleted from the user-defined waypoint list.

D Base
Expired- (Database Expired) Appears whenever the pilot attempts to select an approach from the database on the APT 8 or ACT 8 page and the database has expired.

CRS
XXX° - (Direct To Course XXX°) Appears when the KLN 94 is in the OBS mode and is interfaced with an external indicator for which the KLN 94 cannot change the selected course and the pilot performs a Direct To operation. Since the KLN 94 cannot change the selected course to the direct to course, the KLN 94 gives you this message telling you the OBS value that will take the aircraft direct to the active waypoint.

Dup
Ident - (Duplicate Identifier) Appears when you select a waypoint identifier on one of the waypoint type pages if there is more than one waypoint of that waypoint type having the same identifier.

Freq To NAV X - (frequency to navigation receiver X) Appears when a KLN 94 is configured for QuickTune™ operation and an approach is loaded into the active flight plan. The approach frequency is sent to the standby window of the navigation receiver (KX 155A or KX 165A). The approach frequency must be a valid VHF navigation frequency (108.00 MHz - 117.95 MHz) associated with a VOR or localizer-type approach. "X" is the number of the receiver (e.g. NAV 1 is navigation receiver #1) where the frequency has been sent to.

Fpl Is
Full - (Flight Plan is Full) Appears when an attempt is made to add a new waypoint to the active flight plan (FPL 0) when it already contains 20 waypoints and the first waypoint is part of the active leg. Change the active waypoint or delete another waypoint before adding any more waypoints.

Invalid
Add - (Invalid Add) Appears when an attempt is made to add a new waypoint into the approach. Approach procedures must be flown as they are stored in the database.

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Invalid
Del - (Invalid Delete) Appears when an attempt is made to delete an approach waypoint. Individual approach waypoints cannot be deleted, you must delete or replace the entire approach.

Invalid
Ent - (Invalid Entry) Appears when you attempt to enter data which is not a valid entry. For example, trying to enter a date of 30 FEB 95.

Invalid Freq — Appears if you attempt a QuickTune™ operation for a frequency outside the normal VHF communications and navigation frequency range (108.000 MHz - 136.990 MHz).

Invalid Rcvr — Appears if you attempt a QuickTune™ operation when QuickTune™ has been disabled on a configuration page at the time of installation. The QuickTune™ is operable with Bendix/King KX 155A and KX 165A NavComms only and requires wiring between the NavComm and the KLN 94.

No Act
Wpt - (No Active Waypoint) Appears when you attempt to activate the OBS mode if there is no active waypoint. To have an active waypoint, a flight plan must be activated or a Direct To must be initiated.

No Appr at Apt - (No approach at airport) Appears when attempting to select an approach if you manually enter an airport on the Procedure (PROC) 2 page that doesn't have an approach in the database

No Apr
In Fpl - (No Approach in Flight Plan) Appears when an attempt is made to arm the GPS approach mode when there is no approach loaded into the active flight plan. Load an approach into the flight plan before trying to arm the approach mode.

No DP at Apt - (No departure procedure at airport) Appears when attempting to select a DP if you manually enter an airport on the Procedure (PROC) 2 page that doesn't have a departure procedure in the database.

No STAR at Apt — (No arrival procedure at airport) Appears when attempting to select a STAR if you manually enter an airport on the Procedure (PROC) 2 page that doesn't have an arrival procedure in the database.

No
Intcpt - (No Intercept) Appears when an attempt is made to recalculate the intercept point on a DME arc and the actual track does not intercept with the arc. Change the track (heading) of the aircraft so that the actual track does intercept the DME arc and try again.

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No Nrst - (No Nearest) Appears when the pilot selects a nearest list (APT, VOR, NDB, INT, USR, SUA, FSS or CTR), and there are no nearest items of that type within a 200 nm radius of the aircraft's present position.

No Such Wpt - (No Such Waypoint) Appears when there is no waypoint in the database corresponding to the entered identifier on the Supplemental Waypoint page.

No Wpt Page - (No waypoint page) Appears when an approach, DP or STAR waypoint is displayed in the waypoint scan window of the NAV 4 page and the ENT button is pressed. For waypoints that are not part of an approach, a waypoint page is displayed when the ENT button is pressed but this feature is not available for approach, DP and STAR waypoints. (ORS 02 and higher)

Not an Apt — (Not an airport) Appears when you manually enter a waypoint identifier on the Procedure (PROC) 2 page which is not an airport.

Remarks Full - (Remarks Full) Appears when you attempt to create a user-entered Airport or Supplemental Waypoint remark on the APT 6 or SUP 3 page if 100 user-entered remarks already exist. In order to create additional airport remarks, some existing remarks must be deleted on the AUX 12 page.

Used In Fpl - (Used in Flight Plan) Appears when you attempt to delete a user-defined waypoint on the AUX 12 page if the waypoint is used in a flight plan. Either this waypoint must be deleted from the flight plan or the entire flight plan must be deleted before this waypoint can be deleted from the user-defined waypoint list.

USR DB Full - (User Database Full) Appears when you attempt to create a user-defined waypoint if the user database already contains 500 waypoints. In order to create additional user-defined waypoints, it will first be necessary to delete existing user-defined waypoints on the AUX 12 page.

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APPENDIX D - ABBREVIATIONS

STATE ABBREVIATIONS

ABBREVIATION	STATE
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

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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

ABBREVIATION	PROVINCE
AB	Alberta
BC	British Columbia
MB	Manitoba
NB	New Brunswick
NF	Newfoundland
NS	Nova Scotia
NT & NU	Northwest Territory
ON	Ontario
PE	Prince Edward Island
PQ	Quebec
SK	Saskatchewan
YK	Yukon

COUNTRY ABBREVIATIONS

ABBREV.	COUNTRY
AFGHAN	AFGHANISTAN
ALASKA	ALASKA (AK)
ALBANI	ALBANIA
ALGERI	ALGERIA
ANGOLA	ANGOLA
ANGUIL	ANGUILLA I.

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COUNTRY ABBREVIATIONS (Cont'd)

ANTARC	ANTARCTICA (E. SPA REGION)
ANTIGU	ANTIGUA / BARBUDA
ANTILL	NETHERLANDS ANTILLES / ARUBA
ARGENT	ARGENTINA
ARMENI	ARMENIA / GEORGIA
ASCENS	ASCENSION ISLAND / ST. HELENA
AUSTRA	AUSTRALIA
AUSTRI	AUSTRIA
AZERBA	AZERBAIJAN
BAHAMA	BAHAMAS
BAHRAI	BAHRAIN
BAKER	BAKER ISLANDS
BANGLA	BANGLADESH
BARBAD	BARBADOS
BELARU	BELARUS / LATVIA / LITHUANIA / RUSSIA
BELGIU	BELGIUM
BELIZE	BELIZE
BENIN	BENIN
BERMUD	BERMUDA
BHUTAN	BHUTAN
BOLIVI	BOLIVIA
BOSNIA	BOSNIA AND HERZEGOVIA
BOTSWA	BOTSWANA
BRAZIL	BRAZIL
BRUNE	BRUNEI
BULGAR	BULGARIA
BURKIN	BURKINA FASO
BURUND	BURUNDI
C AFRI	CENTRAL AFRICAN REPUBLIC
C USA	USA (IA,KS,MN,MO,NE,ND,SD)
C VERD	CAPE VERDE
CAMBOD	CAMBODIA / KAMPUCHEA
CAMERO	CAMEROON
CANADA	CANADA
CANARY	CANARY ISLANDS
CAROLI	CAROLINE ISLAND / MICRONESIA
CAYMAN	CAYMAN ISLANDS
CHAD	CHAD
CHILE	CHILE / EASTER I.
CHINA	CHINA
COLUMB	COLUMBIA / SAN ANDRES

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COUNTRY ABBREVIATIONS (Cont'd)

CONGO	CONGO
COOK I	COOK ISLANDS
COSTA	COSTA RICA
CROATI	CROATIA
CUBA	CUBA
CYPRES	CYPRESS
CZECHO	CZECHOSLOVAKIA
DENMAR	DENMARK
DJIBOU	DJIBOUTI
DOM RE	DOMINICAN REPUBLIC
DOMINI	DOMINICA
ECUADO	ECUADOR
EGYPT	EGYPT
EL SAL	EL SALVADOR
EQ GUI	EQUATORIAL GUINEA
ERITRE	ERITREA
ESTONI	ESTONIA / RUSSIA
ETHIOP	ETHIOPIA
FALKLA	FALKLAND ISLANDS
FIJI	FIJI / TONGA
FINLAN	FINLAND
FRANCE	FRANCE
GABON	GABON
GAMBIA	GAMBIA
GAZA	GAZA
GBRIT	UNITED KINGDOM
GERMAN	GERMANY
GHANA	GHANA
GIBRAL	GIBRALTAR
GN BIS	GUINEA-BISSAU
GREECE	GREECE
GREENL	GREENLAND
GRENAD	GRENADA
GUADEL	GUADELOUPE / MARTINIQUE
GUATEM	GUATEMALA
GUIANA	FRENCH GUIANA
GUINEA	GUINEA
GUYANA	GUYANA
HAITI	HAITI
HAWAII	HAWAII (HI)
HONDUR	HONDURAS

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COUNTRY ABBREVIATIONS (Cont'd)

HONG K	HONG KONG
HUNGAR	HUNGARY
ICELAN	ICELAND
IND OC	BRITISH INDIAN OCEAN TERRITORY
INDIA	INDIA
INDONE	INDONESIA
IRAN	IRAN
IRAQ	IRAQ
IRELAN	IRELAND
ISRAEL	ISRAEL
ITALY	ITALY
IVORY	IVORY COAST
JAMAIC	JAMAICA
JAPAN	JAPAN / OKINAWA
JOHNST	JOHNSTON ISLAND
JORDAN	JORDAN
KAZ KY	KAZAKHSTAN / KYRGYZSTAN
KAZ RU	KAZAKHSTAN / RUSSIA
KAZ TA	KAZAKHSTAN / TAJIKISTAN / TURKMENISTAN / UZBEKISTAN
KENYA	KENYA
KIRIBA	KIRIBATI / TUVALU / PHEONIX I. / LINE I.
KITTS	ST. KITTS / NEVIS
KOR PR	KOREA (DEMO. PEOPLES REPUBLIC)
KOREA	KOREA
KUWAIT	KUWAIT
LAOS	LAOS
LATVIA	LATVIA
LEBANO	LEBANON
LESOTH	LESOTHO
LIBER	LIBERIA
LIBYA	LIBYA / SPA JAMAHIRIYA
LUCIA	ST. LUCIA
LUXEMB	LUXEMBOURG
MACAU	MACAU
MACEDO	MACEDONIA
MADAGA	MADAGASCAR / COMOROS / MAYOTTE I. / REUNION
MALAWI	MALAWI
MALAYS	MALAYSIA

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COUNTRY ABBREVIATIONS (Cont'd)

MALDIV	MALDIVES
MALI	MALI
MALTA	MALTA
MARIAN	MARIANA ISLANDS
MARSHA	MARSHALL ISLAND
MELILL	MELILLA (SPAIN)
MEXICO	MEXICO
MIDWAY	MIDWAY ISLAND
MOLDOV	MOLDOVA
MONSER	MONSERRAT I.
MOROCC	MOROCCO
MOZAMB	MOZAMBIQUE
MRTIUS	MAURITIUS
MRTNIA	MAURITANIA
MW USA	USA (IL,IN,KY,MI,OH,WI)
MYANMA	MYANMAR
NAMIBI	NAMIBIA
NAURA	NAURA
NE USA	USA (CT,DE,DC,ME,MD,MA,NH,NJ,NY,PA,RI, VA,VT,WV)
NEPAL	NEPAL
NETHER	NETHERLANDS
NEW ZE	NEW ZEALAND
NEWCAL	NEW CALENDONIA
NICARA	NICARAGUA
NIGER	NIGER
NIGERI	NIGERIA
NIUE I	NIUE ISLAND
NORWAY	NORWAY
NW USA	USA (ID,MT,OR,WA,WY)
OAKLAN	OAKLAND OTCA (PACIFIC)
OMAN	OMAN
P RICO	PUERTO RICO
PAKIST	PAKISTAN
PANAMA	PANAMA
PARAGU	PARAGUAY
PERU	PERU
PHILIP	PHILIPPINES
PNEWG	PAPUA NEW GUINEA
POLAND	POLAND
POLYNE	FRENCH POLYNESIA / SOCIETY I. / TUAMOTU

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COUNTRY ABBREVIATIONS (Cont'd)

PORTUG	PORTUGAL / AZORES / MADEIRA I.
QATAR	QATAR
ROMANI	ROMANIA
RUSSIA	RUSSIA
RWANDA	RWANDA
S AFRI	SOUTH AFRICA
SAO TO	SAO TOME / PRINCIPE
SAUDI	SAUDI ARABIA
SC USA	USA (AR,LA,OK,TX)
SE USA	USA (AL,FL,GA,MS,NC,SC,TN)
SENEGA	SENEGAL
SEYCHE	SEYCHELLES
SIERRA	SIERRA LEONE
SINGAP	SINGAPORE
SLOVAK	SLOVAKIA
SLOVEN	SLOVENIA
SOLO I	SOLOMON ISLANDS
SOMALI	SOMALIA
SPAIN	SPAIN
SRI LA	SRI LANKI
STPIER	ST. PIERRE AND MIQUELON
SUDAN	SUDAN
SURINA	SURINAME
SW USA	USA (AZ,CA,CO,NV,NM,UT)
SWAZIL	SWAZILAND
SWEDEN	SWEDEN
SWITZE	SWITZERLAND
SYRIA	SYRIA
TAIWAN	TAIWAN
TANZAN	TANZANIA
THAILA	THAILAND
TOGO	TOGO
TRINID	TRINIDAD/TABAGO
TUNIS	TUNISIA
TURK I	TURKS AND CAICOS ISLANDS (UK)
TURKEY	TURKEY
UARABE	UNITED ARAB EMIRATES
UGANDA	UGANDA
UKRAIN	UKRAINE / MOLDOVA
URUGUA	URUGUAY
VANAUT	VANAUTU

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COUNTRY ABBREVIATIONS (Cont'd)

VENEZU	VENEZUELA
VIETNA	VIETNAM
VINCEN	ST. VINCENT
VIR UK	VIRGIN ISLANDS (U.K.)
VIR US	VIRGIN ISLANDS (U.S.)
W SOMO	AMERICAN/WESTERN SAMOA
WAKE I	WAKE ISLAND
WALLIS	WALLIS/FUTUNA ISLANDS
YEMEN	YEMEN (ARAB REPUBLIC)
YUGOSL	YUGOSLAVIA
ZAIRE	FORMER ZAIRE
ZAMBIA	ZAMBIA
ZIMBAB	ZIMBABWE

ARTCC ABBREVIATIONS

ABBREVIATION	ARTCC
ABQ	ALBUQUERQUE
ACC	ACCRA
ADD	ADDIS ABABA
ADE	ADELAIDE
ADN	ADEN
AKM	AKMOLA
AKT	AKTYUBINSK
AKU	AKTAU
ALG	ALGIERS
ALM	ALMATY
AMD	AMDERMA
AMM	AMMAN
AMS	AMSTERDAM
ANA	ANADYR
ANC	ANCHORAGE
ANK	ANKARA
ANT	ANTANANARIVO
ARA	ARALSK
ARK	ARKHANGELSK
ARY	ARKAKYK
ASH	ASHGABAT
ASM	ASMARA
AST	ASTRAKHAN
ASU	ASUNCION
ATF	ANTOFAGASTA

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ARTCC ABBREVIATIONS (Cont'd)

ATH	ATHENS
ATL	ATLANTA
ATN	ASTANA
ATY	ATYRAU
AUC	AUCKLAND
AYA	AYAGUS
BAG	BAGHDAD
BAH	BAHRAIN
BAK	BAKU
BAL	BALI
BAN	BANGKOK
BAR	BARCELONA
BAS	BALKHASH
BAT	BATAGAY
BEI	BEIJING
BEL	BELEM
BER	BERMUDA
BIA	BIAK
BIS	BISHKEK
BLA	BLAGOVESCHENSK
BLG	BELGRADE
BLO	BLOEMFONTEIN
BOD	BODO
BOG	BOGOTA
BOM	BOMBAY
BOR	BORDEAUX
BOS	BOSTON
BRA	BEIRA
BRD	BRINDISI
BRE	BREMEN
BRI	BRISBANE
BRL	BERLIN
BRN	BARNAUL
BRR	BARRANQUILLA
BRS	BRASILIA /UTA
BRT	BEIRUT
BRU	BRUSSELS
BRV	BRATISLAVA
BRY	BERYOZOVO
BRZ	BRAZZAVILLE
BSK	BRATSK

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ARTCC ABBREVIATIONS (Cont'd)

BST	BREST
BUC	BUCHAREST
BUD	BUDAPEST
BUJ	BUJUMBURA
CAI	CAIRO
CAL	CALCUTTA
CAM	CAMPO GRANDE
CAM	CENTRAL AMERICA
CAN	CANARIES
CAP	CAPE TOWN
CAS	CASABLANCA
CHA	CHAYBUKHA
CHE	CHELYABINSK
CHI	CHICAGO
CHN	CHENNAI
CHO	CHOKURDAKH
CHR	CHERSKY
CHT	CHITA
CHU	CHULMAN
CLE	CLEVELAND
COC	COCOS I
COL	COLOMBO
COM	COMODORO RIVADAVIA
COP	COPENHAGEN
COR	CORDOBA
CRT	CURITIBA
CRZ	CHARDZHEV
CUR	CURACAO
DAK	DAKAR
DAM	DAMASCUS
DAR	DARWIN
DAS	DASHKHOVUZ
DEL	DELHI
DEN	DENVER
DES	DAR-ES-SALAAM
DHA	DHAKA
DIK	DIKSON
DOR	DORNOD
DSS	DUSSELDORF
DUR	DURBAN
DUS	DUSHANBE

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ARTCC ABBREVIATIONS (Cont'd)

EDM	EDMONTON
EMI	EMIRATES
ENT	ENTEBBE
EZE	EZEIZA
FRA	FRANKFURT
FW	FT WORTH
GAB	GABORONE
GAN	GANDER DOMESTIC
GEN	GENEVA
GEO	GEORGETOWN
GUA	GUANGZHOU
GUY	GUAYAQUIL
HAN	HANOI
HAR	HARARE
HAV	HAVANA
HK	HONG KONG
HNR	HONIARA
HOC	HOCHIMINH
HON	HONOLULU CERAP
HOU	HOUSTON
IND	INDIANAPOLIS
IRK	IRKUTSK
ISL	ISLA DE PASCUA
IST	ISTANBUL
JAK	JAKARTA
JAX	JACKSONVILLE
JED	JEDDAH
JOH	JOHANNESBURG
KAB	KABUL
KAG	KARAGANDA
KAL	KALININGRAD
KAM	KAMENNYI MYS
KAN	KANO
KAR	KARACHI
KAT	KATHMANDU
KAZ	KAZAN
KC	KANSAS CITY
KHA	KHABAROVSK
KHR	KHARKIV
KHT	KHATANGA
KIE	KIEV

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ARTCC ABBREVIATIONS (Cont'd)

KIG	KIGALI
KIN	KINGSTON
KIR	KIRENSK
KIS	KISANGANI
KK	KOTA KINABALU
KL	KUALA LUMPUR
KM	KHANTY-MANSIYSK
KNS	KINSHASA
KO	KZYL-ORDA
KO	KYZYLORDA
KOL	KOLPASHEVO
KOS	KOSTANAY
KOT	KOTLAS
KRA	KRASNOVODSK
KRK	KARAKOL
KRS	KRASNOYARSK
KRV	KIROV
KSH	CHISINAU
KSH	KISHINAU
KTM	KHARTOUM
KUN	KUNMING
KUR	KURGAN
KUW	KUWAIT
KYI	KYIV
LAH	LAHORE
LAP	LA PAZ
LAX	LOS ANGELES
LIL	LILONGWE
LIM	LIMA
LIS	LISBON
LJU	LJUBLJANA
LON	LONDON
LUA	LUANDA
LUB	LUBUMBASHI
LUS	LUSAKA
LVO	LVOV
MAD	MADRID
MAG	MAGADAN
MAI	MAIQUETIA
MAL	MALE
MAN	MANILA

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ARTCC ABBREVIATIONS (Cont'd)

MAR	MARSEILLE
MAU	MAURITIUS
MAZ	MAZATLAN
MDR	MADRAS
MEL	MELBOURNE
MEM	MEMPHIS
MEN	MENDOZA
MER	MERIDA
MEX	MEXICO
MGD	MAGDAGACHI
MIA	MIAMI
MIL	MILAN
MIN	MINNEAPOLIS
MIR	MIRNY
MLM	MALMO
MLT	MALTA
MNC	MONCTON NORTHERN
MNS	MANAUS
MNT	MONTERREY
MOG	MOGADISHU
MON	MONTREAL
MOS	MOSCOW
MRM	MURMANSK
MS	MYS SHMIDTA
MS	MYS KAMENNY
MSK	MINSK
MTV	MONTEVIDEO
MUM	MUMBAI
MUN	MUNICH
MUR	MUREN
MUS	MUSCAT
NAD	NADI
NAH	NAHA
NAI	NAIROBI
NAS	NASSAU
NDJ	N'DJAMENA
NIC	NICOSIA
NIK	NIKOLAEVSK-NA-AMURE
NMY	NIAMEY
NOR	NORILSK

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ARTCC ABBREVIATIONS (Cont'd)

NOV	NOVOSIBIRSK
NUK	NUKUS
NY	NEW YORK
NZE	NEW ZEALAND
OAK	OAKLAND
ODE	ODESSA
OKH	OKHA
OMS	OMSK
ORN	ORENBURG
OSH	OSH
OSK	OKHOTSK
OSL	OSLO
PA	PUNTA ARENAS
PAN	PANAMA
PAP	PORT-AU-PRINCE
PAR	PARIS
PAV	PAVLODAR
PE	PORT ELIZABETH
PEC	PECHORA
PEM	PERM
PEN	PENZA
PEP	PETROPAVLOVSK
PER	PERTH
PET	PETERSBURG
PET	SAINT PETERSBURG
PET	SANKT PETERSBURG
PEV	PEVEK
PHN	PHNOM PENH
PIA	PIARCO
PM	PORT MORESBY
PMT	PUERTO MONTT
PRA	PRAGUE
PRM	PARAMARIBO /UTA
PTR	PETROPAVLOVSK-KAM.
PV	PORTO VELHO
PYO	PYONGYANG
REC	RECIFE
RES	RESISTENCIA
REY	REYKJAVIK
RIG	RIGA
RIV	RIVADAVIA

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ARTCC ABBREVIATIONS (Cont'd)

RMS	REIMS
ROB	ROBERTS
ROC	ROCHAMBEAU
ROM	ROME
ROS	ROSTOV
ROV	ROVANIEMI
SAI	SAINSHAND
SAL	SAL
SAM	SAMARA
SAN	SANTIAGO
SAR	SARAJEVO
SCO	SCOTTISH
SDO	SANTO DOMINGO
SEA	SEATTLE
SEM	SEMIPALATINSK
SEY	SEYCHELLES
SHA	SHANGHAI
SHE	SHENYANG
SHN	SHANNON
SHW	SHANWICK
SHY	SHYMKENT
SIM	SIMFEROPOL
SIN	SINGAPORE
SJU	SAN JUAN
SKO	SKOPJE
SLC	SALT LAKE CITY
SLK	SALEKHARD
SM	SANTA MARIA
SMR	SAMARKAND
SNA	SANAA
SOF	SOFIA
SON	SONDRESTROM
STA	STAVANGER
STO	STOCKHOLM
SUK	SUKHUMI
SUN	SUNDSVALL
SUR	SURGUT
SWI	SWITZERLAND
SYD	SYDNEY
SYK	SYKTYVKAR

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ARTCC ABBREVIATIONS (Cont'd)

SYM	SEYMCHAN
TAE	TAEGU
TAH	TAHITI
TAI	TAIPEI
TAL	TALLINN
TAM	TAMPERE
TAR	TARAZ
TAS	TASHKENT
TAZ	TASHAUZ
TBI	TBILISI
TEH	TEHRAN
TEL	TEL AVIV
TIK	TIKSI
TIL	TILICHIKI
TIR	TIRANA
TKB	TURKMENABAT
TOK	TOKYO
TOR	TORONTO
TRI	TRIPOLI
TRO	TRONDHEIM
TUK	TURKMENBASHI
TUN	TUNIS
TUR	TURUKHANSK
TYU	TYUMEN
UFA	UFA
UJU	UJUNG PANDANG
ULA	ULAANBAATAR
UND	UNDERHAAN
URA	URALSK
URU	URUMQI
VAN	VANCOUVER
VAR	VARNA
VEL	VELIKIYE LUKI
VIE	VIENNA
VIL	VILNIUS
VLA	VLADIVOSTOK
VLO	VOLOGDA
VNT	VIENTIANE
VOL	VOLGOGRAD
VRK	VORKUTA
WAR	WARSAW

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ARTCC ABBREVIATIONS (Cont'd)

WAS	WASHINGTON
WEL	WELLINGTON
WIN	WINNIPEG
WND	WINDHOEK
WUH	WUHAN
YAK	YAKUTSK
YAN	YANGON
YEK	YEKATERINBURG
YEN	YENISEYSK
YER	YEREVAN
YS	YUZHNO-SAKHALINSK
ZAG	ZAGREB
ZHA	ZHAMBYL
ZHK	ZHEZKAZGAN
ZHY	ZHIGANSK
ZUR	ZURICH
ZYR	ZYRYANKA

OTHER ABBREVIATIONS USED ON KLN 94 PAGES

A	Airport waypoint
A/C	Aircraft
ACQ	Acquisition
ACT	Active flight plan waypoints
ADJ	Adjust
AKD	Alaska Daylight Time
AKS	Alaska Standard Time
ALT	Altitude
APT	Airport
ATD	Atlantic Daylight Time
ATS	Atlantic Standard Time
BRG	Bearing
CAL	Calculator
CDT	Central Daylight Time
CHAR	Character
CRS	Course
CRSR	Cursor
CST	Central Standard Time
DB	Database
DEGRD	Degraded navigation
DIS	Distance

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OTHER ABBREVIATIONS (Cont'd)

DTK	Desired track
DUP	Duplicate
E	East
EDT	Eastern Daylight Time
ELE	Elevation
ENT	Enter
EST	Eastern Standard Time
ETA	Estimated time of arrival
ETE	Estimated time en route
FAILR	Failure of receiver
FPL	Flight plan
FPM	Feet per minute
FR	From
GDT	Greenland Daylight Time
GS	Groundspeed
GST	Greenland Standard Time
HAD	Hawaii Daylight Time
HAS	Hawaii Standard Time
HLT	Health of space vehicle signal
IDENT	Identifier
INIT	Initialization
KM	Kilometers
KT	Knots
L	Left
LCL	Local
M	Meters
MAG VAR	Magnetic variation
MDT	Mountain Daylight Time
MPM	Meters per minute
MSG	Message
MST	Mountain Standard Time
N	NDB waypoint
N	North
NAV	Navigation
NAV A	Navigation with altitude aiding
NAV D	Navigation with data collection
NM	Nautical miles
OBS	Omni bearing selection
ORS	Operational Revision Status
OTH	Other

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OTHER ABBREVIATIONS (Cont'd)

P.POS	Present position
PDT	Pacific Daylight Time
POS	Position
POSN	Position
PRES	Present
PRS	Pressure
PST	Pacific Standard Time
PUB	Published
PWR	Power
RAD	Radial
RCVR	Receiver
REF	Reference
REQ	Required
RES	Reserve fuel
S	South
S	Supplemental waypoint
SDT	Samoa Daylight Time
SET	Setup
SNR	Signal-to-noise ratio
SST	Samoa Standard Time
SUP	Supplemental
SV	Space vehicle
SW	Software
TK	Actual track
TOT	Total
U	User-defined waypoint
USR	User-defined waypoint
UTC	Coordinated Universal Time (Zulu)
V	VOR waypoint
W	West
WPT	Waypoint
Z	Zulu time

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APPENDIX E - LAT/LON CONVERSIONS

The KLN 94 utilizes latitude and longitude expressed in degrees, minutes, and hundredths of a minute. You may occasionally see a document expressing latitude and longitude in degrees, minutes, and seconds. This table may be used to convert seconds to hundredths of a minute.

SECONDS (")	HUNDREDTHS OF A MINUTE (')
00	.00
01	.02
02	.03
03	.05
04	.07
05	.08
06	.10
07	.12
08	.13
09	.15
10	.17
11	.18
12	.20
13	.22
14	.23
15	.25
16	.27
17	.28
18	.30
19	.32
20	.33
21	.35
22	.37
23	.38
24	.40
25	.42
26	.43
27	.45
28	.47
29	.48
30	.50
31	.52
32	.53

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LAT/LON CONVERSIONS (Cont'd)

SECONDS (")	HUNDREDTHS OF A MINUTE (')
33	.55
34	.57
35	.58
36	.60
37	.62
38	.63
39	.65
40	.67
41	.68
42	.70
43	.72
44	.73
45	.75
46	.77
47	.78
48	.80
49	.82
50	.83
51	.85
52	.87
53	.88
54	.90
55	.92
56	.93
57	.95
58	.97
59	.98

For example:
35° 46' 24" is the same as 35° 46.40'
32° 15' 58" is the same as 32° 15.97'

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APPENDIX F - 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 has the capability to impose 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 95% of the time. At the time of this writing, Selective Availability has been turned off by the DOD but it could be turned back on at another 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

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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).

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RAIM

Receiver Autonomous Integrity Monitoring (RAIM) is a function that every IFR-certified GPS receiver must continuously perform to assure an accurate position. One characteristic of the GPS Space and Control Segments is that they can't instantly fix a satellite if it begins sending misleading positioning information. For this reason, a GPS receiver can't rely on the GPS satellites to tell it when there is a possible error. The words "receiver autonomous" indicate that the GPS receiver, on it's own, can detect an inaccuracy in the GPS system. It does this by using distance measurements from as many satellites as possible to check the consistency of the position (this is called an over-determined position solution).

If there are not enough satellites in view to assure the position integrity, the KLN 94 notifies the pilot. Five measurements with good geometry (relative positions of the satellites) are needed to provide RAIM. This means that at least five satellites or four satellites and a pressure altitude input from the aircraft's altimeter are required to assure RAIM availability. Likewise, if this check shows some inconsistency in the position, the KLN 94 notifies the user that other navigation sources should be used to cross-check the position. Additionally, sometimes the receiver is unable to assure the position to enough accuracy for the phase of flight, due to the location of the satellites at that instant.

RAIM availability is very seldom a difficulty when in the en route and terminal phases of navigation. The allowable limits are much tighter when a non-precision approach is performed with a KLN 94. For this reason, the KLN 94 Auxiliary (AUX) 3 page allows the pilot to enter a time and location, and the GPS receiver will predict if RAIM will be available to shoot the non-precision approach. See section 6.2.14 for more information about the RAIM prediction capability.

GPS XPRESS™ CARD 8-CHANNEL RECEIVER

The KLN 94 and KLN 94 use a Honeywell Bendix/King GPS receiver known as the GPS Xpress™ card. It was dubbed this way because it is identical in size to an everyday credit card, and its faster acquisition time than previous single-channel designs. The 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.

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- Improved position accuracy.
- The ability of the GPS receiver to perform the RAIM calculations is enhanced without degrading position tracking.

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APPENDIX G - OPERATIONAL COMPARISON: KLN 94 VS. KLN 89B

If you are an experienced user of the KLN 89B GPS this appendix is for you. It identifies most of the significant operational enhancements of the KLN 94 compared to the KLN 89B. Not only have new features been added to the KLN 94, but shortcut methods have been added to make existing features even easier to use. The section number of this Pilot's Guide is included, where applicable, so that you may quickly find and learn the changes.

- Color display vs. monochrome. The use of color significantly aides your ability to visually retrieve the desired data from the screen.
- Five lines of data displayed (only four for KLN 89B). This will be especially helpful on the NAV 4 (Map) page, Flight Plan pages and APT 5 page (Communication frequencies).
- Improved display format (section 3.3).
  - Annuciations (MSG, WPT, GPS APR/ GPS ARM) on dedicated area of display means remote annunciator/switch may not be required in many installations. ***Note****: GPS/NAV annunciator switch will still be required.*
  - Page annunciation along bottom of display instead of on bezel.
  - "SCAN" annunciator on display when the small inner knob is pulled out.
  - "VTF" annunciation on display when Vectors-To-Final loaded or activated (section 3.3 and 6.2.8).
- Full time display of DTK and TK on all pages except map page (section 3.3). DTK is displayed full time on map page and TK is an option (section 3.11.4.2).
- A new procedure (PROC) button and associated means of loading approaches, DPs and STARS, into Flight Plan 0. The Procedure button significantly improves the ease of loading these procedures. (Section 6.2.3 for approach, section 6.3.1 for DP, and section 6.3.2 for STAR).
- Vector-To-Final (VTF) feature. Allows activation of the FAF and the associated inbound course to the FAF. Eliminates having to put the unit into OBS to get established on final approach course and then having to reselect Leg mode. (Sections 6.2.3 and 6.2.8).
- Inclusion of ILS, localizer, and other non-GPS approved approaches. These are selected like other approaches and loaded into FPL 0. The unit doesn't go into approach mode on these approaches but the map provides excellent situational awareness. (Section 6.2.12)

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- QuickTune™ Comm and Nav frequencies into KX 155A and KX 165A (section 3-15). ***Note****: Additional wires must be installed between the KLN 94 and the KX 155A or KX 165A for QuickTune™ to be operational.*
  - Manually from cursor over frequency and press ENT
  - Automatically when ILS, LOC, VOR approach loaded into active flight plan
- A new dedicated Map Range (RNG) button
  - To change map range scale (section 3.11.4.9).
  - A quick way to select “auto” map range (section 3.11.4.9)
  - A quick way to bring up map page from any other page (section 3.11.4.1). Really nice, read this!
- A new dedicated map menu (MNU button)
  - To bring up a list of high level choices for reconfiguring map (aeronautical data – section 3.11.4.4, land data – section 3.11.4.6, map orientation – section 3.11.4.8).
  - To bring up the NAV 4 (Map) page from any other page (section 3.11.4.1).
- Land data shown on map (section 3.11.4.6)
  - Roads
  - Rivers and lakes
  - Railroads
  - Cities
  - Boundaries (country, state)
  - Obstacles
- Nearest aeronautical information shown on map (sections 3.11.4.4 and 3.11.4.5) and in nearest waypoint lists (section 3.9.1)
  - 20 nearest airports and VORs (only 9 in KLN 89B)
  - 20 nearest NDBs and Intersections (none in KLN 89B)
  - 20 nearest user defined waypoints (none in KLN 89B)
  - 10 nearest SUAs (only 5 in KLN 89B)
  - Four nm “Tower Rings” shown around airports having a control tower (not in KLN 89B).
  - Runway diagram (not in KLN 89B)
- Additional levels of map decluttering with the CLR button (section 3.11.4.10)

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- "AUTO" is shown next to the map scale when automatic range scaling has been selected (section 3.11.4.9).
- Added waypoints from the "nearest list" to the active flight plan waypoints on the NAV 4 (map) scan list (section 3.11.4.11).
- Rotatable aircraft symbol on map in place of diamond symbol for North-up and DTK-up map orientations (section 3.11.4.8).
- ILS, LOC, LOC BC, LDA, and SDF approach frequencies added to airport frequency page -APT 5 page (section 3.12.1.5).
- Combined Calculator (CAL) and Other (OTH) pages of KLN 89B into Auxiliary (AUX) pages of KLN 94 (section 3.4.1)
- A full time display of cross-track error (example 2.3nm←) and CDI scale (5.0, 1.0 or 0.3) has been added below the CDI on the NAV 1 page (section 3.11.1). On the KLN 89B there was a cyclic field and only one of these parameters was displayed at a time.
- Removed all "cyclic" fields (those fields changed by CLR button). These are replaced with just changeable fields using cursor and small inner knob. Examples are the NAV 1 page (section 3.11.1) and the FPL 0 page (section 4.2.5).
- Data loader jack built into front panel instead of having to mount in instrument panel (section 2.4.1 and figure 3.1).
- Added most DMEs associated with ILS and LOC to the intersection section of the database (section 6.2.13). ***Note****: This has also been added to the KLN 89B also.*
- Added most terminal NDBs to the database. ***Note****: These have also been added to the KLN 89B.*
- Aeronautical data downloaded from data card to internal memory (section 3.2, item #10).
- A means to select what types of Special Use Airspace are used for SUA Alerting and are displayed on the map (section 3.13).
- The format for the display of RAIM prediction was changed to a graphical format (section 6.2.14).

Additional Operational Differences Incorporated In KLN 94 ORS 02 Units

- Enhanced waypoint scanning on the Nav 4 map page encircles the waypoint whose identifier is contained in the waypoint scan field. In addition, pressing the ENT button brings up the waypoint page for the selected waypoint (section 3.11.4.11).

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- Procedure turns and holding patterns associated with approaches, DPs, and STARs are displayed on the map (section 3.11.4.12).
- New airport map icons now distinguish between airports having hard surface runways vs. soft surface runways and show the orientation of the longest runway if available (section 3.11.4.7).
- New highway map icons are used for the Atlantic International and Pacific International databases (section 3.11.4.7).
- Approaches which have the format of "RNAV # 18L" can now be accomodated. The "#" is a letter or number that designates there is more than one approach of a given type (i.e. RNAV) to the same runway. This format has been adopted by the FAA and other international aviation agencies.
  Example 1: There could be RNAV Y 18L and RNAV Z 18L approaches at the same airport.
  Example 2: There could be RNAV 1 09L and RNAV 2 09L approaches at the same airport.

Additional Operational Differences Incorporated In KLN 94 ORS 03 Units

- The inner rings of Class B, Class C, TMA and CTA airspace are displayed on the Nav 4 map page (section 3.11.4.4).

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