

KLN 88 LORAN

Abbreviated Operation Manual



BENDIX/KING

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Abbreviated Operation Manual

ORS 01 and 03

Note: See inside front cover of large KLN 88
Pilot's guide (006-8458-0000) for Data
Base update information.





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PREVIEW OF OPERATION

To give you an idea of how easy the KLN 88 is to operate, the following operational preview is presented. This operational preview assumes the KLN 88 has been properly installed, the unit was previously operational in the same general geographical location, and that no peripheral equipment interfaced with the KLN 88 (such as external HSIs, CDIs, autopilots, RMI's, fuel flow systems, moving map displays, 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 crosscheck position.

1. Push the power/brightness knob located in the upper right corner of the unit to the "in" position.
2. After a few seconds of warm up, the screen will show a Turn-On page with the words **SELF TEST IN PROGRESS** at the bottom of the page. Rotate the power/brightness knob to select the desired screen brightness. After a few seconds the Turn-On page will automatically be replaced with the Self Test page. The Self Test page is recognizable because it shows the date and time on the right side. If the date and time are incorrect, refer to section 1.0 of this manual. The bottom left side of the Self Test page must display **TEST OK**. Press  to approve the Self Test page. (Note: If the KLN 88 is being used in the optional KCC 88 take-home case, a Take-Home Warning page is displayed before the Self Test page and must be acknowledged by pressing .)
3. A Data Base page is now displayed showing the date the data base expires or the date it expired. Press  to acknowledge the information displayed on this page.
4. A page displaying the letters **PRESENT POS** at the top will now be on the left side of the screen. In a couple of minutes or less, this page will display the aircraft's present position. It shows the position both in latitude/longitude and in terms of the radial and distance from a nearby VOR. Verify that the position is correct before proceeding.
5. Press the  button. A page with the words **DIRECT TO** is now displayed on the left. In step 6 you will enter the identifier of the destination airport. The identifier will have a "K" prefix for a U.S. airport (or a "C" prefix for a Canadian airport) if the identifier is all letters. For example, LAX becomes KLAX. If the identifier contains any numbers there is no prefix. For example TX04 is entered as TX04.
6. Rotate the left inner knob until the first character of the airport identifier is displayed. Turn the left outer knob one step clockwise to move the

flashing segment to the second character position. Rotate the left inner knob to select the second character of the identifier. Use this procedure to enter the complete airport identifier.

7. Press . The right side will display a page showing the identifier, name, and position of the airport just entered. Confirm that the correct airport is displayed. Press a second time to approve the airport data.
8. A Navigation page is now on the right side of the screen. It displays the distance, ETE, and bearing to the destination airport. In addition, it displays groundspeed and course deviation indicator. If the left inner knob is rotated one step counterclockwise, you will get an enlarged Navigation page occupying the entire screen.

This abbreviated operation manual describes many of the frequently used features of the KLN 88 in a condensed format for your convenience. It does not replace the KLN 88 Pilot's Guide. The KLN 88 has many very useful features which are not described in this manual. Be sure to keep your KLN 88 Pilot's Guide with you in the aircraft to use as a reference.



1.0 TURN ON

- Push the power/brightness knob located in the upper right corner of the unit to the “in” position. The unit is turned off by pulling this knob to the “out” position. (If the KLN 88 is in the KCC 88 take-home case, place the red switch in the “on” position.)
- After a few seconds of warm up, the screen will show a Turn-On page with the words **SELF TEST IN PROGRESS** at the bottom.
- Rotate the power/brightness knob to select the desired screen brightness.
- After a few moments the Turn-On page will automatically be replaced with the Self Test page. The Self Test page is recognizable because it shows the date and time on the right side. (Note: if the unit is in the KCC 88 take-home case, a page stating that the unit is in the Take-Home mode will appear before the Self Test page. Press **ENT** to acknowledge the statement and to bring up the Self Test page.)
- Verify that the information shown on the left side of the Self Test page is correct and that **TEST OK** is displayed in the bottom left corner. If the KLN 88 is interfaced with the left/right deviation bar (D-Bar) of an HSI or CDI, the D-Bar should be half scale to the right. The TO/FROM indicator should be showing FROM. If interfaced to a compatible RMI, the RMI should be pointing to 130 degrees. If interfaced to a compatible DME indicator, the DME indicator should display 34.5 nm. If necessary, refer to the KLN 88 Pilot's Guide for more information.
- Verify that the date displayed on the right side of the Self Test page is correct. If the date is incorrect, rotate the right outer knob counterclock-

wise until the cursor is over the entire date. Rotate the right inner knob until the correct day of the month is displayed. Then, rotate the right outer knob one step clockwise to place the flashing part of the cursor over the month field (three dashes). Rotate the right inner knob to display the correct month. Rotate the right outer knob one step clockwise again, and then use the right inner knob to select the first digit of the correct year (an 8 for 1989, for example). Next, rotate the right outer knob one more step clockwise, and then use the right inner knob to select the second digit of the year. When the date is correct press **ENT**.

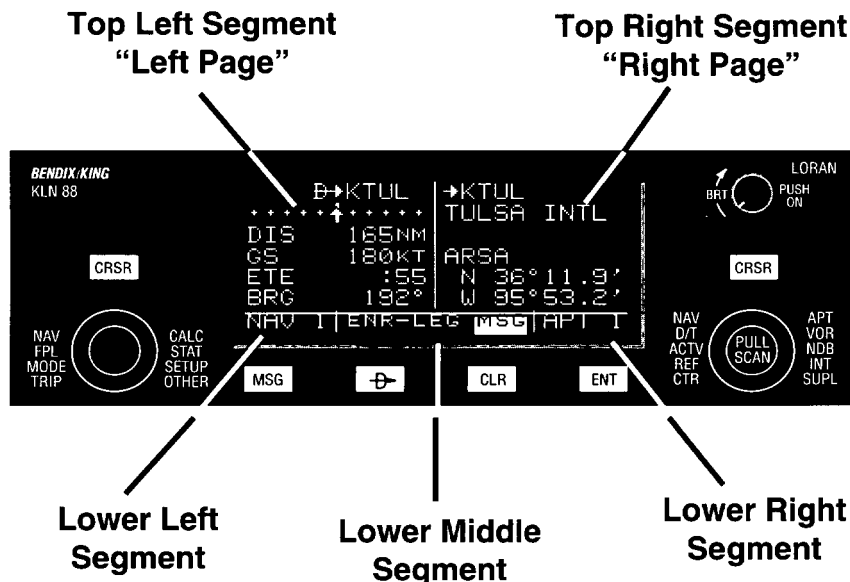
- Verify that the time displayed on the right side of the Self Test page is correct. If it is necessary to reset the time, use the right outer knob to position the cursor over the time zone. Use the right inner knob to select the desired time zone. UTC (Coordinated Universal Time, which is also called “Zulu”) is always a good choice if flying is done through several time zones. Now, turn the right outer knob one step counterclockwise to position the cursor over the entire time field. Use the right inner knob to select the correct hour. 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 14:30). Next, turn the right outer knob one step clockwise to position the flashing part of the cursor over the first minutes position. Turn the right inner knob to select the correct value. Turn the right outer knob one more step clockwise to position the flashing part of the cursor over the second minutes position. The right inner knob is now used to finalize the time selection. When the correct time has been entered, press **ENT** to start the clock running.
- Use the right outer knob to position the cursor over **APPROVE** (if the cursor is not there already) and press **ENT** to approve the Self Test page.
- The screen will now display the Data Base page, which shows the date the data base expires or the date on which it expired. Press **ENT** to acknowledge.

WARNING: The accuracy of the data base information is assured only if it is used before the expiration date. Use of out of date data base information is done entirely at the user’s own risk.

- The NAV 2 page (present position) will now be displayed on the left side of the screen, and the waypoint page for the last active waypoint (before the KLN 88 was last turned off) will be displayed on the right side. If the last active waypoint was an airport, the the APT 4 page (airport communications) will be displayed on the right side.
- When the KLN 88 is ready to navigate, the NAV 2 page will display the present position both in terms of latitude/longitude and in terms of the radial and distance from a nearby VOR.

2.0 BASIC OPERATION OF PANEL CONTROLS

2.1 Page Selection



The screen is normally divided into five segments defined by vertical and horizontal lines on the screen. The large top left segment is called the left page, and the large top right segment is called the right page. The small lower left segment displays the name of the left page being displayed while the small lower right segment displays the name of the right page being displayed. The lower middle segment displays the mode of operation (ex: **ENR-LEG** is Enroute-Leg mode, which is the normal mode for enroute operations).

NOTE: When power is applied to the KLN 88 it always "wakes up" in the Enroute-Leg mode. Only the Enroute-Leg mode is described in this manual. In this mode the KLN 88 performs great circle navigation (the shortest distance between two points located on the earth's surface). The course deviation output displayed on the unit's internal course deviation indicator (CDI) and provided to an external HSI or CDI is five nautical miles left and right, full scale sensitivity. The other three modes of the unit (Enroute-OBS, Approach-Leg, and Approach-OBS) are described in the KLN 88 Pilot's Guide.

The two concentric knobs and **CRSR** button on the left are used to control the left page, and the two concentric knobs and **CRSR** button on the right are used to control the right page. The right inner knob has an "in" and an "out" position. It should be pushed to the "in" position for now.

The cursor is an area of inverse video (dark characters on a light background). Many pages allow you to add, delete, or change data on the screen by first pressing the appropriate **CRSR** button (left **CRSR** for left page and right **CRSR** for right page) to turn the cursor function on and bring the cursor on the screen. The appropriate concentric knobs are then used to enter the data. When a cursor is on the screen, the page name normally shown in the lower left and right segments is replaced with a **CRSR** annunciation in inverse video. Not all pages allow you to make data entry, and therefore pressing the **CRSR** button while these pages are displayed will have no effect.

There are eight types of pages that may be displayed on the left side of the screen and ten types of pages that may be displayed on the right side. The abbreviations for these page types are displayed around the outside of the left and right outer knobs. The page types are different on the left and right sides with the exception of the NAV (Navigation) type, which appears on both sides. To select a page type, the cursor must not be displayed on the side of the screen where page selection is to be made. If the cursor is displayed, the appropriate **CRSR** button must be pressed to turn the cursor function off. To select the NAV page type on the right side, turn the right outer knob until **NAV** is displayed in the lower right segment. The order in which the page types will be displayed is the same as the order they are positioned around the outer knob. Thus, if **APT** (Airport) is displayed in the lower right segment, turning the right outer knob one step counterclockwise or nine steps clockwise will display **NAV**.

Many types of pages, such as NAV, have more than one page. There are five NAV pages for example. Once the type of page has been selected using the outer knob, the inner knob is used to select the specific page. For example, if **NAV 3** is displayed in the lower right segment then the NAV 3 page is being displayed in the upper right segment. To view the NAV 1 page turn the right inner knob two steps counterclockwise or three steps clockwise, and **NAV 1** will be displayed. Some types of pages such as **VOR** only have one page. Turning the inner knob while it is in the "in" position, will have no effect on the VOR page type and other types of pages having only one page.

If all of the information to be displayed won't fit on a specific page, a "+" sign is used to indicate that there is additional information of the same kind available for viewing. The inner knob is turned to see the additional information, but the name and number of the page doesn't change. For example, it is not uncommon to see **APT+4**. The APT 4 page always displays the communications frequencies for the selected airport. If all of the frequencies don't fit on one page, there will be two or more APT 4 pages used to display all of the frequencies.

The eight page types for the left side are the following:

<u>Page Annunciation</u>	<u>Knob Annunciation</u>	<u>Page Name</u>	<u>Page #'s</u>
TRI	TRIP	Trip Planning	0 - 6
MOD	MODE	Mode	1 - 4
FPL	FPL	Flight Plan	0 - 9
NAV	NAV	Navigation	1 - 5
CAL	CALC	Calculator	1 - 7
STA	STAT	Status	1 - 2
SET	SETUP	Setup	1 - 8
OTH	OTHER	Other	0 - 5*

* 0 - 9 with fuel management

The ten page types for the right side are the following:

<u>Page Annunciation</u>	<u>Knob Annunciation</u>	<u>Page Name</u>	<u>Page #'s</u>
CTR	CTR	Center Wpt.	1 - 2
REF	REF	Reference Wpt.	None
ACT	ACTV	Active Wpt.	**
D/T	D/T	Distance/Time	1 - 4
NAV	NAV	Navigation	1 - 5
APT	APT	Airport Wpt.	1 - 6
VOR	VOR	VOR Wpt.	None
NDB	NDB	NDB Wpt.	None
INT	INT	Intersection Wpt.	None
SUP	SUPL	Supplemental Wpt.	None

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

2.2 Entering Waypoint Identifiers

The KLN 88 data base contains thousands of waypoints for the area that includes the United States, Canada, Mexico, Central America, and the Caribbean. To use these waypoints it is only necessary to enter the ICAO (International Civil Aviation Organization) identifier of the waypoint, thus saving the labor of entering a latitude and longitude.

Many airport ICAO identifiers have four letters beginning with a prefix letter that corresponds to the geographic area in which it is located. The prefix letter of the Contiguous United States is "K". Thus, the ICAO identifier for Los Angeles International airport is KLAX, not LAX which is the identifier of Los Angeles VOR. Not all airport identifiers receive the prefix letter. Airport identifiers which are a combination of letters and numbers do not receive the prefix letter.

NOTE: 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, or a "C" in Canada. If there are numbers in the identifier, then a prefix is not used.

The general procedure for entering a waypoint identifier is described below. You need not perform these steps now since they will be described again shortly.

- If the cursor is not positioned on the screen location where you desire to enter the waypoint identifier, press **CRSR** (left **CRSR** for left page or right **CRSR** for right page) to turn on the cursor function.
- If required, rotate the outer knob (left outer knob for left page or right outer knob for right page) to position the cursor in the desired location.
- Rotate the appropriate inner knob to select the first character of the waypoint identifier.
- Turn the appropriate outer knob one step clockwise to move the cursor to the second character position.
- Rotate the inner knob to select the second character.
- Use the outer and inner knobs in this manner until the complete waypoint identifier is displayed. Note that you may not have to enter the last characters of the identifier because each time you enter a character, the KLN 88 offers you the first identifier in the data base beginning with the characters you have entered.
- If the **ENT** is flashing in the lower middle segment of the display then press the **ENT** button.

2.3 The Duplicate Waypoint Page

There are some waypoints in the data base 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 left side. The Duplicate Waypoint page is 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. To the right of the identifier is the number of waypoints in the data base having the identifier. Below the identifier is a list of the waypoint types (APT, VOR, NDB, INT, SUP) and the associated countries which use the identifier. To see an example of a Duplicate Waypoint page perform the following steps:



- Press **[P]**.
- Turn the left inner knob to select the letter “**D**” as a waypoint identifier.
- Press **[ENT]**. The Duplicate Waypoint page will be displayed on the left side. At the time of this writing, there were three waypoints in the data base having the identifier “**D**”. These three are shown on the page. One is an NDB located in Canada, one is an NDB located in Cuba, and one is an NDB located in the United States. They are listed with the waypoint closest to the present position first and the waypoint farthest last (third in this case). The cursor will be over the first waypoint type listed. If another selection is desired, rotate the left outer knob to move the cursor over the appropriate choice.
- Press **[ENT]** to view the waypoint page for the selected waypoint.
- Press **[ENT]** to approve the waypoint page.


3.0 INITIALIZATION

The KLN 88 remembers where it was when power was turned off. Therefore, it is usually only necessary to initialize the system if you have moved the unit significantly from where it was at last power down. To initialize:


- Select the Setup 1 page (**SET 1**) on the left side.
- Press the left **[CRSR]**.
- Rotate the left inner knob to display the first character of the airport identifier for the aircraft’s present position or of a nearby navaid. Remember to enter the “**K**”, “**P**”, or “**C**” prefix for certain airports, if required. See section 2.2, “Entering Waypoint Identifiers”.
- Turn the left outer knob one step clockwise to move the flashing portion of the cursor to the second character position. Use the left inner knob to select the second character of the identifier.
- Use the left outer and inner knobs to complete displaying the identifier.
- Press **[ENT]** to display the waypoint page on the right side.
- Press **[ENT]** to approve the waypoint page. The cursor will now be flashing over **CONFIRM?**.
- Press **[ENT]**.

4.0 DIRECT TO NAVIGATION



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 on the left side with a flashing cursor over a waypoint identifier. The waypoint identifier which appears on the Direct To page is chosen by the KLN 88 according to the following rules:

- If the Flight Plan 0 page is displayed on the left side and the cursor is over one of the waypoint identifiers in Flight Plan 0 when  is pressed, then that waypoint identifier will appear on the Direct To page. (You will appreciate this feature when you learn to use flight plans in section 13, “OPERATING FROM THE ACTIVE FLIGHT PLAN”.

If condition number 1 isn't occurring, then:


- If there is any waypoint page (APT 1-6 page, VOR page, NDB page, INT page, SUP page, or ACT page) in view on the right side when  is pressed, then the Direct To page will contain the identifier for the waypoint page being viewed on the right side.

If neither condition number 1 nor number 2 above is occurring, then :

- When  is pressed, the waypoint identifier for the current active waypoint will be displayed.
- If there is no active waypoint when  is pressed, then the Direct To page displays blanks. 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.

The application of rule 1 is described in section 13.4, “Combining Direct To And Flight Plan Operation”. With rules 2 and 3 in mind, here are three procedures for initiating Direct To navigation.

4.1 Direct To - Procedure A

- Press  . The Direct To page is displayed on the left side. The cursor will already be on the left page. A waypoint identifier may or may not be displayed, it doesn't matter at this point.
- Rotate the left inner knob to select the first character of the desired waypoint's identifier. Remember to enter the “K”, “C”, or “P” prefix for certain airports, if required (see section 2.2, “Entering Waypoint Identifiers”).
- Turn the left outer knob one step clockwise to move the flashing portion

of the cursor over the second character position.

- Rotate the left inner knob to select the second character of the identifier.
- Use the left outer and inner knobs as in the previous steps until the desired identifier is completely displayed.
- Press **[ENT]** to display the waypoint page on the right side for the selected waypoint. (If an incorrect identifier has been entered, you may immediately start using the left inner knob to re-enter the correct identifier.)
- Press **[ENT]** again to approve the displayed waypoint page. The right side will display the NAV 1 page and the left side will return to the page which was displayed prior to pressing **[⇐]**. The selected waypoint is now the active Direct To waypoint.

4.2 Direct To - Procedure B




- Select the desired waypoint type (**APT**, **VOR**, **NDB**, **INT**, or **SUP**) on the right page.

Select the desired waypoint identifier using the following method:

- a. Press the right **[CRSR]**. The cursor will be over the first character in the waypoint identifier.
 - b. Rotate the right inner knob to select the first character of the desired identifier.
 - c. Turn the right outer knob one step clockwise to move the cursor to the second character, and then use the right inner knob to select the second character.
 - d. Use the right outer and inner knobs as in the previous two steps to complete the identifier.
- Press **[⇐]**. The Direct To page is displayed on the left side, and it contains the desired waypoint identifier.
 - Press **[ENT]** to approve the waypoint page displayed on the right side. The right side will display the NAV 1 page, and the left side will return to the page which was displayed prior to pressing **[⇐]**. The selected waypoint is now the active Direct To waypoint.



4.3 Direct To - Procedure C

- Select the desired waypoint type (**APT**, **VOR**, **NDB**, **INT**, or **SUP**) on the right page.
- Select the desired waypoint identifier using the following method:
 - a. Pull the right inner knob to the “out” position. Make sure the right cursor function is turned off.

- b. Rotate the right inner knob in either direction to scan through the waypoint identifiers in alphabetical order. The faster you rotate the knob, the larger the change. Numbers precede letters in the list.
 - c. When the desired identifier is found, press the right inner knob back to the “in” position.
- Press  . The Direct To page is displayed on the left side, and it contains the desired waypoint identifier.
 - Press  to approve the waypoint page displayed on the right side. The right side will display the NAV 1 page, and the left side will return to the page which was displayed prior to pressing  . The selected waypoint is now the active Direct To waypoint.

4.4 To Recenter The D-Bar

If you get off course and wish to recenter the left/right deviation bar (D-Bar) to proceed direct to the same waypoint:




- Select a non-waypoint page (**NAV**, **D/T**, **REF**, or **CTR**) or the active waypoint page on the right side.
- Press  . The Direct To page is displayed on the left, containing the active waypoint identifier.
- Press  .

4.5 To Proceed Direct To Another Waypoint:

You may proceed Direct To another waypoint other than the active one by using Direct To procedure A, B, or C at any time.

4.6 Cancelling Direct To Operation

The primary reason for wanting to cancel Direct To operation is to return to flight plan operation, which is described later in section 13.0, “OPERATING FROM THE ACTIVE FLIGHT PLAN”. To cancel Direct To operation:



- Press  .
- Press  .
- Press  .

5.0 THE NAVIGATION PAGES

As you would expect, the NAV (navigation) pages contain information relating specifically to the KLN 88's navigation capabilities. The KLN 88 has five NAV pages. Unlike any other pages, these pages may be selected and viewed on both the left and right sides of the screen. The procedure for selecting specific pages, including the NAV pages, was described previously under "BASIC OPERATION OF PANEL CONTROLS". NAV pages 1,2,3, and 5 are briefly described here. The KLN 88 Pilot's Guide must be referred to for an explanation of the NAV 4 page (vertical navigation) and for more detailed information on all other NAV pages.

5.1 The Navigation 1 Page (NAV 1)

The NAV 1 page displays the following information:

- The active navigation leg. For Direct To operation this consists of the Direct To symbol, , followed by the active Direct To waypoint identifier. For the leg of a flight plan this consists of the "from" waypoint identifier and the active "to" waypoint identifier. An arrow () precedes the active waypoint identifier.
- A course deviation indicator (CDI) which displays left and right deviation from the desired track. A vertical bar operates like a navigation deviation needle on a conventional CDI or HSI. An on-course indication is displayed when the vertical deviation bar is centered on the triangle in the middle of the CDI. In the enroute modes, each dot represents one nautical mile deviation from the desired track. Therefore, the CDI shows course deviation five nautical miles left and right of course. 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. In the approach modes (refer to KLN 88 Pilot's Guide) each dot represents one-fourth nautical mile. 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; an "up" triangle indicates "to" the active waypoint while a "down" triangle indicates "from" the active waypoint.
- Distance (**DIS**) to the active waypoint
- Groundspeed (**GS**)
- Estimated time enroute (**ETE**)
- Bearing (**BRG**) to the active waypoint

5.2 The Super NAV 1 Page

When the NAV 1 page is selected on both the left and right sides at the same time, the Super NAV 1 page is displayed. The Super NAV 1 page contains exactly the same information as the standard NAV 1 page but spreads the data out across the entire screen making it even easier to view.

5.3 The Navigation 2 Page (NAV 2)

The NAV 2 page displays the aircraft's present position in two formats. The first format is in terms of the distance and radial from a nearby VOR. (Although terminal VOR's are in the data base, they are not used on this page since many aeronautical charts do not display a compass rose around them for orientation purposes). The second format is in latitude and longitude.

5.4 The Navigation 3 Page (NAV 3)

The NAV 3 page displays additional supplementary navigation information. With the KLN 88 in the normal enroute-leg mode it displays the following:

- Desired track (**DTK**), which is the great circle course between two waypoints. The CDI displayed on the NAV 1 page is referenced to this DTK.
- Actual track (**TK**), which is the aircraft's present track over the ground.
- Cross track error correction – This is a text means of indicating how far and which direction to get back on course. It is consistent with the vertical deviation bar displayed on the NAV 1 page. “**FLY L 2.7 NM**” means fly left 2.7 nautical miles to get on course.
- Minimum Safe Altitude for present position (**MSA**) – *IMPORTANT: refer to the KLN 88 Pilot's Guide to understand the clearance provided by this altitude.*
- Minimum Enroute Safe Altitude from present position to destination (**ESA**). *IMPORTANT: refer to the KLN 88 Pilot's Guide to understand the clearance provided by this altitude.*

5.5 The Navigation 4 Page (NAV 4)

The NAV 4 page is used exclusively for advisory vertical navigation (VNAV). Its operation is described in the KLN 88 Pilot's Guide.

5.6 The Navigation 5 Page (NAV 5)

The NAV 5 page provides a navigation graphics presentation. It is useful in providing a pilot with proper orientation of the navigation situation. One of three map orientation formats may be selected for use on the NAV 5 page: a true North up display, a desired track up display, or an actual track up

display. When the North up display is selected, viewing the NAV 5 page is like looking at a navigation chart with North at the top. When the desired track up display is selected, viewing the NAV 5 page is like looking at a chart that is turned so that your course line is pointing up. When the actual track up display is selected, viewing the NAV 5 page is like looking at a chart that is turned so that the direction the aircraft is tracking over the ground is pointing up.

To change the NAV 5 page map orientation, select the Setup 5 page (**SET 5**) on the left side. Then:

- Press the left **CRSR**.
- Rotate the left inner knob to alternate the text from **NORTH UP**, to **DTK UP** (desired track up), to **TRACK UP** (actual track up). Select the desired format.
- Press the left **CRSR** to turn off the left cursor function, and then use the left knobs to return to the desired page.

In both the North up format and the desired track up format, the aircraft's position is depicted by a diamond. The diamond always stays in the same position on the screen. The map graphics move on the screen to display the correct orientation. In the North up format, the lower left corner of the NAV 5 page shows a **N↑**. In the desired track up format, the lower left corner of the NAV 5 page shows a number such as 237. The number displayed in front of the degree symbol is the desired track for the current leg.

In the actual track up format, an aircraft symbol replaces the diamond to depict the aircraft's position. The aircraft symbol always stays in the same position on the screen. ***The groundspeed of the aircraft must be at least 30 knots in order for the aircraft symbol to appear, and the NAV 5 page to become functional.*** The lower left corner of the NAV 5 page shows a number similar to the desired track up format. However, the number displayed in front of the degree symbol is the direction the aircraft is actually tracking over the ground. In a no wind condition, this is also the aircraft's heading.

CAUTION: The KLN 88 calculates the aircraft's actual track from changes in position. Therefore, it is typical to have a 10 to 20 second delay from the time a significant heading change is made until the new actual track is calculated and the correct map orientation is displayed. THIS IS NOT A HEADING UP DISPLAY.

The range scale is displayed in the lower right corner of the NAV 5 page. The range scale indicates the distance from the aircraft's position (the

diamond or aircraft symbol) to the top of the screen. Range scale selections from 5 NM to 1000 NM may be made by pressing the appropriate **CRSR** (left **CRSR** if NAV 5 page is on left side and vice versa) and turning the appropriate inner knob.

When operating Direct To a waypoint which is not in the active flight plan, the Direct To waypoint is indicated on the NAV 5 page by an “*”.

When navigating using flight plan operation, the active flight plan (FPL 0) waypoints are displayed using the number associated with the waypoint as it appears on the FPL 0 page. Thus, the position of the third waypoint in FPL 0 is indicated by a 3 on the NAV 5 page. Lines connect the flight plan waypoints. An arrow points to the active waypoint and shows the current flight plan leg.

When the NAV 5 page is displayed on the left side of the screen and any selected waypoint page is displayed on the right side, the location of the selected waypoint is indicated by a “+” on the NAV 5 page. Of course, the display scale must be chosen which allows the selected waypoint to be displayed.

5.7 The Super NAV 5 Page

When the NAV 5 page is selected on both the left and right sides at the same time, the Super NAV 5 page is displayed. The Super NAV 5 page has a unique format unlike any other KLN 88 page. This is done so that the maximum amount of screen is dedicated to graphics display. There are no page indicators in the lower left and right segments of the screen to indicate that the Super NAV 5 page is being displayed. However, you will soon learn to recognize the Super NAV 5 page from its unique format. The mode annunciation, which normally appears in the lower center segment of the screen, is now located on the far left side. The message prompt is now located on the lower left corner of the graphics display.

The Super NAV 5 page shows alphanumeric waypoint identifiers on the graphics display. In addition, the left side of the Super NAV 5 page shows the following information:

- The active waypoint identifier
- Distance to the active waypoint
- Groundspeed
- Estimated time enroute
- Mode of operation
- Map orientation
- Range scale

Like the standard NAV 5 page, map orientation may be either North up, desired track up, or actual track up. The left **[ALT]** and left inner knob are used to change range scale.

CAUTION: The NAV 5 and Super NAV 5 pages do not provide any functions other than orientation. They do not display weather, terrain, restricted airspace, or any other data. Be careful when using the desired track up display or the actual track up display to not think that this is a heading up display. The desired track up display orientation is most useful when the aircraft's heading is approximately the same as the desired track.

6.0 MESSAGE PAGE

Whenever the KLN 88 determines that there is a situation that requires the pilot's attention, the message prompt (**MSG**) begins flashing in inverse video at the bottom of the display just to the right of the mode of operation. A remote message annunciator may also be installed in the aircraft instrument panel. The message should be viewed at the pilot's earliest opportunity because the unit may be alerting the pilot of some condition of immediate concern. To view the message, press **[M]**. The Message page, which takes the whole width of the display, will appear and show the new message. Appendix B of the KLN 88 Pilot's Guide contains a listing of all of the Message page messages and their meanings. 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.

After reading the message, press **[M]** again to return to the pages which were previously in view. If all of the messages can not be displayed on one Message page, repeated presses of **[M]** will show the other messages before returning to the pages which were previously being viewed. Whenever a message condition exists which requires a specific action by you, the message prompt will remain on but not flashing.

7.0 SPECIAL USE AIRSPACE ALERT

The KLN 88 data base contains the location of areas of special use airspace. These areas include Prohibited Areas, Restricted Areas, Warning Areas, Alert Areas, Military Operations Areas (MOAs), Terminal Control Areas (TCAs), Airport Radar Service Areas (ARSAs), and Terminal Radar Service Areas (TRSAs). The outer lateral boundaries for each of these areas are stored without reference to any altitude restriction criteria.

The KLN 88 normally will 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. If the special use airspace is a TCA, ARSA, or TRSA, the message page will also instruct the user to see the Airport 4 page (airport communications) for the primary airport so that the correct communication frequency may be determined.

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 two nautical miles of one of these areas even if the aircraft's projected track over the ground won't actually penetrate the special use airspace. If one of the special use areas is penetrated, another message will state: **INSIDE SPC USE AIRSPACE**.

The special use airspace alert feature may be disabled (or enabled) on the Setup 8 page. After displaying the Setup 8 page (**SET 8**) on the left side, press the left **CRSR** to turn on the left cursor function. The left inner knob is used to display **AIRSPACE ALERT ENABLE** or **AIRSPACE ALERT DISABLE**. After the desired selection has been made, press the left **CRSR** to turn off the cursor function.

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 88's special use airspace alert is only a tool to assist the pilot but should never be relied upon as the sole means of avoiding these areas.

8.0 VIEWING THE WAYPOINT PAGES

Waypoint pages include APT (airport), VOR, NDB, INT (intersections and outer markers), and SUP (supplemental). Supplemental waypoints are user defined waypoints that have not been defined specifically as an airport, VOR, NDB, or intersection. Airport waypoints have six pages while the other type waypoints all have one page each.

8.1 Selecting The Desired Waypoint Page

To select a specific waypoint page:

- Select the desired waypoint type (**APT**, **VOR**, **NDB**, **INT**, or **SUP**) on the right page using the right outer knob.

- Select the desired waypoint identifier using one of the following two methods.

Method 1:

- a. Press the right **CRSR**. The cursor will be over the first character in the waypoint identifier.
- b. Rotate the right inner knob to select the first character of the desired identifier.
- c. Turn the right outer knob one step clockwise to move the cursor to the second character, and then use the right inner knob to select the second character.
- d. Use the right outer and inner knobs as in the previous two steps to complete the identifier.

Method 2:

- a. Pull the right inner knob to the “out” position.
 - b. Rotate the right inner knob in either direction to scan through the waypoint identifiers in alphabetical order. The faster you rotate the knob, the larger the change. Numbers precede letters in the list.
 - c. When the desired identifier is found, press the right inner knob back to the “in” position.
- If an airport page has been selected, rotate the right inner knob to change the page to the desired airport page (APT 1 - APT 6).

NOTE: *If an airport, VOR, or NDB waypoint identifier is not known, there is a method described in the KLN 88 Pilot's Guide for entering a portion of the waypoint name and having the KLN 88 automatically retrieve the appropriate waypoint page. In addition, for airport waypoints a portion of the city, state may be entered to retrieve the airport waypoint page. See “Selecting Waypoint By Name or City” in the Level One Operation section of the KLN 88 Pilot's Guide.*

8.2 The Airport 1 Page (APT 1)

The Airport 1 page contains the following information:

- Airport identifier. An arrow precedes the identifier if it is the active waypoint.
- Airport name
- The letters **TCA**, **ARSA**, or **TRSA** will appear if the airport underlies the outer boundary of a Terminal Control Area, an Airport Radar Service Area, or a Terminal Radar Service Area, respectively. In addition, if the airport is a military airport the letters **MILTRY** will appear.
- The latitude and longitude of the airport reference point (the “official” location of the airport).

8.3 The Airport 2 Page (APT 2)

The Airport 2 page contains the following information:

- Airport identifier. An arrow precedes the identifier if it is the active waypoint.
- The city where the airport is located.
- The state if the airport is located in the United States, the Province if located in Canada, or the country if located outside the United States and Canada. A listing of the abbreviations used is contained in the KLN 88 Pilot's Guide.
- Airport elevation (rounded to the nearest 10 feet).
- Time in relationship to UTC (Zulu). **Z-5**, for example, indicates standard time is five hours behind UTC time. If the airport is located in an area which observes daylight savings time the information in parentheses shows the daylight savings time in relationship to UTC.
- Instrument approach information
 - ILS** - airport has an ILS approach
 - MLS** - airport has an MLS approach
 - ILS/MLS** - airport has an ILS and MLS approach
 - NP APR** - airport has a nonprecision approach and no ILS or MLS.
 - NO APR** - airport does not have an instrument approach
- The symbol **(R)** indicates that the airport is serviced by an Approach/Departure control facility having radar capability.

8.4 The Airport 3 Page (APT 3)

The Airport 3 page contains the following information for up to five runways. If there are more than two runways, there will be more than one APT 3 page.

- Airport identifier. An arrow precedes the identifier if it is the active waypoint.
- Runway number
- Runway lighting availability:
 - L** - runway lighting sunset to sunrise
 - LPC** - runway lighting is pilot controlled
 - LPT** - runway lighting is part time or on-request
 - Blank indicates no runway lighting
- Runway length in feet

- Runway surface:
HRD - hard surface
TRF - turf
GRV - gravel
CLY - clay
SND - sand
DRT - dirt
UNK - unknown

8.5 The Airport 4 Page (APT 4)

The Airport 4 page contains the following communications frequency information. If there are more frequencies for an airport than can be displayed on a single page, there will be more than one APT 4 page.

- Airport identifier. An arrow precedes the identifier if it is the active waypoint.
- Frequencies for:
ATIS - automatic terminal information service
PTAX - pre-taxi clearance
CLR - clearance delivery
GRND - ground control
TWR - tower
UNIC - unicom
MCOM - multicom
CTAF - common traffic advisory frequency
MF - mandatory frequency
ATF - aerodrome traffic frequency
TCA - terminal control area (VFR frequency)
ARSA - airport radar service area (VFR frequency)
TRSA - terminal radar service area (VFR frequency)
APR - approach control
DEP - departure control
AAS - aeronautical advisory service

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

If an approach or departure frequency has an associated range of radials for which it should be used, that range is displayed. If the radials are measured from another airport or waypoint, that waypoint identifier is displayed. If the frequency is for use above or below a certain altitude or between two altitudes, that information is also displayed.

8.6 The Airport 5 Page (APT 5)

The Airport 5 page is used to store and display user-entered remarks. Up to 100 airports may contain these remarks. A remark may contain up to three lines of eleven characters each. Letters, numbers, hyphens, and spaces may be used in the remark. To enter a remark:

- Select the APT 5 page for the desired airport.
- Press the right **CRSR**.
- Rotate the right outer knob until the cursor fills the entire third line of the screen.
- Use the right inner knob to select the first character of the remark.
- Use the right outer knob to move the flashing portion of the cursor to the second cursor position, and then use the right inner knob to select the second character.
- Use the right outer and inner knobs to select the rest of the first line of the remark.
- Press **ENT** to approve the first line. The cursor will move to the next line.
- Use the above procedure to select the characters for the second and third lines of the remark. Press **ENT** to individually approve each line of the remark.
- Press the right **CRSR** to turn the right cursor function off.

The Other 4 page (**OTH 4**) contains a listing of all airports containing remarks. To delete a previously entered airport remark, select the Other 4 page, position the left cursor over the desired airport identifier, press **CLR**, and then press **ENT**.

8.7 The Airport 6 Page (APT 6)

The Airport 6 page is used for Loran approaches. The page will display blanks if there is no Loran approach for the airport. Refer to the KLN 88 Pilot's Guide for additional information.

8.8 The VOR Page

The VOR page contains the following information:

- VOR identifier. An arrow precedes the identifier if it is the active waypoint.

- The letter “D” appears following the VOR identifier if the VOR has DME capability.
- The name of the VOR.
- The VOR frequency (MHz).
- The published magnetic variation of the VOR.
- The latitude and longitude of the VOR.

8.9 The NDB Page

The NDB page contains the following information for Non-directional beacons (NDBs):

- NDB identifier. An arrow precedes the identifier if it is the active waypoint.
- The name of the NDB.
- The NBD frequency (kHz)
- The latitude and longitude of the NDB.

NOTE: NDB's which are combined with outer markers (usually called outer compass locators) are not stored with NDB's. Instead, they are stored with intersections and are found on the intersection (INT) pages.

8.10 The Intersection Page (INT)

The Intersection pages contain low altitude, high altitude, approach, and SID/STAR intersections **as well as outer markers and outer compass locators**. The following information is displayed for Intersection pages:

- The intersection, outer marker, or outer compass locator name.
- The location of the intersection, outer marker, or outer compass locator expressed in terms of a radial and distance from a nearby VOR.
- The latitude and longitude of the intersection, outer marker, or outer compass locator.

In addition, the user may enter the identifier of another nearby waypoint (such as a VOR) in the **REF** field, and the page will compute and display the radial and distance from the nearby waypoint to the intersection. This information is not stored with the Intersection page and is lost when leaving the page. To calculate the radial and distance from a nearby waypoint:

- Display the desired Intersection page.
- Press the right **CRSR** to turn the right cursor function on.
- Rotate the right outer knob until the cursor is positioned over the dashed field adjacent to **REF**.
- Use the right inner and outer knobs to select the desired identifier.
- Press **ENT** to display the waypoint page for the identifier just entered.
- Press **ENT** to approve the waypoint page. The Intersection page is displayed with the computed radial and distance.
- Press the right **CRSR** to turn off the right cursor function.

8.11 The Supplemental Waypoint Page (SUP)

Supplemental waypoints are user-defined waypoints that have not been defined specifically as an airport, VOR, NDB, or intersection. The following information is displayed on a Supplemental waypoint page:

- The name or identifier of the supplemental waypoint.
- The position of the supplemental waypoint expressed in terms of a radial and distance from a nearby VOR.
- The latitude and longitude of the supplemental waypoint.

In addition, the user may enter the identifier of another nearby waypoint (such as a VOR) in the **REF** field and the page will compute and display the radial and distance from the nearby waypoint to the supplemental waypoint. The procedure for doing this is identical to that just explained above for an intersection waypoint. This radial and distance information is not stored with the Supplemental Waypoint page and is lost when leaving the page.

9.0 NEAREST AIRPORTS, VORS, AND NDBS

9.1 Viewing The Nearest Airports, VORs, And NDBs

The KLN 88 computes the nine nearest airports, the nine nearest VORs, and the nine nearest NDBs to the aircraft's present position. There is no "nearest" list for intersection and supplemental waypoints. To view the nearest airports:

- Rotate the right outer knob to select the airport (**APT**) types.

- Pull the right inner knob to the “out” position.
- Rotate the right inner knob counterclockwise to initially scan through a complete list of all airport identifiers backward in alphabetical order. There are actually two waypoint scan lists. These two lists are the “complete” list and the “nearest” list. The complete list contains all of the airport waypoints in the data base. The nearest list consists of the nine nearest airports to your present position.

The nearest list is positioned in front of the complete list. That is, you must scan backwards through the complete list to reach the nearest list. This is easy to do because the faster the knob is turned, the larger the step is made through the list. You will know when you have reached the nearest list because the top right portion of the waypoint page will flash the relative position of the waypoint to the present position (**NR 1** indicates the nearest). As you scan clockwise from **NR 1**, **NR 2**, **NR 3**, ..., **NR 9**, the next scan position is the beginning of the complete list. 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 are displayed. The bearing and distance are updated continuously, although the nearest waypoint list is updated approximately every two minutes.

The procedure above is for viewing the nearest airports but it is equally applicable to VORs and NDBs except that either VOR or NDB waypoint types are selected in the first step.

9.2 Nearest Airports In An Emergency

In the event of an emergency, a special procedure exists to very quickly get to the beginning of the nearest airport list:

- Press **MSG**.
- Press **ENT**. The waypoint page for the nearest airport is now displayed on the right side. The right inner knob may now be used in the normal manner to scan the other nearest airports (knob in the “out” position) or to view all six airport pages for a specific airport (knob in the “in” position).

9.3 Selecting The Nearest Airport Criteria

The nine airports in the nearest list are the nine airports which meet the criteria selected on the Setup 3 page (**SET 3**). The SET 3 page allows you to specify what criteria you want an airport to meet before it is considered for the nearest airport list. To specify the airport criteria:

- Select the SET 3 page on the left side.

- Press the left **[CRSR]** to turn on the left cursor function. The cursor will appear over the minimum runway length field.
- Use the left inner knob to select the minimum length runway desired for the airport to qualify for the nearest airport list. Values between 1,000 feet and 5,000 feet in 100 foot increments may be selected.
- Rotate the left outer knob one step clockwise to position the cursor over the runway surface criteria.
- Turn the left inner knob to select either **HRD SFT** or to select **HRD**. If **HRD SFT** 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 and asphalt. Soft surface runways include turf, gravel, clay, sand, and dirt.

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

10.0 CREATING USER WAYPOINTS

Up to 250 user-defined waypoints may be created. These waypoints must contain an identifier, latitude, and longitude. This manual describes the most common methods of creating user-defined waypoints. The KLN 88 Pilot's Guide describes several alternative methods.

Regardless of which of the three methods described below is utilized for creating a user-defined waypoint, it is first necessary to enter a unique identifier for the waypoint. The identifier can be one to five characters in length. To select the identifier:

- Use the right outer knob to select the supplemental (**SUP**) type waypoints.
- Press the right **[CRSR]** to turn on the right cursor function. The cursor will appear over the first character position of the identifier.
- Use the right inner knob to select the first character of the identifier.
- Turn the right outer knob one step clockwise to position the cursor over the second character, and then use the right inner knob to select the desired character.

- Use the right outer and inner knobs as described above to finish selecting the identifier. The following text should now be displayed:

**CREATE NEW
WPT AT:
USER POS?
PRES POS?**

NOTE: *If a waypoint page containing a latitude and longitude is displayed instead of the above text, the identifier entered already exists in the data base. Another identifier must be chosen.*

10.1 Creating A Waypoint At The Present Position

The first method of creating a user-defined waypoint is to define it at your present position (the position shown on the NAV 2 page). To create a waypoint in this manner:

- Follow the steps just presented in section 10.0 to enter a waypoint identifier.
- Turn the right outer knob clockwise to position the cursor over **PRES POS?** and press **[ENT]**. A SUP page will now be displayed with the waypoint identifier at the top of the page and the latitude and longitude of the waypoint at the bottom of the page. The user-defined waypoint is now created.

10.2 Creating A Waypoint As A Radial And Distance From Another Waypoint

The second method of creating a user-defined waypoint is to define the waypoint's position in terms of a radial and distance from any other existing waypoint. To create a waypoint in this manner:

- Follow the steps presented in section 10.0 to enter a waypoint identifier.
- Rotate the right outer knob to position the cursor over **USER POS?** and press **[ENT]**. A user waypoint page will appear with the identifier at the top of the page and the cursor over a dashed latitude field.
- Turn the right outer knob counterclockwise to position the cursor over the dashes to the right of **REF**. The next step will be to enter the identifier of an existing waypoint into this field.
- Rotate the right inner knob to select the first character of the "reference waypoint".
- Use the right outer knob to position the cursor and the right inner knob to

select the characters so that the entire identifier for the reference waypoint is displayed.

- Press **[ENT]** to see the waypoint page for the reference waypoint just entered.
- Press **[ENT]** again to approve this waypoint page. The waypoint page being created will return with the cursor over the dashes to the right of **RAD**.
- Use the right inner and outer knobs to select the radial (from the reference waypoint). The radial may be selected to the nearest tenth of a degree.
- Press **[ENT]**. The cursor will move to the dashes to the right of **DIS**.
- Use the right inner and outer knobs to select the distance. The distance may be selected to the nearest tenth of a nautical mile.
- Press **[ENT]**. The latitude and longitude is calculated and displayed. The user-defined waypoint is now created.

NOTE: *Entering the reference waypoint, radial, and distance is done only to define the user waypoint's latitude and longitude position. The reference waypoint, radial, and distance are not stored as part of the user waypoint. As soon as another page is viewed on the right side, these parameters are lost. They may, of course, be re-entered at any time.*

10.3 Creating A Waypoint By Entering A Latitude/Longitude Position

The third method of creating a user-defined waypoint is to directly enter a latitude/longitude position. To create a waypoint in this manner:

- Follow the steps presented in section 10.0 to enter a waypoint identifier.
- Rotate the right outer knob to position the cursor over **USER POS?** and press **[ENT]**. A user waypoint page will appear with the identifier at the top of the page and the cursor over a dashed latitude field.
- Turn the right inner knob to display an **N** (for North) or an **S** (for South).
- Select the latitude in degrees, minutes, and tenths of a minute by using the right outer knob to position the cursor and the right inner knob to select the desired numbers.
- When the complete latitude has been selected, press **[ENT]**. The cursor will jump down to the longitude field.
- Turn the right inner knob to select **W** (for West) or **E** (for East).

- Use the right outer and inner knobs to select the longitude.
- Press **[ENT]**. The user-defined waypoint is now created.

11.0 DELETING USER WAYPOINTS

A listing of all user-defined waypoints is contained on the Other 3 page (OTH 3). To the right of the identifier is the type waypoint defined (**APT**, **VOR**, **NDB**, **INT**, or **SUP**). If the waypoint is used in a flight plan, the flight plan number is shown to the right of the waypoint type. ***If more than five user waypoints exist, it is necessary to press the left **[CRSR]** and then use the left outer knob to scroll through the complete list.*** To delete a user waypoint:

- Select the OTH 3 page.
- Press the left **[CRSR]** and use the left outer knob to move the cursor over the waypoint to be deleted. A waypoint contained in a flight plan can not be deleted without first either deleting the waypoint from the flight plan or deleting the entire flight plan.
- Press **[CLR]**.
- Press **[ENT]**.

12.0 CREATING AND MODIFYING FLIGHT PLANS

The advantages of creating flight plans are: (1) the entire route of flight for an upcoming trip can be created and stored prior to departure to reduce workload while enroute; and (2) the routes for frequently made trips need to be created just once and may then be recalled as required for later use. The following rules and considerations apply to KLN 88 flight plans:

- The KLN 88 is capable of storing in its memory nine flight plans plus an active flight plan.
- Each of the flight plans may contain up to 20 waypoints. These waypoints may consist of any combination of published waypoints from the data base or user created waypoints.
- The flight plans are numbered 0 through 9 (FPL 0, FPL 1, FPL 2, ..., FPL 9).

- The active flight plan is always FPL 0. The standard procedure is to create a flight plan in one of the flight plans numbered as FPL 1, FPL 2, FPL 3, ..., or FPL 9. When one of these numbered flight plans is activated, it becomes FPL 0, the active flight plan. This manual will refer to FPL 0 as the “active flight plan” and FPL 1 through FPL 9 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 88 system will be flagged.

12.1 Creating A Flight Plan

To create a flight plan:

- Rotate the left outer knob to select the flight plan (**FPL**) type pages.
- Turn the left inner knob to select a flight plan page (preferably other than **FPL 0**) which does not contain a flight plan. If all of the flight plan pages contain flight plans, refer to section 12.5, “Deleting Flight Plans”.
- Press the left **[CRSR]** to turn on the cursor function for the left page. The cursor will be over the first waypoint position.

NOTE: The KLN 88 flight plan operation is designed so that the first waypoint in the flight plan should always be the departure point. Remember to enter the “K”, “P”, or “C” prefix for certain airports. See section 2.2, “Entering Waypoint Identifiers”.

- Use the left inner knob to select the first character of the departure waypoint identifier.
- Turn the left outer knob one step clockwise to move the flashing portion of the cursor over the second character position, and then use the left inner knob to select the desired character.
- Use the above procedure to select the entire identifier for the first waypoint.
- Press **[ENT]**. A waypoint page for the identifier just entered will be displayed on the right side. If a mistake was made and the wrong waypoint identifier was entered, press **[CLR]** and begin again. If a

mistake was not made but the waypoint identifier just entered isn't in the data base, a page allowing creation of a user defined waypoint will appear on the right side. Refer to section 10.0, "CREATING USER WAYPOINTS", for instruction on how to define a user created waypoint.

- Press **[ENT]** again to approve the waypoint page being displayed. The cursor will move to the second waypoint position.
- Use the same procedure to enter the rest of the waypoints in the flight plan. If the flight plan consists of five or more waypoints, the waypoints will automatically scroll as necessary to allow entry of the next waypoint.
- When all of the waypoints have been entered in the flight plan, the left 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 six or more waypoints since not all of the waypoints can be displayed at one time. When the left outer knob is rotated to the full counterclockwise position, the cursor will be positioned over **USE?**. If there are more than five waypoints in the flight plan, the first four waypoints will then be displayed followed by the last waypoint in the flight plan. Rotate the left outer knob to move the cursor, and manually scroll to see the missing intermediate waypoints.
- Press the left **[CRSR]** to turn off the left cursor function. Additional flight plans may now be created in the same manner.

12.2 Activating A Numbered Flight Plan

To activate one of the previously created numbered flight plans:

- Use the left outer knob to select the flight plan (**FPL**) type pages.
- Rotate the left inner knob to select the desired flight plan.
- Press the left **[CRSR]** to enable the left cursor function. The cursor will appear over **USE?**. (If you haven't left the numbered flight plan page since creating this flight plan, rotate the left outer knob all the way counterclockwise to position the cursor over **USE?**.)
- Press **[ENT]** to activate the flight plan in the order shown. To activate the flight plan in inverse order (first waypoint becomes last and last waypoint becomes first), rotate the left outer knob one step clockwise to position the cursor over **USE? INVRT?** before pressing **[ENT]**.
- 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.

12.3 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:

- Press the left **[CRSR]** to enable the left cursor function if it is not on already.
- Rotate the left outer knob as necessary to 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 position in the flight plan you wish the new waypoint to be added. For example, if **TUL** is presently the second waypoint in the flight plan and you wish to insert **GNP** in the number two position in front of **TUL**, move the cursor over **TUL**.
- Use the left inner knob to enter the first character of the waypoint being inserted. As you begin to turn the knob the exiting waypoint in this position automatically jumps down to the next position. In the previous example, **TUL** automatically moves to waypoint three.
- Use the left outer and inner knobs in the normal manner to complete entering the waypoint identifier.
- Press **[ENT]** to display the waypoint page on the right side for the identifier just entered.
- Press **[ENT]** again to approve the waypoint page.
- Press the left **[CRSR]** to turn off the left cursor function.

12.4 Deleting A Waypoint From A Flight Plan

To delete a waypoint from a flight plan:

- Press the left **[CRSR]** to enable the left cursor function if it is not on already.
- Rotate the left outer knob as necessary to position the cursor over the waypoint to be deleted.
- 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. If a mistake was made and you do not wish to delete this waypoint, press **[⊞]**.
- Press **[ENT]** and the waypoint will be deleted from the flight plan. The other waypoints in the flight plan will be correctly repositioned.

12.5 Deleting Flight Plans

To delete a flight plan which is no longer required:

- Display the flight plan (**FPL 0**, **FPL 1**, **FPL 2**,..., or **FPL 9**) which is to be cleared.
- Make sure the left cursor function is turned off. If the left cursor is on, press the left **CRSR** to turn it off.
- Press **CLR**. The words **DELETE FPL?** will appear at the top of the page. If a mistake was made and you do not wish to clear this flight plan, press **CLR**.
- Press **ENT** to clear the flight plan.

12.6 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:

- Select a numbered flight plan page which does not contain any way-points. If none exist, use the procedure described in section 12.5, "Deleting Flight Plans", to clear a flight plan which is no longer required.
- Press the left **CRSR** to turn on the left cursor function with the cursor over the blank first waypoint position.
- Rotate the left outer knob one step counterclockwise to position the cursor over **LOAD FPL 0?**.
- Press **ENT** to load the active flight plan into this numbered flight plan.








13.0 OPERATING FROM THE ACTIVE FLIGHT PLAN

13.1 General Procedures

Everything described in this manual thus far is applicable to using the KLN 88 for flight plan operation. The following rules and considerations apply to flight plan operation while the KLN 88 is in the enroute-leg mode:

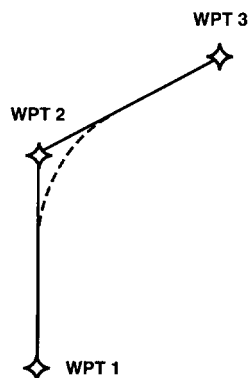
- Although many of the KLN 88 pages may be utilized while operating along a flight plan, common page selections are the FPL 0 page on the left side while simultaneously displaying one of three Distance/Time pages (D/T 1, D/T 2, D/T 3) or the NAV 5 page (navigation graphics) on the right side. Of course the other four Navigation pages may also be used extensively. The information contained on the Distance/Time pages is explained later in section 13.5, "The Distance/Time Pages".
- 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. The tail of the symbol is positioned to the left of the “from” waypoint. The symbol is not displayed unless the KLN 88 is actually receiving signals suitable for navigation. (*Note: If the unit is in the KCC 88 take-home case, 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. If in doubt as to whether or not Direct To operation is occurring, view the NAV 1 page. If the top line shows the  symbol instead of a “from” waypoint, then Direct To navigation is occurring. If it is desired to cancel the Direct To operation and operate from the active flight plan; press , then press  , then press .
- As flight plan waypoints are reached, the active leg symbol automatically orients itself on 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.
- 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 left cursor function on and use the left 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.

13.2 Turn Anticipation And Waypoint Alerting

Prior to reaching a waypoint in the active flight plan, the KLN 88 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 the following figure. 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 88 automatically sequences to the next leg after passing the midpoint in the transition segment.



Approximately 20 seconds prior to the beginning of

Turn Anticipation

turn anticipation, the arrow preceding the active waypoint identifier will begin flashing on the FPL 0 page and on any Navigation page, Distance/Time page, or waypoint page displaying the active waypoint identifier. 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.

To utilize the turn anticipation feature, start the turn transitioning to the next leg in the flight plan at the very beginning of turn anticipation. This occurs when the desired track (**DTK**) displayed on the NAV 3 page changes to the value for the next leg. The beginning of turn anticipation is also indicated when the external waypoint alert annunciator stops flashing and goes on steady. Turn anticipation becomes inactive when transition to the next leg has been made.

If desired, turn anticipation may be disabled (or enabled) on the Setup 6 page (**SET 6**) using the left **CRSR** and the left inner knob to select between **DISABLE** or **ENABLE**. 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.

13.3 Viewing The Waypoint Pages For The Active Flight Plan Waypoints

The waypoint page(s) for each of the waypoints in the active flight plan may be easily displayed by selecting the Active Waypoint page (**ACT**) type on the right side. When the **ACT** page type is first selected, the waypoint page for the active waypoint will be displayed. 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. The letter to the far right of the identifier designates the type of waypoint: **A** = airport, **V** = VOR, **N** = NDB, **I** = intersection, or **S** = supplemental. For VOR's having DME capability, the letter **D** is displayed between the VOR identifier and the **V**. To view the other waypoints in the flight plan, pull the right inner knob to the “out” position and turn it to view each of the waypoints in the order they are contained in the flight plan. For airport waypoints, the right inner knob may be pushed back to the “in” position and rotated to display any of the six airport pages. Pulling the knob back out will allow further scanning of the waypoint pages in the active flight plan.

13.4 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 flight plan. For example, after takeoff it is very normal to receive radar vectors in the terminal area and then be given a clearance direct to the first point in the flight plan that was filed. The KLN 88 makes this kind of operation very easy to accomplish. Whenever you do a Direct To operation to a waypoint which is in the active flight plan (FPL 0), the system will provide navigation to the waypoint

and then automatically resume navigation along the flight plan when the Direct To waypoint is reached. Waypoints which exist prior to the Direct To waypoint in the active flight plan are bypassed. Of course, the active flight plan will never be resumed if the Direct To operation is to a waypoint which is not in the active flight plan.

Any of the several methods previously described for initiating Direct To operation may be used, although the one below is the easiest for this application. The procedure below takes advantage of rule number 1 described in section 4.0.

- Select the FPL 0 page on the left side.
- Press the left **[CRSR]** and then use the left outer knob to position the cursor over the desired waypoint.
- Press **[P-]**. The waypoint page for the selected waypoint in FPL 0 will be displayed on the right side.
- Press **[ENT]** to approve the waypoint page. The Direct To waypoint identifier in the active flight plan will now be preceded by just an arrow. The **↳** symbol is not displayed since there is no "from" waypoint in the flight plan.

If for some reason 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 **[P-]**, then press **[CLR]**, and then press **[ENT]**.

13.5 The Distance/Time Pages

As stated earlier, it is common to use the Distance/Time pages in conjunction with flight plan operation. The Distance/Time pages are specially designed to be most useful when the active flight plan page (FPL 0) is displayed simultaneously on the left side.

13.6 The Distance/Time 1 Page (D/T 1)

When the FPL 0 page is displayed on the left side and the D/T 1 page is displayed on the right side, the distance (**DIS**) and estimated time enroute (**ETE**) are displayed for each of the active flight plan waypoints. ***The distance displayed is the cumulative distance from the aircraft's present position to each waypoint along the flight plan route.*** The ETE is displayed in hours:minutes. If Direct To operation is occurring to a waypoint that is not in the active flight plan, then the D/T 1 page is blank when the FPL 0 page is displayed on the left.

If a numbered flight plan page (FPL 1 through FPL 9) is displayed on the left side, the distances displayed are from the first waypoint in the flight plan and

have nothing to do with the aircraft's present position. No ETEs are then shown.

If a non-flight plan page is displayed on the left, the format of the D/T 1 page changes to display just the distance and ETE for the active waypoint and for the last waypoint in the flight plan.

13.7 The Distance/Time 2 Page (D/T 2)

When the FPL 0 page is displayed on the left side and the D/T 2 page is displayed on the right side, the distance and estimated time of arrival are displayed for each of the active flight plan waypoints. The distances are as described for the D/T 1 page. The time zone associated with the estimated time of arrival is annunciated at the top right of the D/T 2 page. The time zone may be changed by enabling the right cursor function to bring the cursor over the time zone and then turning the right inner knob to select the desired time zone. Changing the time zone on the D/T 2 page changes the time zone on other pages where time is displayed.

If a numbered flight plan page is displayed on the left side, no estimated times of arrival are displayed.

If a non-flight plan page is displayed on the left side, the format of the D/T 2 page changes to display just the distance and estimated time of arrival for the active waypoint and for the last waypoint in the flight plan.

13.8 The Distance/Time 3 Page (D/T 3)

When any flight plan page is displayed on the left side and the D/T 3 page is displayed on the right side, the distance and desired track (**DTK**) are displayed. The distances are as described for the D/T 1 page. The desired track is the great circle course between two waypoints. You should view the diagram in Appendix A of the KLN 88 Pilot's Guide if you are unfamiliar with this term.

If a non-flight plan page is displayed on the left side, the format of the D/T 3 page changes to display just the distance and desired track for the active waypoint **and for the next waypoint in the flight plan**. Note that this is different than for the D/T 1 and D/T 2 pages.

13.9 The Distance/Time 4 Page (D/T 4)

The format of the D/T 4 page does not change. It displays on a single page the pertinent times for the flight regardless of what is displayed on the left page and regardless of whether flight plan or Direct To operation is occurring. The information displayed on the D/T 4 page is the following:

- The destination waypoint
- The selected time zone. The time zone may be changed by pressing the right **CRSR** and using the right inner knob to select the desired time zone.

- **DEP** – The departure time. There are two definitions of departure time depending on what has been selected on the Setup 4 page (**SET 4**). If the SET 4 page displays **RUN WHEN GS > 30 KT**, then the departure time is that time when the groundspeed first reached 30 knots. If the SET 4 page displays **RUN WHEN POWER IS ON**, then the departure time is the time when power was applied to the KLN 88. The SET 4 page may be changed by pressing the left **CRSR** while the SET 4 page is displayed on the left side and then rotating the left inner knob. Press the left **CRSR** again to turn the left cursor function off.
- **TIME** – The present time. The time may be reset on the Self Test page at system turn-on or on the SET 2 page at any time.
- **ETA** – The estimated time of arrival at the destination waypoint.
- **FLT** – The flight time. If **RUN WHEN GS > 30 KT** is selected on the SET 4 page, then flight time is the amount of time that the aircraft's groundspeed has been above 30 knots. Normally, this will be the time since takeoff. However, time spent at groundspeeds less than 30 knots such as intermediate stops without shutting down power or helicopter hovering is not counted as flight time. If **RUN WHEN POWER IS ON** is selected on the SET 4 page, then flight time is the time since power on.
- **ETE** – Estimated time enroute to the destination waypoint.

14.0 UPDATING THE DATA BASE

To update the KLN 88 cartridge, it is necessary to remove the KLN 88 from the aircraft's instrument panel. The KLN 88 and the mounting rack have been designed to provide for easy removal. Follow these steps to update the data base cartridge.

- Insert the KLN 88 insertion/removal tool (supplied with unit) in the small hole located on the right side of the front of the unit. A standard 3/32 inch Allen wrench may also be used.
- Turn the tool counterclockwise until the locking mechanism becomes loose, and then continue turning counterclockwise until it ***just barely begins to become snug***. Do not turn so far counterclockwise that the mechanism starts to bind and can no longer be turned.
- The KLN 88 should now be loose from the rack. Pull the unit out of the rack by pulling on the sides of the radio's front panel. **DO NOT REMOVE BY PULLING ON THE KNOBS.**
- Remove the old data base cartridge by pulling it straight out the back of the KLN 88.
- Remove the new data base cartridge from its shipping container. Note

that the label on the cartridge indicates which side is up and which end to insert into the KLN 88. Insert the new cartridge into the back of the unit. When the cartridge is properly inserted, the "Insert To Here" marking on the label can just be seen protruding from the rear of the KLN 88.

- Make sure that the front lug of the locking mechanism is in the up position. Insert the KLN 88 back in the rack as far as it will go.
- Re-insert the insertion/removal tool. Turn the tool clockwise until snug. The KLN 88 should now be locked back into the mounting rack.
- Insert the old cartridge and the new packing list into the container which had been used to ship the new cartridge. Peel off the protective backing from the adhesive on the side flap on the container. Press the flap against the adhesive to seal the container.
- Mail immediately. The container already has a return shipping label back to Bendix/King. No postage is required if mailed from within the U.S. Please return the old cartridge promptly. Users will be billed for cartridges not returned, and no additional cartridges will be sent until either the old cartridge or payment for the old cartridge is received.

15.0 ITEMS NOT COVERED IN THIS MANUAL

Be sure to take the time to read through the KLN 88 Pilot's Guide. In some cases more detail is provided on subjects covered in this manual. In addition, the Pilot's Guide describes many very useful KLN 88 features you will want to learn to use which are not covered in this manual. Some of these features include:

- Finding waypoints when the identifier isn't known by entering the name or city
- Trip planning
- VNAV operation
- Displaying the nearest FSS and frequency
- Displaying the ARTCC and frequency for the aircraft's present position
- Creating "Reference" waypoints
- Creating ARTCC "Center" waypoints
- Pressure and density altitude calculations
- True airspeed (TAS) calculations
- Wind speed and direction calculations
- Displaying sunrise and sunset for any waypoint
- Other modes of operation
- Viewing the status of the Loran stations
- Using Loran approaches
- And more !

NOTES

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