APOLLO® 618

with Airspace Alert

IIMORROW INC.
Salem, Oregon U.S.A.
A United Parcel Service Company

Manufacturer of Quality Navigation and Communications Equipment

II MORROW INC.
Limited Warranty
(Avionic Loran Products)

1. Scope of Limited Warranty

II Morrow warrants to the original consumer purchaser that II Morrow products will be free of defects in materials and workmanship, under normal use, for the periods described below. The warranty begins on the original retail delivery date, or on the date of first use, whichever occurs earlier. Avionic Loran receivers are covered for 26 months after delivery or first use, whichever is earlier. Antennas and antenna preamplifiers are covered for a period of 12 months after delivery or first use, whichever is earlier. This warranty shall be effective only if and when (i) II Morrow receives a completed warranty registration card with respect to the specific product unit found to be defective; (ii) the unit was installed by personnel certified by the FAA to install avionic equipment and copy of FAA Form 337 documenting the installation is provided to II Morrow (except for homebuilts); (iii) II Morrow receives notice of such defect during the period of the warranty; and (iv) the consumer purchases the unit in the United States or Canada. (II Morrow's sole and exclusive liability for breach of warranty shall be (at II Morrow's option) to repair or replace the defective II Morrow products or return the purchase price for any defective products that are returned during the warranty period. II Morrow products repaired or replaced under this warranty are subsequently warranted only for the remaining, unexpired portion of the warranty period applicable to the original product. If II Morrow elects to repair or replace the product, II Morrow shall have a reasonable time to do so.

2. Limitation of Implied Warranties

TO THE EXTENT ALLOWED BY LAW, ANY IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE APPLICABLE TO II MORROW PRODUCTS ARE LIMITED IN DURATION TO THE DURATION OF THESE WRITTEN WARRANTIES. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

3. Exclusion of Remedies and Liability

IN NO EVENT SHALL II MORROW, ANY DISTRIBUTOR, OR THE SELLING DEALER BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFITS, LOSS OF TIME, OR INCONVENIENCE) WHETHER BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER LEGAL THEORY EVEN IF II MORROW, SUCH DISTRIBUTOR, OR THE SELLING DEALER WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Some states do not allow limitations of incidental or consequential damages, so the above limitation may not apply to you.

4. Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from (a) improper or inadequate maintenance; (b) unauthorized modification of the products; (c) operation of the products outside of their environmental specifications; (d) improper installation; (e) neglect, misuse or abuse of the products; (f) integration with other products not covered by a II Morrow warranty; or (g) exposure to corrosive environments. This warranty shall not apply to any products not manufactured by II Morrow. No one is authorized to change or add to this warranty.

5. Technical Assistance

The warranty set forth above shall not be enlarged, diminished or affected by, and no obligation or liability shall arise from II Morrow, any authorized dealer or any other person rendering of technical advice, assistance or service in connection with the selection, purchase or use of any II Morrow products.

6. Installation

II Morrow makes no warranty with respect to any installation of II Morrow products by II Morrow, any authorized dealer or any other person.

7. Other Rights

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

8. Place of Repair or Replacement

In order to obtain the benefits of this warranty, the defective II Morrow products must be returned to II Morrow at its plant at 2345 Turner Road, S.E., Salem, Oregon 97302, II Morrow Service Center, or to an authorized dealer, with transportation charges prepaid. II Morrow shall pay for the return of the repaired or replaced II Morrow products to you by surface transportation.

Effective September 1988

Summary of Changes

Apollo 618 Pilot's Operating Handbook
Revision 7

561-0081

Factory

USING THE APOLLO® 618 TRAINING MANUAL

The purpose of the Training Manual is to provide you with a comprehensive ground school course in the operation of the Apollo® 618 LORAN-C. This manual is designed to be used on the ground in conjunction with a working receiver.

IMPORTANT

Do NOT use this manual while airborne. Safe flying requires pilots to practice SEE and AVOID procedures mandated by FAA regulations. For this reason, before using the Apollo® 618 in the air, you should be quite familiar with its operation.

II MORROW INC
Apollo® 618

Tab Explanation

Reference Manual . . . . White Tabs

    Normal Procedures

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Training Manual . . . . Blue Tabs

    Introduction

    Navigation

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Please begin by reading the Training Manual *(blue tabs) so you will be able to take full advantage of the capability of the Apollo® 618. It's recommended you read at least through "Interpreting NAV Pages" in the Navigation section of the Training Manual before using the unit in the air for the first time. The referance manual is for pilots who are already familiar with the Apollo® 618.*

We welcome your comments concerning this publication.

Technical Publications
II Morrow Inc.
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APOLLO® 618

Caution

The Apollo® 618 LORAN-C is a powerful navigation tool, but you should never rely solely on any one piece of navigation equipment. It's important to maintain a constant awareness of the navigation picture by using all appropriate resources.

Optional database updates are available on a 56 day cycle basis. Contact your II Morrow dealer for details.

Your new LORAN should be installed only by an FAA certified facility. Each installation is unique, and there are several variables and cautions that an installer must deal with for you to get the maximum benefit from your Apollo® 618.

Note To Apollo® 618R and 618C Users

The procedures for operating your LORAN are identical to the procedures for operating the Apollo® 618; however the arrangement of the annunciator lights is slightly different on the 618C.

HISTORY OF REVISIONS

Apollo® 618

Manual Revision	Software Version	
0	1.0	June 1988
1	1.0	December 1988
2	2.0	December 1988
3	2.0	July 1989
4	3.0	November 1989
5	3.1	July 1990
6	4.0	March 1991
7	4.2	November 1991

NORMAL PROCEDURES
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NORMAL PROCEDURES

APOLLO® 618

Note
IF YOU'RE A NEW USER, BEGIN BY READING THE TRAINING MANUAL (BLUE TABS). The Normal Procedures section is intended to to serve as a reference for pilots who are already familiar with the Apollo® 618. They are NOT intended to be used on a regular basis in a manner similar to aircraft checklists. Safe flying requires pilots to practice SEE and AVOID procedures mandated by FAA regulations. For this reason, before using the Apollo® 618 in the air, you should be quite familiar with its operation.

PREFLIGHT

START-UP

1. **Power** - ON

2. **GRI** - CHECK

Note
To enter a new GRI or manually select a triad, use ENTERING NEW GRI OR MANUALLY SELECTING A TRIAD procedures, page P-2.

3. **MODE** - SETUP

4. **LARGE KNOB** - SCROLL to display Setup Pages. Enter new settings as required.

ENTERING NEW GRI OR MANUALLY SELECTING A TRIAD

1. **MODE** - SETUP
   When entering SETUP MODE, the first display is the GRI/TRIAD page. If the unit is already in the SETUP MODE and not displaying the GRI page, TURN LARGE KNOB to display the GRI page.

2. **SEL** - PRESS

3. **SMALL KNOB** - TURN to choose desired GRI.

4. **ENT** - PRESS
   Automatic triad selection is active whenever GRI is changed.

If Manual Triad Selection is Desired

To enter Manual Triad Selection, complete steps 5-8.

Note

Anytime the power is turned on Auto Triad Selection is automatically activated.

5. **SMALL KNOB** - TURN to choose "manual" triad selection

6. **ENT** - PRESS

7. **SMALL KNOB** - TURN to display desired secondaries in large letters.

8. **ENT** - PRESS

Note

To reactivate Auto Triad Selection, repeat the above procedure selecting "Auto" in Step 5. Steps 7 & 8 do not apply to Auto Triad Selection.

WAYPOINT MANAGEMENT

● **DISPLAYING WAYPOINTS**

Note
*Anytime you are displaying a waypoint in WPT mode, you may
return to the beginning of WPT Mode by pressing MODE once.*

From NORTH AMERICA DATABASE

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display NORTH
   AMERICA DATABASE.

3. **ENT** - PRESS

4. **SMALL KNOB** - TURN to display APT ID, INTERSEC, VOR, or
   NDB. (To search by city, use SEARCHING BY CITY NAME
   procedures, page P-15).

5. **ENT** - PRESS

6. **SMALL KNOB** - SCROLL to display desired ID character.

7. **ENT** - PRESS

8. **Steps 6 & 7** - REPEAT to enter remaining ID characters. If ID is
   shorter than the number of available spaces, enter "_" as the final
   character. The desired waypoint will be displayed.

From PILOT CREATED, PILOT COPY, and SEABASE/HELIPORT Databases

1. **MODE - WPT**

2. **SMALL KNOB or LARGE KNOB** - TURN to display desired database.

3. **ENT** - PRESS

4. **LARGE KNOB** - SCROLL to display desired waypoint.

    <u>or</u>

If using LOOK FOR feature:

4. **SEL** - PRESS

5. **SMALL KNOB** - SCROLL to display desired ID character.

6. **ENT** - PRESS

7. **Steps 5 & 6** - REPEAT to enter remaining ID characters. If ID is shorter than the number of available spaces, enter "_" as the final character. The desired waypoint is displayed.

COPYING WAYPOINTS

Note

It's recommended all waypoints planned for use be copied into the PILOT COPY DATABASE. Entries to the NAV Flightplan page can be made only from the PILOT COPY DATABASE.

1. With desired waypoint displayed, ENT - PRESS

   The message SAVED TO COPY DATABASE will appear momentarily. You may copy any displayed waypoint from any database into the PILOT COPY DATABASE by pressing ENT. To enter the beginning of WPT mode, press MODE once.

CREATING A WAYPOINT

Note

To create a PHANTOM WAYPOINT, use the CREATING A PHANTOM WAYPOINT procedure on page P-7.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT CREATED DATABASE.

3. **ENT** - PRESS

4. **LARGE KNOB** - TURN one click counter-clockwise to display ENT TO CREATE NEW WPT page.

5. **ENT** - PRESS

6. **SEL** - PRESS

   Your present position is entered and assigned a numerical identifier. The first number in the identifier flashes. Any portion of the waypoint may be edited as desired, page P-6.

To Edit a CREATED Waypoint

1. **Desired waypoint** - DISPLAY (See DISPLAYING WAYPOINTS, page P-3)

2. **SEL** - PRESS TWICE

3. **ENT** - PRESS

4. **SMALL KNOB** - SCROLL to display first waypoint ID character.

5. **ENT** - PRESS

6. **Steps 4 & 5** - REPEAT to edit remaining waypoint ID characters, the latitude, and the longitude.

Note

Once the desired editing is accomplished, it is not necessary to press ENT repeatedly to fix the remaining values. For example, if you wanted to edit only an identifier, but not the associated coordinates, you could press MODE or scroll LARGE KNOB immediately after editing the identifier.

CREATING A PHANTOM WAYPOINT

A phantom waypoint is referenced as a bearing and distance from an existing waypoint.

Note
Any new PILOT CREATED waypoint may be created as a PHANTOM WAYPOINT.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT CREATED DATABASE.

3. **ENT** - PRESS

4. **LARGE KNOB** - TURN one click counter-clockwise to display ENT TO CREATE NEW WPT.

5. **ENT** - PRESS twice.

6. **SMALL KNOB** - SCROLL to display reference waypoint.

Note
The reference waypoint must be copied into the PILOT COPY DATABASE.

7. **ENT** - PRESS

8. **SMALL KNOB** - SCROLL to display first digit in reference radial.

9. **ENT** - PRESS

10. **Steps 8 & 9** - REPEAT to enter remaining reference radial digits and DST digits.

    The ID and LAT/LONG of the PHANTOM WAYPOINT will be displayed, and you may edit the display by following the procedure, beginning with Step 6, in the "CREATING A WAYPOINT--To Edit a CREATED Waypoint" procedure, page P-6.

DELETING WAYPOINTS IN PILOT CREATED OR PILOT COPY DATABASE

1. **Waypoint to be deleted** - DISPLAY in WPT mode (see DISPLAYING WAYPOINTS, page P-3).

2. **SEL - PRESS**
    ENT TO DEL WPT will be displayed.

5. **ENT - PRESS**

<div align="center">Note</div>

Deleting a waypoint in the PILOT CREATED DATABASE automatically deletes it from the PILOT COPY DATABASE; however, deleting a CREATED waypoint from the PILOT COPY DATABASE does NOT delete it form the PILOT CREATED DATABASE.

FLIGHT PLANNING

NAVIGATING FROM PRESENT POSITION

1. **FRM - PRESS TWICE** within one second.

    Note

    If the WARN light is still on, the unit cannot yet calculate your present position; however, if the unit is in the same location as it was when it was last turned off, the displayed present position will be accurate provided the WARN light was off when the unit was turned off. You do not have to wait for the WARN light to go out if your correct position is displayed.

2. **"To" waypoint** - DISPLAY in WPT mode (see DISPLAYING WAYPOINTS, page P-3).

3. **TO** - PRESS

4. **WARN light** - VERIFY OFF before using LORAN navigation.

USING FLIGHTPLAN PAGE

The flightplan page allows the pilot to enter a flightplan with up to 20 waypoints. For more information see NAVIGATION section: *"Using FlightplanPage"*.

Note

Waypoints to be used must be in the PILOT COPY DATABASE. Present position is always in the PILOT COPY DATABASE and is updated each time the FRM button is pressed twice within one second.

If Navigating From Present Position

1. WARN light - VERIFY OFF

2. FRM - PRESS TWICE within one second.
   The unit displays the Flightplan page with new Present Position (PPFR) as the departure waypoint.

3. SEL - PRESS

4. ENT - PRESS

5. SMALL KNOB - SCROLL to choose a new "To" waypoint.

6. ENT - PRESS TWICE

If Navigating From a Database Waypoint

1. MODE - NAV

2. LARGE KNOB - TURN to display the Flightplan page.

3. SMALL KNOB - TURN to display the desired Flightplan waypoint (1-20), with the leg number for the FROM waypoint displayed on the top line.

4. SEL - PRESS

5. SMALL KNOB - SCROLL to display the desired waypoint.

6. ENT - PRESS

7. SMALL KNOB - SCROLL to choose the next waypoint in the flightplan.

8. ENT - PRESS

9. Repeat - steps 5 through 8 to complete the flightplan.

10. WARN light - VERIFY OFF before using LORAN navigation.

Changing the "To" Waypoint (Moving the arrow)

1. Flightplan page - DISPLAY in NAV mode.

2. SMALL KNOB - SCROLL to position the desired "To" waypoint at the top of the display.

3. SEL - PRESS. The waypoint identifier flashes.

4. TO - PRESS to change the selected "To" waypoint.

Displaying Information and Deleting Waypoints from Flightplan Page

Note
A convenient method of displaying information on the "To" waypoint is to press TO while displaying any page in NAV mode.

Displaying Information from Flightplan Page

1. MODE - NAV

2. LARGE KNOB - TURN to display Flightplan page.

3. SMALL KNOB - SCROLL to position the desired waypoint at the top of the display.

4. SEL - PRESS
   The waypoint at the top of the display flashes.

5. SEL - PRESS

6. SMALL KNOB - TURN to view information.

7. SEL - PRESS (once or twice as necessary) to return to Flightplan page.

8. LARGE KNOB - TURN to the desired NAV page.

To Delete A Single Flightplan Waypoint

1. Flightplan page - DISPLAY in NAV mode.

2. SMALL KNOB - SCROLL to position the desired waypoint at the top of the display.

3. SEL - PRESS. The waypoint at the top of the display flashes.

4. SMALL KNOB - SCROLL to "- - -", which is located at both ends of the database.

5. ENT - PRESS to delete waypoint.

6. LARGE KNOB - TURN to the desired NAV page.

To Delete the Active Flightplan

1. Flight Plan Page - Display in NAV mode.

2. SMALL KNOB - TURN counter clockwise to "ENT TO DELETE FLT PLAN".

3. ENT - PRESS to delete active flightplan.

Inserting a Waypoint

1. Flightplan Page - DISPLAY in NAV mode.

2. SMALL KNOB - SCROLL so the waypoint that is to follow the new waypoint appears at the top of the display.

3. SEL - PRESS. The waypoint identifier flashes.

4. SMALL KNOB - SCROLL to display "insrt".

5. ENT - PRESS. The display flashes "- - - - -"

6. SMALL KNOB - SCROLL to the waypoint to be inserted.

7. ENT - PRESS to insert the new waypoint into the flightplan.

8. LARGE KNOB - TURN to the desired NAV page.

To Reverse the Active Flightplan

1. **Flight Plan Page** - Display in NAV mode.

2. **SMALL KNOB** - TURN clockwise to
   "ENT TO REVERSE FLT PLAN".

3. ENT - PRESS to reverse active flightplan.

USING NAV PLANNER

The purpose of NAV PLANNER is to display bearing and distance from a waypoint other than your present position. Bearing and distance from your present position is shown on the bottom line of the first page of each waypoint display.

Note
To use NAV PLANNER, the waypoints you are interested in ·
MUST be in the PILOT COPY DATABASE.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT COPY DATABASE.

3. **ENT** - PRESS

4. **LARGE KNOB** - SCROLL to display ENT FOR NAV PLANNER (located at both ends of the PILOT COPY DATABASE).

5. **ENT** - PRESS

6. **SMALL KNOB** - SCROLL to display "Fr" waypoint.

7. **ENT** - PRESS

8. **SMALL KNOB** - SCROLL to display "To" waypoint.
   The bearing and distance is displayed on the bottom line.

Displaying Information When Using NAV PLANNER

1. **Desired waypoint** - DISPLAY flashing identifier using NAV PLANNER feature.

2. **SEL** - PRESS

3. **SMALL KNOB** - TURN to display information.

4. **SEL** - PRESS twice to return to the NAV PLANNER page.
   If the first INFO page is displayed, press SEL only once.

SEARCHING BY CITY NAME

> *Note*
> *The NORTH AMERICA DATABASE is sorted alphanumerically according to identifier, not city.*

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display NORTH AMERICA DATABASE.

3. **ENT** - PRESS

4. **SMALL KNOB** - TURN to display CITY.

5. **ENT** - PRESS

> *Note*
> *To restore the name of the last city you searched for, press ENT again. With the name restored, pressing ENT once more initiates the search. To edit the restored name before searching, press SEL as necessary to cause successive characters to flash.*

6. **SMALL KNOB** - SCROLL to display the first letter in the city name.

7. **ENT** - PRESS

8. **Steps 6 & 7** - REPEAT to enter remaining letters. If you enter less than 8 letters, enter "_" as the final character. If the name is more than eight letters long, enter up to eight letters. If the waypoint found is not the one desired, proceed with step 9.

9. **SEL** - PRESS
   CONTINUE LOOKING FORWARD will be displayed.

> *Note*
> *You will normally search the database FORWARD according to alphanumeric order; however, if you wish to display a waypoint you previously elected to pass-up, you may select BACKWARD with the SMALL KNOB after completing Step 9.*

10. **ENT** - PRESS

11. **Steps 9 & 10** - REPEAT until desired waypoint is displayed.

AIRBORNE FUNCTIONS

● EMERGENCY SEARCH WITH SAFE - GLIDE™

IMPORTANT

EMERGENCY SEARCH WITH SAFE - GLIDE™ may be a valuable resource in an actual emergency; however, the information it provides should be considered advisory. The course of action a pilot chooses in an emergency should be based on the existing conditions, including such factors as terrain, altitude, fuel supply, the nature of the emergency, and weather. EMERGENCY SEARCH DOES NOT "CONSIDER" TERRAIN. The unit has no way of "knowing" if a mountain or other obstruction lies between you and an airport. Also, the unit does not consider wind.

To activate the SAFE - GLIDE™ feature, you must program the engine-out glide rate for your aircraft in SETUP MODE. See detailed instructions in the setup mode section.

SAFE - GLIDE™ is incorporated in the EMERGENCY SEARCH Feature. When EMERGENCY SEARCH is activated, the airports are ordered according to the altitude required to reach the airport. For example, an airport with an elevation of 2,500 ft MSL may be the closest to your location; however, an airport with an elevation of 500 ft MSL, while being somewhat further, may require less altitude to reach it. In this case, SAFE - GLIDE™ prioritizes the airports so that the airport at 500 ft MSL displays first.

Without the II Morrow Encoding Altimeter Input:

1. **APR/ENR & ENT** - PRESS simultaneously.
   After searching for the nearest airports, the altitude required to glide to the first airport is displayed on the top line. The length of the longest runway is displayed on the middle line, and the bearing and distance is displayed on the bottom line. Press SEL to view airport identifier, state, and city name.

To view information on the displayed airport turn the small knob. If the runway length at the first airport is insufficient or the airport is otherwise undesirable, turn the LARGE KNOB cw to display the next airport. If not on the first information page, pressing SEL will display the first information page.

IMPORTANT

Your glidepath is based on the information you defined in SETUP Mode. SAFE - GLIDE™ DOES NOT CONSIDER WIND; however, as you glide toward the airport the ALTITUDE REQUIRED display will be continually updated so you can monitor your progress. You should periodically check the required altitude as you proceed, especially if you have a headwind component. During your approach, if the aircraft's altitude becomes less than the required altitude, the airport is out of range; however, on short final approach the required altitude may be above the aircraft's altitude because SAFE-GLIDE™ brings the aircraft to the Airport Reference Point, not to the runway threshold. See diagram on page N-61.

If you want to exit Emergency Search without defining an emergency airport as your To waypoint, press APR/ENR and ENT simultaneously. (If you do not wish to exit Emergency Search, continue with step 2).

2. **TO** - PRESS
The unit switches to NAV mode and the emergency airport is the To waypoint. The SAFE - GLIDE™ information periodically displays over the NAV pages.

To Cancel The SAFE - GLIDE™ FEATURE

1. **MODE** - PRESS
ENT TO DISABLE SAFGLIDE is displayed. This is to allow you to disable SAFE - GLIDE™ if you are not in an engine-out emergency. (If you do not wish to exit SAFE - GLIDE™, Press MODE four times to re-enter NAV Mode).

NOTE
Changing the Flightplan will also disable SAFE - GLIDE™.

2. **ENT - PRESS**
   SAFE - GLIDE™ displays are discontinued.

With II Morrow Encoding Altimeter Input

1. **APR/ENR & ENT** - PRESS simultaneously.
   After searching for the nearest airports, the length of the longest
   runway is displayed on the middle line, and the bearing and distance
   is displayed on the bottom line. The top line displays how far
   (proceeded by a "+" sign) the aircraft could glide after reaching the
   airport. This line alternates with the GLIDE OK message. If the
   airport is out of range, the distance display (proceeded by a "-" sign)
   will alternate with the TOO FAR message.

IMPORTANT

*Your glidepath is based on the information you defined in
SETUP Mode. SAFE-GLIDE™ DOES NOT CONSIDER
WIND; however as you glide toward the airport the GLIDE
OK\TOO FAR display will be continuously updated so you can
monitor your progress. During your approach, if the aircraft's
altitude becomes less than the required altitude, the airport is out
of range, and TOO FAR appears; however, on short final
approach TOO FAR may appear because the required altitude
is above the aircraft's altitude. This is because SAFE-GLIDE™
brings the aircraft to the Airport Reference Point, not to the
runway threshold. See diagram on page N-64.*

If you want to exit Emergency Search without defining an emergency
airport as your To waypoint, press APR/ENR and ENT simultaneously.

2. **TO - PRESS**
   The unit switches to NAV mode and the emergency airport is the To
   waypoint. The SAFE - GLIDE™ information periodically appears
   over the NAV pages.

To Cancel The SAFE - GLIDE™ FEATURE

1. **MODE - PRESS**
   ENT TO DISABLE SAFGLIDE appears. (If you do not wish to exit
   SAFE - GLIDE™, press MODE four times to re-enter NAV Mode).

NOTE
Changing the Flightplan will also disable SAFE - GLIDE™.

2. **ENT - PRESS**
   SAFE - GLIDE™ displays are discontinued.

RETURNING TO DEPARTURE POINT

1. **MODE - NAV**

2. **LARGE KNOB** - SCROLL to display RETURN TO page.
   The bearing and distance back to the departure waypoint is displayed.

NEAREST WAYPOINT SEARCH

Note
If you are looking for the nearest airports in the NORTH AMERICA DATABASE, using EMERGENCY SEARCH is easier than using NEAREST WAYPOINT SEARCH; however, EMERGENCY SEARCH only locates airports. NEAREST WAYPOINT SEARCH locates the nearest waypoints, including NAVAIDS, INTERSECTIONS, and PILOT CREATED WAYPOINTS.

1. **MODE - WPT**

2. **SMALL KNOB or LARGE KNOB** - TURN to display NEAREST WAYPOINT DATABASE.

3. **ENT - PRESS**

4. **SMALL KNOB** - TURN to display APT ID, INTERSEC, VOR, NDB, or CREATED.

5. **ENT - PRESS**
   The nearest waypoint is displayed. Turning the LARGE KNOB clockwise displays the 25 nearest waypoints in succession, with the nearest first. If you wish to navigate to one of these waypoints, display the waypoint and press TO.

Note
If the WARN light is on, the unit cannot accurately determine your position. NEAREST WAYPOINT uses the last known position as your present position until the WARN light goes out.

ALTITUDE SELECT

This feature alerts you as your aircraft enters the selected altitude range or if your aircraft strays above or below the selected altitude by a user-specified value. The unit must be connected to a II Morrow encoding altimeter and the altimeter setting must be set. If your unit is connected to a buzzer, an audible alert may be selected.

After setting-up Altitude Select (see SETUP MODE), as you fly into the selected altitude range while in NAV or AIRSP Mode, ALTITUDE flashes on the bottom line of the display and the buzzer (if connected and selected) sounds four double beeps. When leaving the selected altitude range, the alert continues until you acknowledge it by pressing ENT or return within the altitude range.

NOTE
Single beeps indicate the WARN light is on. Double beeps indicate an Altitude Alert.

ACKNOWLEDGING AN ALERT:

1. **ENT - PRESS**
   The alert ceases.

Selecting a New Altitude in NAV Mode:

1. **MODE - NAV**

2. **LARGE KNOB** - TURN to display any page except the Present Postion or Flightplan page.

3. **SEL - PRESS**
   The ALT - SEL page appears and the current selected altitude flashes.

4. **SMALL KNOB** - TURN to select the new altitude.

5. **ENT - PRESS**
   The NAV page reappears. ENT must be pressed, or the selected altitude will not be changed.

DEFINING A NEW COURSE FROM PRESENT POSITION

1. **WARN light** - VERIFY off.

2. **FRM** - PRESS TWICE within one second.
   The unit automatically switches to the NAV mode Flightplan page.
   Present Position is now the new departure waypoint.

USING VNAV

Note
If a II Morrow encoding altimeter is installed, the ARIV light
flashes for a few seconds when the aircraft is approximately 2
minutes from the Top of Decent point.

1. **Aircraft Altitude** - Adjust to match the VNAV altitude.

DISPLAYING ALTERNATE SOLUTION

The unit will calculate two possible positions for the aircraft, i.e. an
alternate solution. This procedure describes how to change between
solutions. See "How Loran-C works" on page N-81 for further discussion
of Alternate Solutions.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display the Present Position page.

3. **SEL** - PRESS

4. **ENT** - PRESS twice.

EXTENDED RANGE

Note

Normally EXTENDED RANGE will be set to "Off". If you plan to use this feature, be sure to turn it on before leaving the prime coverage area. When the power is turned on, or the GRI is changed, EXTENDED RANGE is automatically set to "Off".

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display EXTENDED RANGE page.

3. **SEL** - PRESS

4. **SMALL KNOB** - TURN to display "On".

5. **ENT** - PRESS
   To turn EXTENDED RANGE off, repeat the above procedure selecting "Off" in step 4.

LINING-UP WITH A RUNWAY OR BEARING

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display BRG.

3. Turn aircraft to a heading that intercepts the desired course.

4. When the BRG display approaches the desired course, turn the aircraft to the heading that matches the desired course.

5. **FRM** - PRESS twice.
   A straight-in approach is defined.

CUSTOM FEATURES

ENTERING NEW AIRSPACE ALERT SETTINGS

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR AIRSPACE SETUP page (3 clicks clockwise from GRI page).

3. **ENT** - PRESS

To Change The AIRSPACE ALERT "On or Off" Setting

4. **SEL** - PRESS

5. **SMALL KNOB** - TURN to display "on or off" setting.

6. **ENT** - PRESS

To Change The DISTANCE BUFFER Value

7. **SMALL KNOB** - TURN to display DISTANCE BUFFER page.

8. **SEL** - PRESS

9. **SMALL KNOB** - TURN to change DISTANCE BUFFER value (nautical miles).

10. **ENT** - PRESS

To Change The AIRSPACE ALTITUDE BUFFER Value

Note
The ALTITUDE BUFFER page is not displayed if the II Morrow encoding altimeter is not installed or not functioning reliably.

1. **SMALL KNOB** - TURN to display ALTITUDE BUFFER page.

2. **SEL** - PRESS

3. **SMALL KNOB** - TURN to change ALTITUDE BUFFER value.

4. **ENT** - PRESS

Note

After changing a value with the SMALL KNOB for AIRSPACE ALERT, DISTANCE BUFFER, or ALTITUDE BUFFER, pressing SEL instead of ENT causes the unit to ignore an individual new setting.

ALTIMETER AND VNAV SETUP WITH THE II MORROW ENCODING ALTIMETER INSTALLED

Note
VNAV and ALTIMETER Setup is disabled when you are currently editing NAV pages.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display a page with **A↑,V↓**, or both.

Note
Your altitude will not display until the altimeter setting is set. Since you may edit (customize) the NAV pages, it is possible to have your Alt (Altimeter) and VNV (Vertical Navigation) read-outs on separate pages, or on the same page in the reverse order from the default (factory) page. The default page shows (from top to bottom) DST/ALT/VNV. THE REMAINDER OF THESE PROCEDURES ARE BASED ON THE DEFAULT PAGE. If you have edited this page so that ALT and VNV are on separate pages, you need to select the appropriate page to set up each function.

3. **SEL** - PRESS
   Press SEL twice if the altimeter has already been set. ENT TO SET ALTIMETR is displayed.

4. **ENT** - PRESS

5. **SMALL KNOB** - TURN to change current altimeter setting. (barometric pressure measured in inches of mercury).

6. **ENT** - PRESS
   The NAV page is displayed again.

7. **SEL** - PRESS 3 Times
   ENT FOR VNAV SETUP is displayed.

8. **ENT** - PRESS
   The GSA value (Glide Slope Angle in tenths of a degree) flashes.

9. **SMALL KNOB** - TURN to change desired GSA.

10. **ENT - PRESS**
    The EL (elevation) setting flashes.

11. **SMALL KNOB** - TURN to change the first three digits of the desired
    target elevation (EL). These are in 100 foot increments.

    Note

    *The current EL display is automatically set to the airport
    elevation of the "To" waypoint, provided the "To" waypoint is
    an airport from the NORTH AMERICA DATABASE.*

12. **ENT - PRESS**

13. **Steps 11 & 12** - REPEAT to enter the remaining two EL digits. These
    are for 1 foot increments.

VNAV SETUP WITHOUT II MORROW ENCODING ALTIMETER INSTALLED

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display a page with VNV.

3. **SEL** - PRESS twice

4. **ENT** - PRESS
    The GSA setting flashes.

5. **SMALL KNOB** - TURN to display desired GSA.

6. **ENT** - PRESS
    The EL setting flashes.

7. **SMALL KNOB** - TURN to display the first three digits of the desired target elevation(EL). These are 100 foot adjustments.

8. **ENT** - PRESS
    Steps 6 & 7 - REPEAT to enter remaining two EL digits. These are 1 foot adjustments.

EDITING NAV PAGES

Note
The Flightplan page, RETURN TO page, and Present Position
page cannot be altered.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN two clicks clockwise after entering SETUP
   mode to display ENT FOR NAV MODE SETUP.

3. **ENT** - PRESS
   EDIT NAV PAGES Off is displayed.

4. **SEL** - PRESS

5. **SMALL KNOB** - TURN to display "On"

6. **ENT** - PRESS
   The unit automatically switches to NAV mode.

7. **LARGE KNOB** - TURN to display NAV page to be edited.

8. **SEL** - PRESS as necessary to choose the line to be edited. The line
   will flash.

9. **SMALL KNOB** - TURN to display the desired NAV information.

10. **ENT** - PRESS
    The next line flashes, unless the bottom line is altered.

11. **Steps 9 & 10** - REPEAT as necessary to alter the remaining lines on
    the page. To edit another NAV page, turn the LARGE KNOB to the
    desired page and repeat steps 8-11.

12. **MODE** - PRESS to turn NAV PAGE editing "off".

Note
Once you exit NAV mode, EDIT NAV PAGES is
automatically set to "Off."

RESTORING DEFAULT NAV PAGES

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN two clicks clockwise after entering SETUP mode to display ENT FOR NAV MODE SETUP.

3. **ENT** - PRESS
   EDIT NAV PAGES "Off" is displayed.

4. **SEL** - PRESS

5. **SMALL KNOB** - TURN to display "Default".

6. **ENT** - PRESS
   The default NAV pages are restored

USING AUTO NAV SCROLL

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN clockwise two clicks to display ENT FOR NAV MODE SETUP.

3. **ENT** - PRESS

4. **SMALL KNOB** - TURN ONE click clockwise to display AUTO NAV SCROLL "Off/On" page.

5. **SEL** - PRESS

6. **SMALL KNOB** - TURN to display "On".

7. **ENT** - PRESS

Note

If you do not wish to make any changes in the AUTO NAV SCROLL setup, press MODE to leave SETUP mode. AUTO NAV SCROLL is activated/deactivated by pressing ENT in NAV mode.

8. **SMALL KNOB** - TURN to change the number of NAV pages to scroll.

9. **ENT** - PRESS

10. **SMALL KNOB** - TURN to choose the first page you wish to include in the scroll sequence.

11. **ENT** - PRESS

12. **Steps 10 & 11** - REPEAT as necessary to enter the remaining pages you want to include in the AUTO NAV SCROLL sequence.

13. **SMALL KNOB** - TURN to change the number of seconds each page is to be displayed.

14. **ENT** - PRESS

To Pause AUTO NAV SCROLL On The Displayed Page

1. **Any button or knob (except MODE)** - PRESS or TURN

To Reactivate AUTO NAV SCROLL After Pausing

1. **ENT** - PRESS

To Turn Off AUTO NAV SCROLL

Repeat the USING AUTO NAV SCROLL procedure (page P-32), selecting "off" with the SMALL KNOB in step 6.

MANUAL CROSS TRACK SENSITIVITY (XTD SENS)

NOTE
The sensitivity of the external CDI and internal CDI are independent of each other. XTD SENS only affects the internal CDI.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display XTD SENS page.

3. **SEL** - PRESS

4. **SMALL KNOB** - TURN to display "Manual".

5. **ENT** - PRESS

6. **SMALL KNOB** - TURN to select desired sensitivity. (Hundreths of a nautical mile per dot).

7. **ENT** - PRESS

DEFINING A PARALLEL COURSE (COURSE OFFSET)

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display COURSE OFFSET page.

3. **SEL** - PRESS

4. **SMALL KNOB** - TURN to change desired OFFSET distance. Turn the SMALL KNOB clockwise for a right of course offset, counterclockwise for a left of course offset. Offset distances are in tenth of a nautical mile increments.

5. **ENT** - PRESS
   The OFST light is on, indicating a course offset has been entered. To remove the offset, set the offset to zero.

SELECTING THE MAG VAR (MAGNETIC VARIATION) YEAR

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR MAGVAR SETUP page.

3. **ENT** - PRESS

4. **SMALL KNOB** - TURN to display MAG YEAR page.

5. **SEL** - PRESS

6. **SMALL KNOB** - TURN to choose desired year.

7. **ENT** - PRESS

MANUALLY SETTING MAG VAR (MAGNETIC VARIATION)

Note
MAG VAR should normally be set to "Auto".

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR MAGVAR SETUP page.

3. **ENT** - PRESS

4. **SEL** - PRESS

5. **SMALL KNOB** - TURN to display "Manual".

6. **ENT** - PRESS

7. **SMALL KNOB** - TURN to choose desired variation in whole degrees East or West.

8. **ENT** - PRESS

NOTE
To set MAG VAR back to "Auto", repeat the above procedure,
selecting "Auto" in step 5.

POSITION CALIBRATION

Due to local conditions, the NAV Present Position display may be slightly in error. These errors are generally so small they are insignificant for normal operations. However, when highly precise navigation is called for, calibration factors (also called ASFs--Additional Secondary Phase Factors) may be entered.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display the Present Position.

3. **SEL** - PRESS

4. **SMALL KNOB** - TURN to display LAT CAL? (Latitude Calibration) or LON CAL? (Longitude Calibration), as required.

5. **ENT** - PRESS

6. **SMALL KNOB** - TURN (clockwise for +, counterclockwise for -) to adjust the known latitude or longitude.

7. **ENT** - PRESS
   The ASF light is on to remind the pilot calibration factors are in use. To remove calibration factors, repeat the above procedure, selecting a calibration factor of "0" in step 6.
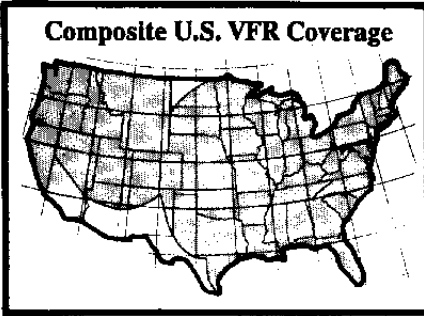
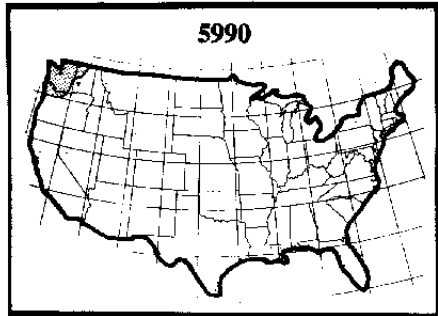*NOTES:*

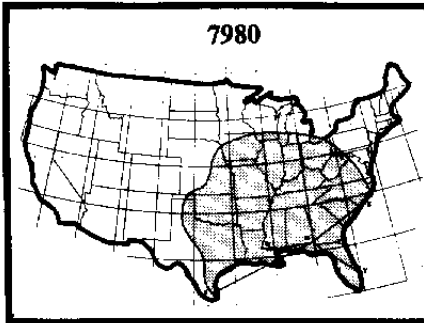# LORAN-C CHAINS

Apollo 618

CONTINENTAL UNITED STATES COMPOSITE

Composite U.S. VFR Coverage

5990

7980

8970
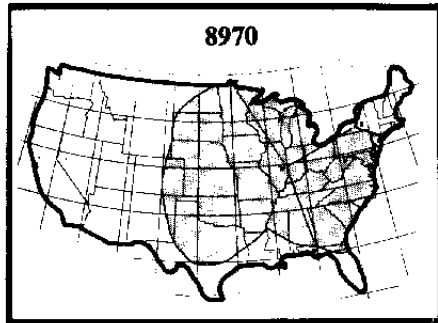
9940

9960

CENTRAL PACIFIC - GRI 4990
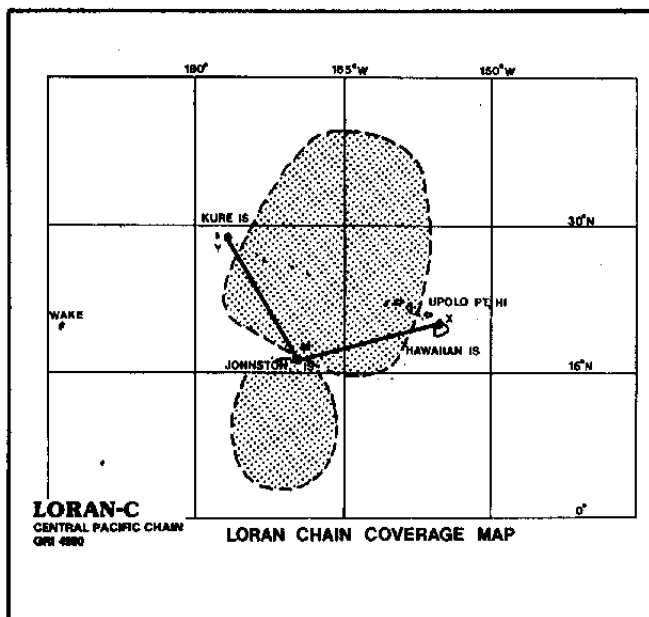
CENTRAL PACIFIC LORAN-C CHAIN - GRI 4990 (old rate 5I)

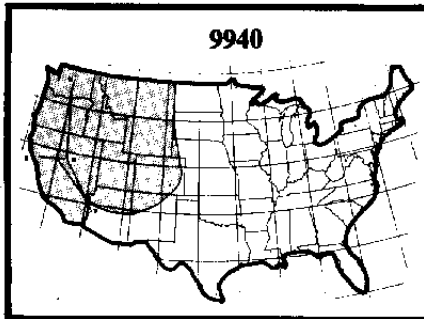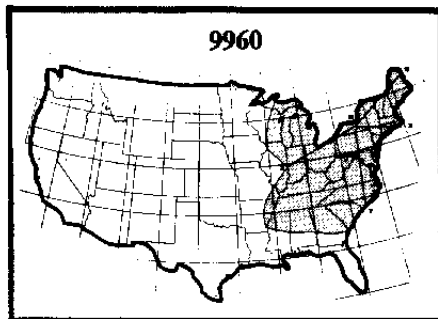| STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Johnston Is, HI	Master	16 44 44.0 N 169 30 31.0 W		275	
Upolu Pt, HI	Xray	20 14 49.2 N 155 53 09.7 W	11000/ 4972.23	275	Time service monitor.
Kure Is, HI	Yankee	28 23 41.8 N 178 17 30.2 W	29000/ 5253.17	275	
Lormonsite Johnston Is, HI	Monitor	16 43 19.5 N 169 32 36.8 W			
Lormonsite Honolulu, HI	Control				Controls X and Y.

CANADIAN EAST COAST - GRI 5930
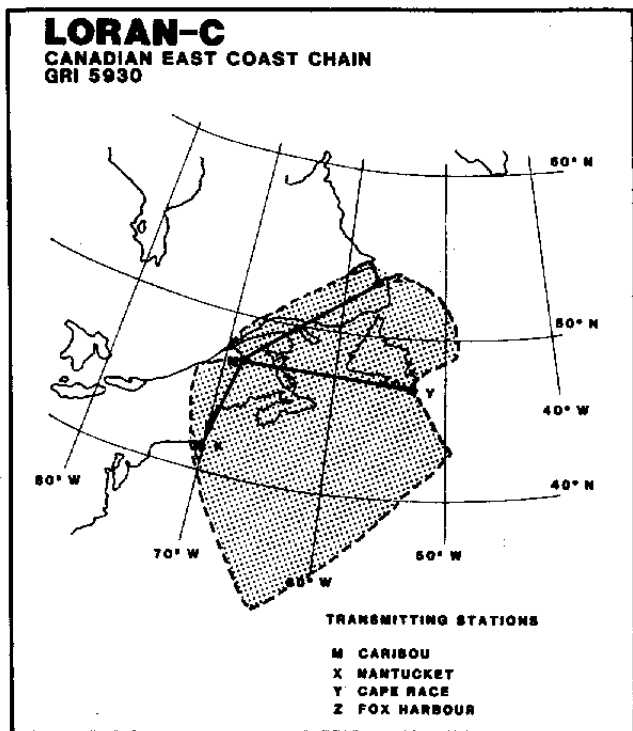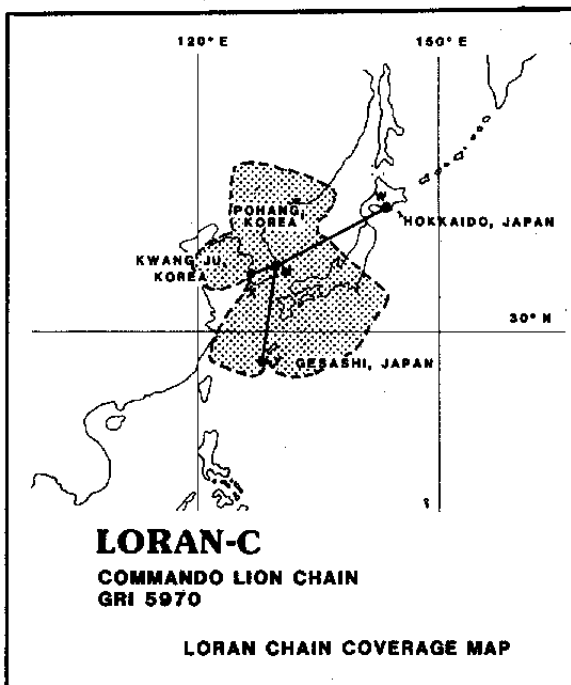

CANADIAN EAST COAST LORAN-C CHAIN - GRI 5930

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Caribou, ME	Master	46°48'27.2"N 67°55'37.7"W		350	Dual-Rated to North-east U.S. Chain.
Nantucket, MA	Xray	41°15'11.9"N 69°58'39.1"W	11000/ 2131.86	275	Dual-Rated to North-east U.S. Chain.
Cape Race, NFLD	Yankee	46°46'32.2"N 53°10'28.2"W	25000/ 3755.02	1500	Dual-Rated to Labrador Sea Chain.
Fox Harbour, Labrador	Zulu	52°22'35.2"N 55°42'26.4"W	38000/ 3594.58	800	Dual-Rated to Lab-rador Sea Chain.
Cape Elizabeth, ME	Monitor	43°33'54.8"N 70°11'58.5"W			Unmanned Receiver Site.
Montague, P.E.I.	Monitor	46°11'40.0"N 62°39'37.0"W			Unmanned Receiver Site.
St. Anthony, NFLD	Monitor/ Control	51°21'37.0"N 55°37'28.0"W			Exercises Operational Control of the Chain.

COMMANDO LION - GRI 5970

LORAN-C

COMMANDO LION CHAIN
GRI 5970

LORAN CHAIN COVERAGE MAP

COMMANDO LION LORAN-C CHAIN - GRI 5970

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (kW)	REMARKS
Pohang, Korea	Master	36°11'05.8" N 129°20'27.3" E		15	
Hokkaido, Japan	Whisky	42°44'37.1" N 143°43'09.2" E	11000 4783.69	1000	Dual rated to Northwest Pacific Chain
Kwang Ju, Korea	Xray	35°02'23.9" N 126°32'26.7" E	31000 947.02	35	
Gesashi, Japan	Zulu	26°36'25.0" N 128°08'56.4" E	42000 3565.56	1000	Dual rated to Northwest Pacific Chain

CANADIAN WEST COAST - GRI 5990

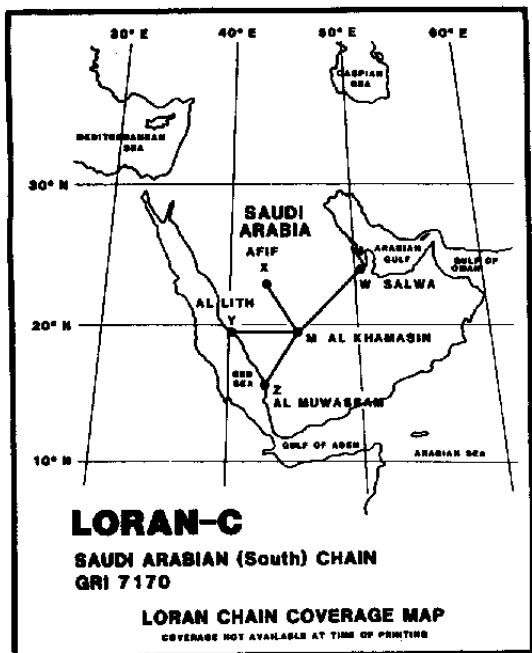**LORAN-C**
CANADIAN WEST COAST CHAIN
GRI 5990
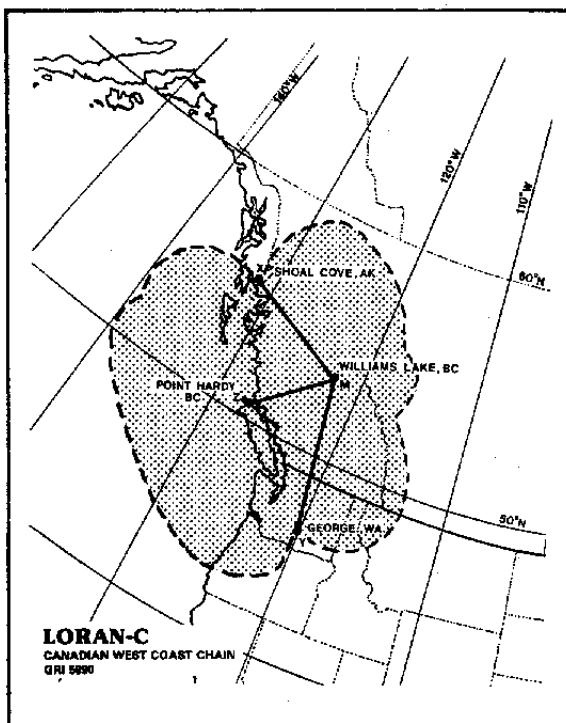
CANADIAN WEST COAST LORAN-C CHAIN - GRI 5990 (old rate SH1)

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Williams Lake, BC, Canada	Master	51 57 58.8 N 122 22 02.2 W		400	Control for X and Y. Two pulse comms installed.
Shoal Cove, AK	Xray	55 26 20.9 N 131 15 19.7 W	11000/ 2343.60	540	Two pulse comms installed. Dual-rated to Gulf of Alaska Chain.
George, WA	Yankee	47 03 48.0 N 119 44 39.5 W	27000/ 1927.36	1600	Two pulse comms installed. Dual-rated to U.S. West Coast Chain.
Port Hardy, BC, Canada	Zulu	50 36 29.7 N 127 21 29.4 W	41000/ 1266.63	400	Scheduled to be operational June 1980.
Alert Bay, Canada	Monitor	50 35 01 N 126 54 39 W			Unmanned receiver site.
Whidbey Is, WA	Monitor	48 17 39 N 124 33 55 W			Unmanned receiver site.

SAUDI ARABIA (SOUTH) - GRI 7170

LORAN-C

**SAUDI ARABIAN (South) CHAIN
GRI 7170**

LORAN CHAIN COVERAGE MAP

COVERAGE NOT AVAILABLE AT TIME OF PRINTING

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (kW)
Al Khamasin	Master	20°28'01.89" N 44°34'52.34" E		800
Salwa	Whisky	24°50'01.50" N 50°34'12.02" E	11000 2612.55	600
Afif	Xray	23°48'36.82" N 42°51'17.63" E	26000 1371.23	800
Al Lith	Yankee	20°13'58.31" N 40°12'31.02" E	39000 1526.50	200
Al Muwassam	Zulu	16°25'55.89" N 42°48'04.33" E	52000 1617.59	800

LABRADOR SEA - GRI 7930

LORAN-C
LABRADOR SEA CHAIN
GRI 7930

TRANSMITTING STATIONS

M   FOX HARBOUR
W   CAPE RACE
X   ANGISSOQ
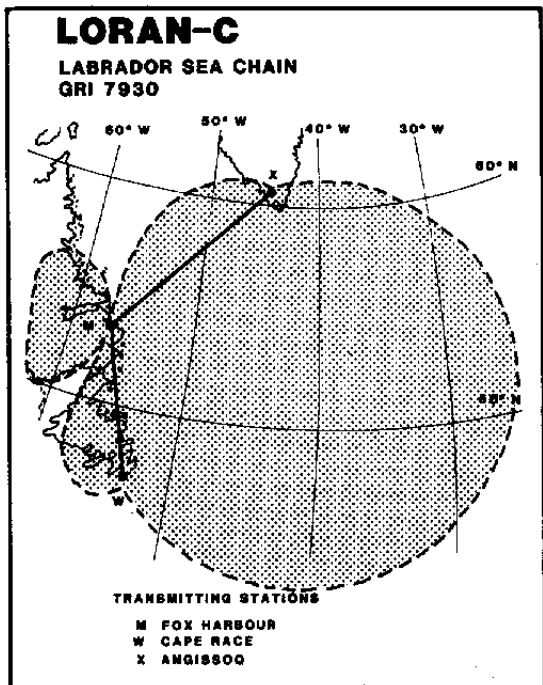
LABRADOR SEA LORAN-C CHAIN - GRI 7930

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Fox Harbour, Labrador	Master	52°22'35.2"N 65°42'28.4"W		800	Dual-Rated to Can-adian East Coast Chain.
Cape Race, NFLD	Whiskey	46°46'32.2"N 53°10'28.2"W	11000/ 2167.30	1500	Dual-Rated to Can-adian East Coast Chain.
Angissoq, Greenland	Xray	59°59'17.3"N 45°10'27.5"W	26000/ 3565.38	760	Dual-Rated to Icelandic Chain.
St. Anthony, NFLD	Monitor	51°21'37.0"N 55°37'28.0"W			

# EASTERN USSR - GRI 7950

LORAN-C
EASTERN U.S.S.R. CHAIN
GRI 7950
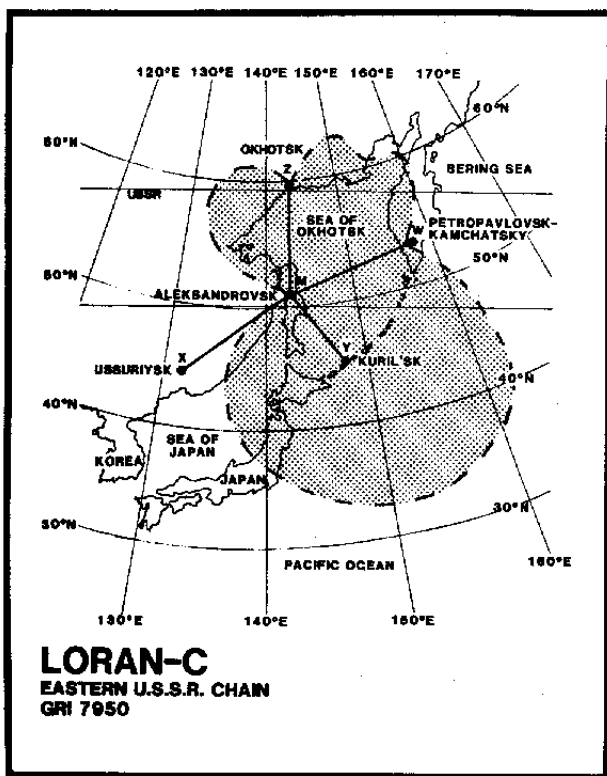
Eastern U.S.S.R LORAN-C Chain GRI 7950

Station	Function	Coordinates	Coding Delay/- Baseline Length	Radiated Power (kW)
A l e k - sandrov	Master	51 04 71.3 N 142 42 08.2 E		700
Petropavlo	Whisky	53 07 79.2 N 157 41 71.5 E	11,000 3508.1	700
Ussuriiak	Xray	44 31 99.5 N 131 38 39.0 E	30,000 3678.0	700
Kuril'ak	Yankee	45 12 76.2 N 147 51 61.8 E	46,000 2527.4	6
Okhotak	Zulu	59 25 03.3 N 143 05 38.2 E	61,000 3101.5	6

GULF OF ALASKA - GRI 7960

LORAN-C
GULF OF ALASKA CHAIN
GRI 7960
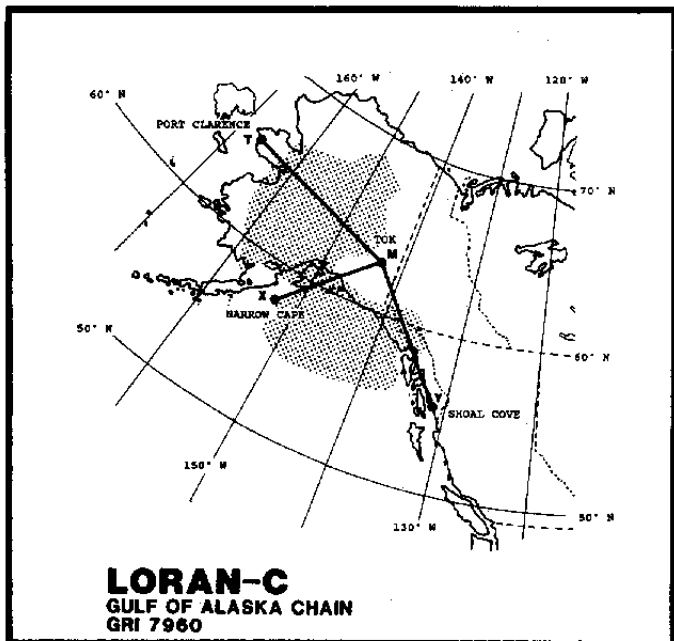
STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (kW)	REMARKS
Tok, AK	Master	63° 19 42.8 N 142° 48 31.9 W		540	Two pulse comms installed
Narrow Cape, Kodiak Is., AK	Xray	57° 24 20.2 N 152° 22 11.3 W	11000/ 2804.45	400	Two pulse comms in-stalled. Dual rated to North Pacific chain.
Shoal Cove, AK	Yankee	55° 26 20.9 N 131° 15 19.7 W	26000/ 3651.14	540	Two pulse comms in-stalled. Dual rated to Canadian West Coast chain.
Port Clarence, AK	Tango	65° 14 40.3 N 166° 53 12.6 W	44000/ 3932.52	1000	Dual rated to North Pacific chain.
Kodiak, AK	Monitor/ Control	57° 44 00.7 N 152° 30 30.4 W			Exercises operational control of chain, control for X and Y.
Juneau, AK	Monitor	58° 17 54.8 N 134° 24 45.4 W			Unmanned receiver site.

NORWEGIAN SEA - GRI 7970

LORAN-C
NORWEGIAN SEA CHAIN
GRI 7970

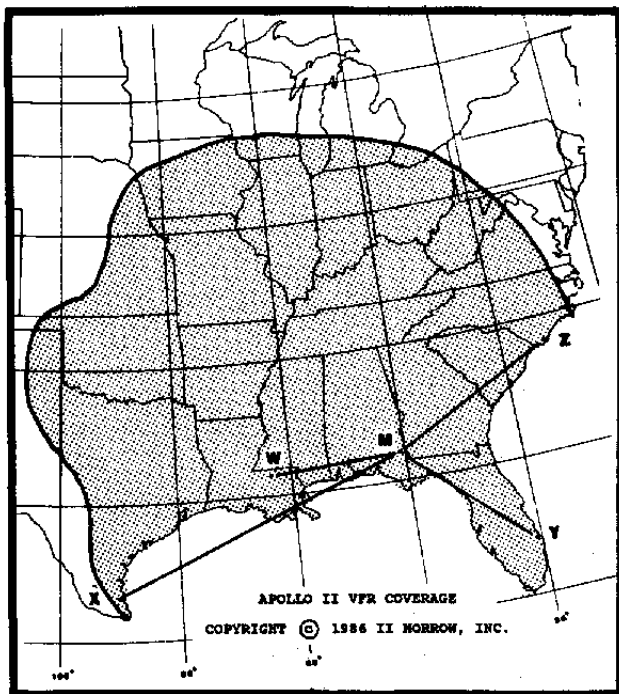**TRANSMITTING STATIONS**

M EJDE
W SYLT
X BØ
Y SANDUR
Z JAN MAYEN
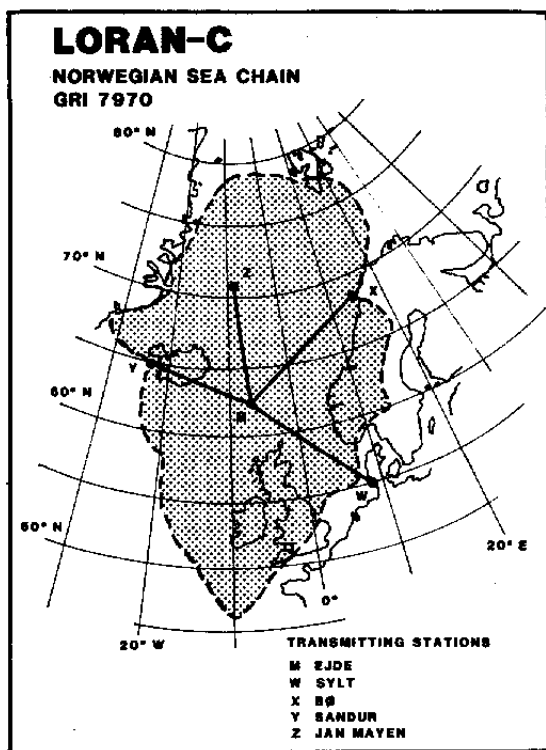
NORWEGIAN SEA LORAN-C CHAIN - GRI 7970 (old rate SL3)

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(Kw)	REMARKS
Ejde, Faeroe Is., Denmark	Master	62 17 59.7 N 07 04 26.7 W		325	Host Nation Manned, Dual-rated to North Atlantic Chain.
Bø, Norway	Xray	68 38 06.2 N 14 27 47.0 E	11000/ 4048.10	165	Host Nation Manned.
Sylt, Germany	Whiskey	54 48 29.8 N 08 17 36.3 E	26000/ 4065.64	325	
Sandur, Iceland	Yankee	64 54 26.6 N 23 55 21.8 W	46000/ 2944.53	1500	Host Nation Manned, dual-rated to North Atlantic Chain.
Jan Mayen, Norway	Zulu	70 54 52.6 N 08 43 58.7 W	60000/ 3216.30	165	Host Nation Manned.
Shetland Is., U.K.	Monitor/ Control	60 26 25.3 N 01 18 05.7 W			Control for X, W, Y, and Z

SOUTHEAST UNITED STATES - GRI 7980

APOLLO II VFR COVERAGE

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STATION	FUNCTION	COORDINATES	CODING DELAY-BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Malone, FL	Master	30 59 38.7 N 85 10 09.3 W		800	Control for W, X, Y, and Z. Dual-rated to Great Lakes Chain.
Grangeville, LA	Whiskey	30 43 33.0 N 90 49 43.6 W	11000/ 1809.54	800	
Raymondville, TX	Xray	26 31 55.0 N 97 50 00.1 W	23000/ 4443.30	400	
Jupiter, FL	Yankee	27 01 58.5 N 80 06 53.5 W	43000/ 2201.88	275	
Carolina Beach, NC	Zulu	34 03 46.0 N 77 54 46.8 W	59000/ 3542.72	550	
Mayport, FL	Monitor	30 22 58.9 N 81 25 13.1 W			Unmanned receiver site.
Eglin, FL	Monitor	30 35 05.3 N 86 36 54.4 W			Unmanned reciever site.
New Orleans, LA	Monitor	29 49 17.5 N 90 01 44.2 W			Unmanned receiver site.

MEDITERRANEAN - GRI 7990

LORAN CHAIN COVERAGE MAP
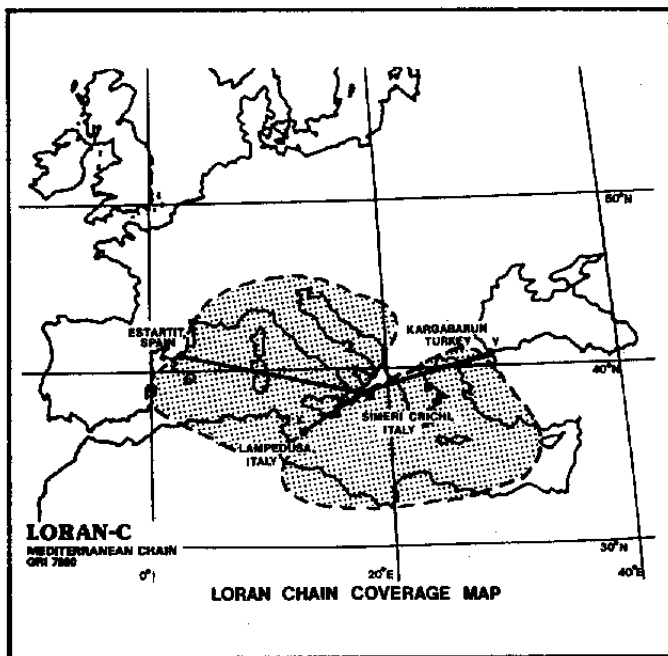
MEDITERRANEAN SEA LORAN-C CHAIN - GRI 7990 (old rate SL1)

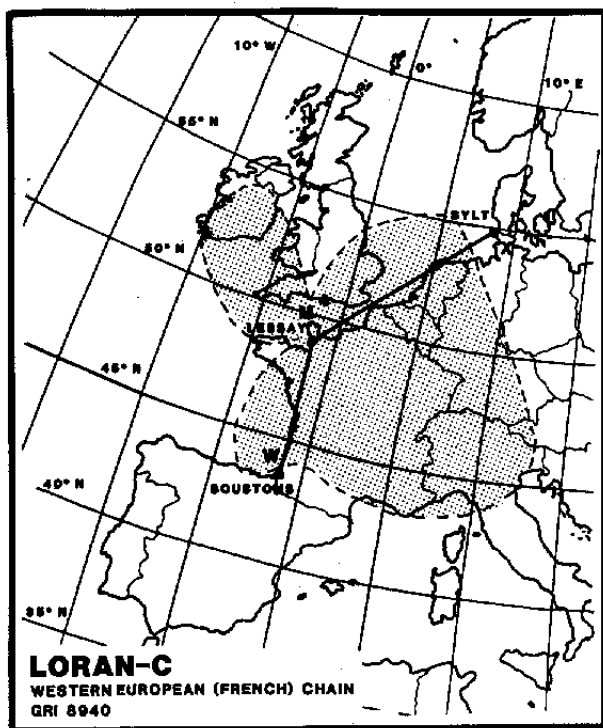| STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Sellia Marina, Italy	Master	38 52 20.5 N 16 43 06.2 E		165	Exercises operational control of chain.
Lampedusa, Italy	Xray	35 31 20.8 N 12 31 30.2 E	11000/ 1756.98	325	Atis station.
Kargabarun, Turkey	Yankee	40 58 21.0 N 27 52 01.5 E	29000/ 3273.29	165	
Estartit, Spain	Zulu	42 03 36.5 N 03 12 15.9 E	47000/ 3999.71	165	

WESTERN USSR - GRI 8000
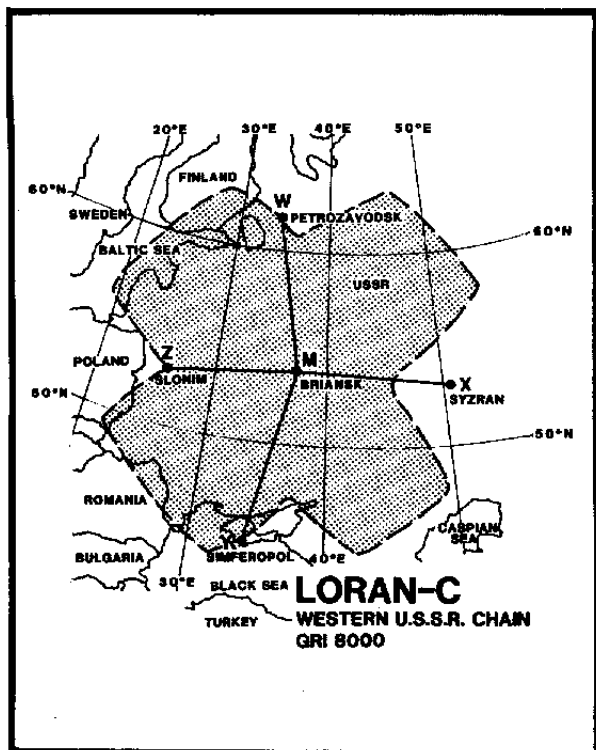
Western U.S.S.R LORAN-C Chain GRI 8000

Station	Function	Coordinates	Coding Delay/- Baseline Length	Radiated Power (kW)
Briansk	Master	53 07 84.3 N 34 54 74.7 E		650
Petroz-avodsk	Whisky	61 45 54.0 N 33 41 67.3 E	10,000/ 3217.21	700
Slonim	Xray	53 07 92.0 N 25 23 76.7 E	25,000/ 2125.00	450
Simferopol	Yankee	44 53 34.3 N 33 52 53.5 E	50,000/ 3070.25	550
Syzran	Zulu	53 17 29.3 N 48 06 89.0 E	65,000/ 2941.60	700

WESTERN EUROPE (FRANCE) - GRI 8940

LORAN-C
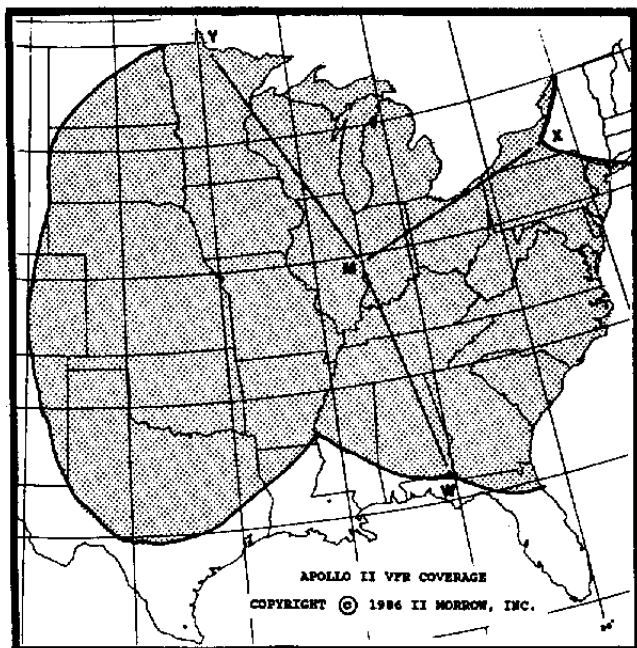WESTERN EUROPEAN (FRENCH) CHAIN
GRI 8940

WESTERN EUROPEAN (FRENCH) LORAN-C CHAIN - GRI 8940

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (kW)	REMARKS
Lessay, France	Master	49°08'55.1" N 01°30'17.6" W		NA	
Soustons, France	Whisky	43°44'22.9" N 01°22'50.1" W	14000 2008.27	NA	
Sylt, Germany	Xray	54°48'29.9" N 08°17'36.3" W	33000 3072.46	NA	
Shetlands	Monitor	60°26'25.3" N 01°18'05.3" W			

All numbers are approximate and preliminary.

GREAT LAKES - GRI 8970

APOLLO II VFR COVERAGE

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STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(kW)	REMARKS
Dana, IN	Master	39 51 07.5 N 87 29 12.1 W		400	Dual-rated to Northeast U.S. Chain.
Malone, FL	Whiskey	30 59 38.7 N 85 10 08.3 W	11000/ 3355.11	800	Dual-rated to Southeast U.S. Chain.
Seneca, NY	Xray	42 42 50.6 N 76 49 33.9 W	28000/ 3162.06	800	Dual-rated to Northeast U.S. Chain. Exercises operational control of chain.
Baudette, MN	Yankee	48 36 49.8 N 94 33 18.5 W	44000/ 3753.74	400	
Loran Wildwood, NJ	Tango	38 56 58.2 N 74 52 01.6 W	72000/ 1617.92	Various	Experimental station, not to be used for navigation.
Claybanks, MI	Monitor	N W			
Plumbrook, OH	Monitor	44 22 47.0 N 82 39 38.5 W			Unmanned receiver site.
Eglin, FL	Monitor	30 35 05.3 N 86 36 54.4 W			Unmanned receiver site.
Mayport, FL	Monitor	30 22 58.9 N 81 25 13.1 W			Unmanned receiver site.

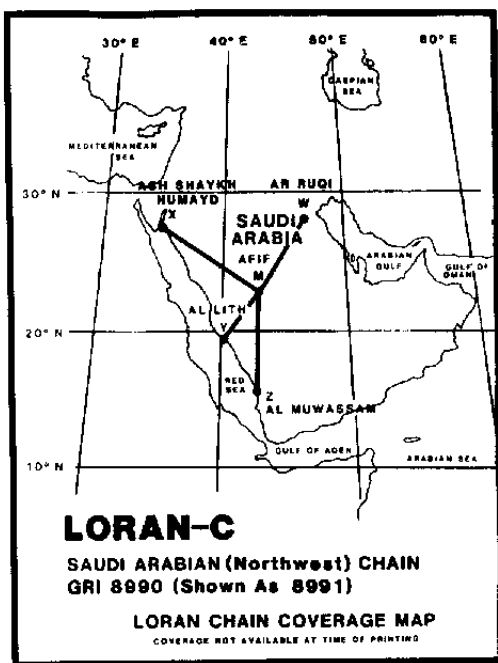# SAUDI ARABIAN (COMPOSITE OF SOUTH - GRI 7170 & NORTH GRI 8990)

LORAN-C

SAUDI ARABIAN NORTH and SOUTH CHAINS

North ———— South - - - - -

LORAN CHAIN COVERAGE MAP
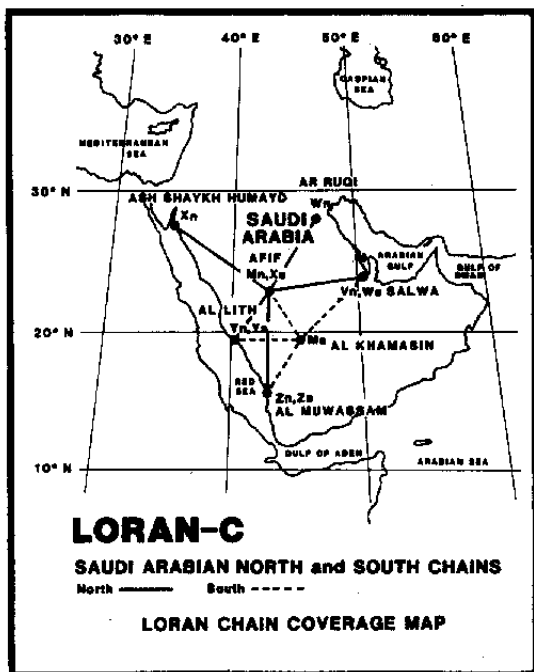
NORTHEAST SAUDI ARABIA - GRI 8990
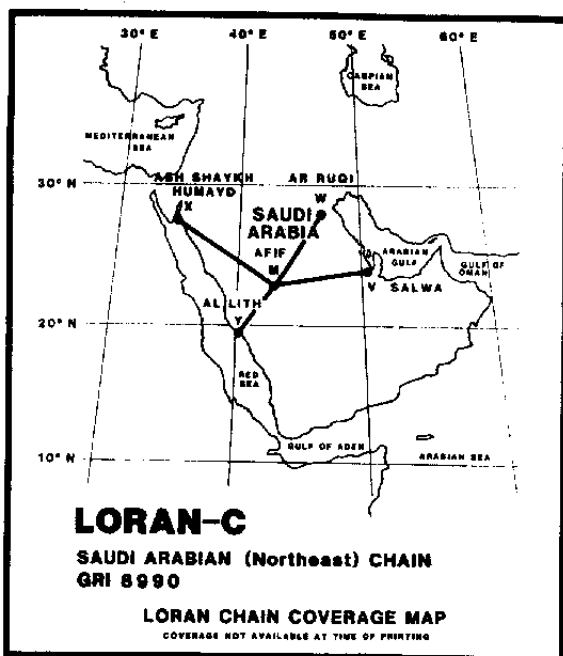
LORAN-C
SAUDI ARABIAN (Northeast) CHAIN
GRI 8990

LORAN CHAIN COVERAGE MAP
COVERAGE NOT AVAILABLE AT TIME OF PRINTING

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (kW)
Afif	Master	23°48'36.02" N 43°51'17.63" E		800
Salwa	Victor	24°50'01.50" N 50°34'12.02" E	11000 2641.09	800
Ar Ruqi	Whisky	29°01'04.61" N 46°37'21.96" E	25000 2298.51	200
Ash Shaykh Humayd	Xray	28°09'15.67" N 34°45'39.99" E	40000 3145.53	400
Al Lith	Yankee	20°13'58.31" N 40°12'31.02" E	56000 1606.26	200
Jubail	Monitor	2?°19'36.60" N 49°38'30.67" E		
Yanbu	Monitor	24°04'14.14" N 38°02'35.90" E		
Al Qunfuddah	Monitor	19°08'48.27" N 41°03'40.69" E		

* The Saudi Arabian chains are not operated or controlled
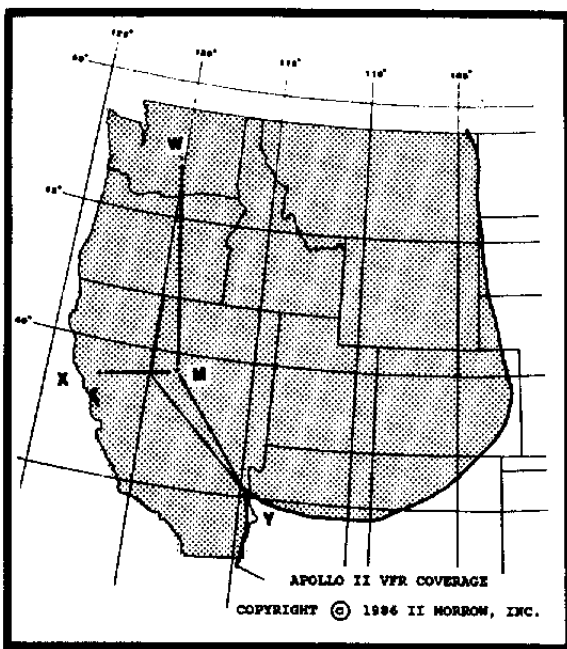by the United States Coast Guard.

NORTHWEST SAUDI ARABIA - GRI 8991

LORAN-C

SAUDI ARABIAN (Northwest) CHAIN
GRI 8990 (Shown As 8991)

LORAN CHAIN COVERAGE MAP

COVERAGE NOT AVAILABLE AT TIME OF PRINTING

SAUDI ARABIAN (NORTHWEST) LORAN-C CHAIN* - GRI 899

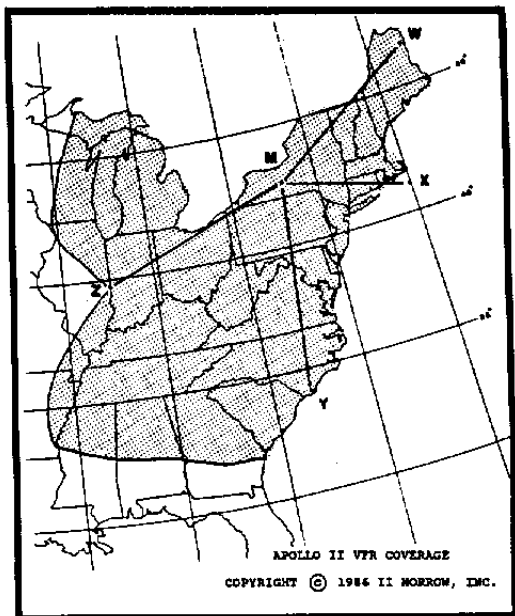| STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (KW)
Afif	Master	23°48'36.82" N 42°51'17.63" E		600
Ar Ruqi	Whisky	29°01'04.61° N 46°37'21.95° E	25000 2398.51	200
Ash Shaykh Humayd	Xray	28°09'15.87° N 34°45'39.99° E	40000 3145.53	400
Al Lith	Yankee	20°13'58.31° N 40°12'31.02° E	56000 1606.26	200
Al Muwassam	Zulu	16°25'55.89° N 42°48'04.33° E	69000 2726.96	800
Jubail	Monitor	27°19'36.40° N 49°28'30.67° E		
Yanbu	Monitor	24°04'14.14° N 38°02'35.90° E		
Al Qunfuddah	Monitor	19°08'48.27° N 41°03'40.69° E		

* The Saudi Arabian chains are not operated or controlled by the United States Coast Guard.
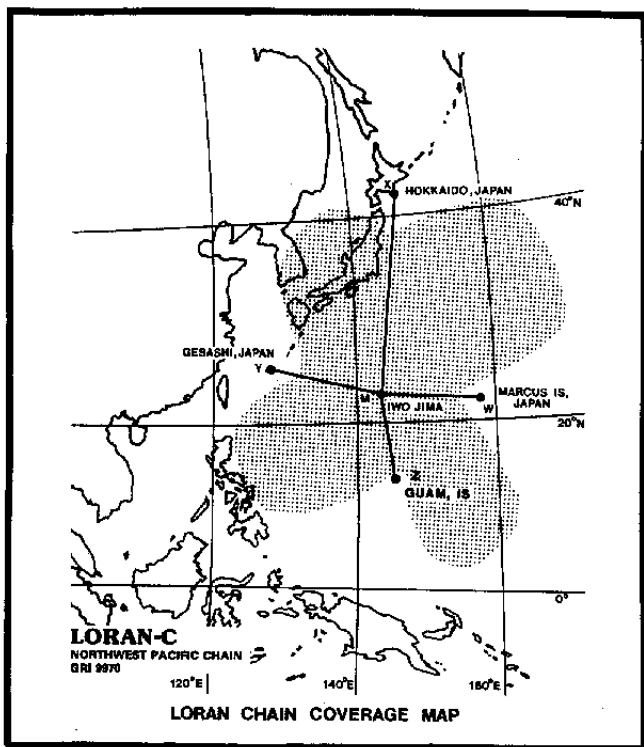
WEST COAST UNITED STATES - GRI 9940

APOLLO II VFR COVERAGE

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STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Fallon, NV	Master	39 33 06.6 N 118 49 56.4 W		400	Two pulse comms installed.
George, WA	Whiskey	47 03 48.0 N 119 44 39.5 W	11000/ 2796.90	1600	Two pulse comms installed. Dual-rated to West Coast Canada Chain.
Middletown, CA	Xray	38 46 57.0 N 122 29 44.5 W	27000/ 1094.50	400	Exercises operational control of chain. Control for W, X, and Y. Two pulse comms installed.
Searchlight, NV	Yankee	35 19 18.2 N 114 48 17.4 W	40000/ 1967.30	540	
North Bend, OR	Monsite	43 24 36.2 N 124 14 27.9 W			Unmanned receiver site.
Pt. Pinos, CA	Monsite	36 37 59.0 N 121 56 05.6 W			Unmanned receiver site.

NORTHEAST UNITED STATES - GRI 9960

APOLLO II VFR COVERAGE

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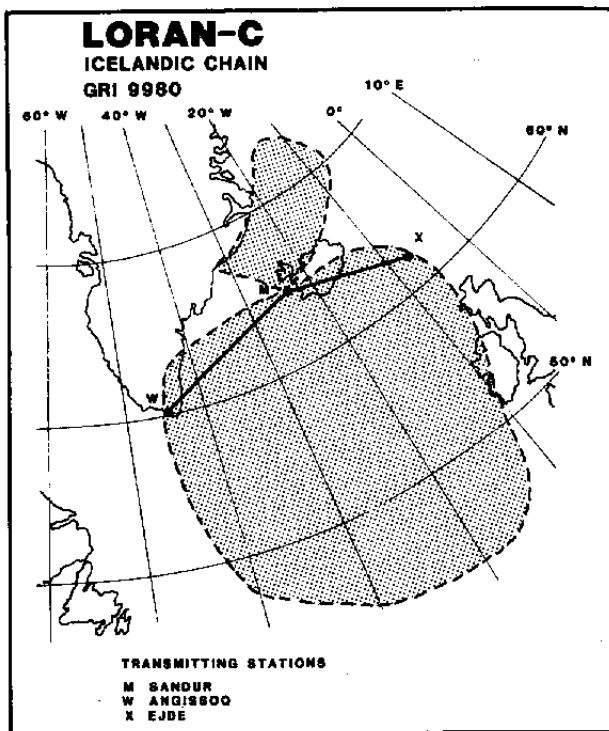| STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Seneca, NY	Master	42 42 50.6 N 76 49 33.9 W		800	Control for W, X, Y, and Z. Exercises operational control of Chain.
Caribou, ME	Whiskey	46 48 27.2 N 67 55 37.7 W	13000/ 2797.20	350	
Nantucket, MA	Xray	41 15 11.9 N 69 58 39.1 W	25000/ 3869.91	275	
Carolina Beach, NC	Yankee	34 03 46.0 N 77 54 46.8 W	39000/ 3221.65	550	
Dana, IN	Zulu	39 51 07.5 N 87 29 12.1 W	54000/ 3162.06	400	
Eocen Wildwood, NJ	Tango	38 56 58.2 N 74 52 01.6 W	83500.49	Various	Experimental station, not to be used for navigation.
Cape Elizabeth, ME	Monitor	43 33 54.8 N 70 11 58.5 W			Unmanned receiver site.
Sandy Hook, NJ	Monitor	40 28 17.0 N 74 01 03.7 W			Unmanned receiver site.
Plumbrook, OH	Monitor	41 22 47.0 N 82 39 38.5 W			Unmanned reciever site.
Claybanks, MI	Monitor	43 31 48.0 N 86 29 01.0 W			Unmanned receiver site.

NORTHWEST PACIFIC - GRI 9970

LORAN CHAIN COVERAGE MAP

NORTHWEST PACIFIC LORAN-C - GRI 9970

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER (kW)	REMARKS
Iwo Jima, Japan	Master	24° 48 03.6 N 141° 19 30.3 E		540	Clarinet Pilgrim TTY2
Marcus Is Japan	Whiskey	24° 17 07.9 N 153° 58 50.3 E	11,000/ 4283.94	1800	Clarinet Pilgrim TTY2 installed
Hokkaido, Japan	Xray	42° 44 37.1 N 143° 43 09.2 E	30,000/ 6685.12	1000	Clarinet Pilgrim TTY2 installed
Gesashi, Japan	Yankee	26° 36 28.0 N 128° 08 56.4 E	55,000/ 4443.18	1000	Clarinet Pilgrim TTY2 installed
Guam Is., USA	Zulu	13° 27 51.3 N 144° 49 56.1 E	81,500/ 4365.84	750	Replaces Yap Is.
Saipan, U.S.A.	Monitor/ Control	15° 07 46.8 N 145° 41 38.6 E			Controls W and Z
Yokota, Japan	Monitor/ Control	35° 44 34.6 N 139° 21 41.3 E			Controls X and Y
Chausan, Korea	Monitor	35° 11 26.0 N 128° 08 45.0 Z			

ICELAND - GRI 9980

LORAN-C
ICELANDIC CHAIN
GRI 9980

TRANSMITTING STATIONS

M SANDUR
W ANGISSOQ
X EJDE
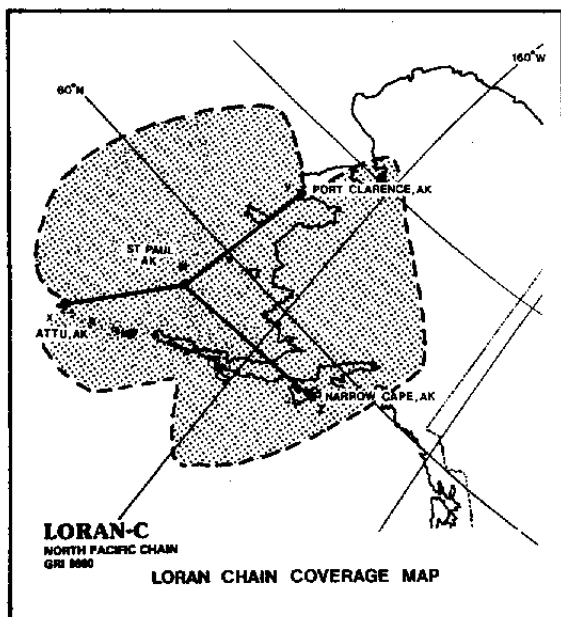
ICELANDIC LORAN-C CHAIN - GRI 9980

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE-LINE LENGTH	RADIATED POWER(KW)	REMARKS
Sandur, Iceland	Master	64°54'26.6"N 23°55'21.8"W		1500	
Angissoq, Greenland	Whiskey	59°59'17.3"N 45°10'27.5"W	11000/ 4068.03	760	Dual-Rated to Labrador Sea Chain
Ejde, Faeroe Is., Denmark	Xray	62°17'59.6"N 07°04'26.5"W	30000/ 2944.54	325	Dual-Rated to Norwegian Sea Chain.
Keflavik, Iceland	Monitor	63°57'23.0"N 22°43'21.0"W			

NORTH PACIFIC - GRI 9990

LORAN-C
NORTH PACIFIC CHAIN
GRI 9990
LORAN CHAIN COVERAGE MAP

NORTH PACIFIC LORAN-C CHAIN - GRI 9990 (old rate 5S1)

STATION	FUNCTION	COORDINATES	CODING DELAY/BASE- LINE LENGTH	RADIATED POWER(KW)	REMARKS
St. Paul, AK	Master	57 09 12.3 N 170 15 06.8 W		275	Controls X and Y, exercises operational control of chain, two pulse comms installed.
Attu, AK	Xray	52 49 44.0 N 173 10 49.0 E	11000/ 3875.25	275	
Port Clarence, AK	Yankee	65 14 40.3 N 166 53 12.6 W	29000/ 3068.95	1000	
Narrow Cape, AK	Zulu	57 26 20.2 N 152 22 11.3 W	43000/ 3590.45	400	Two pulse comms in- stalled. Dual-rated to Gulf of Alaska Chain.
Kodiak, AK	Monitor/ Control	57 44 00.7 N 152 30 20.4 W			Control for Z.

NOTES:

Facts To Remember

If Your LORAN Needs Service

1. Before you call your Dealer or II Morrow, Inc., be sure you know the model number and serial number of your unit.

2. Before you send your unit in for service, be sure to keep a record of any PILOT CREATED waypoints you want to keep. These waypoints are frequently lost in the process of performing the necessary maintenance.

3. New database updates are available every 56 days. Contact your dealer or the II Morrow factory for details.

TROUBLESHOOTING

Apollo 618

To Ensure Trouble Free Operation

Avoid high cockpit temperatures when aircraft is not in use.

DO NOT clean the face plate with chemical cleaning agents, solvents, or harsh detergents.

Periodically check all antenna, power, and ground connections.

DO NOT wax or paint the antenna.

Battery Replacement

The Apollo 618TCA memory is maintained by a lithium battery. The expected service life of this type of battery is approximately 5 years. This is not a user replaceable item. The lithium battery must be replaced by the factory or an authorized dealer.

Indications Of A Low Battery Level

Loss of the PILOT CREATED DATABASE memory.

GRI changes to 4990.

The unit does not search and acquire the signal properly.

If You Have A Problem

Read the instructions again for the desired function.

If You Are Unable To Correct The Problem

Record the SNRs and ECDs for ALL stations in the chain and call your II Morrow dealer or the factory. The technician MUST have this information before he can analyze the problem.

IN-FLIGHT

INDICATION
WARN light is on.

PROBLEM
If flying through clouds, rain, snow, etc., the likely problem is precipitation static (P-STAT).

ACTION
Check SNRs. If the problem is P-STAT, all SNRs will be less than 25. After landing inspect (or install) static wicks per aircraft manufacturers specifications. Also, check the bonding on all control surfaces. If the problem continues, skin mapping may be necessary.

PROBLEM

If the aircraft is flying out of the coverage area for the selected chain, once the SNR's become sufficiently low, the WARN light will come on.

ACTION
Select a new GRI.

PROBLEM

If the WARN light is on after takeoff, or runup, noise from the aircraft alternator or magneto may be responsible.

ACTION
Contact the dealer or factory after landing.

IN-FLIGHT (CONTINUED)

INDICATION
WARN light is on
(continued).

PROBLEM
Flying over a LORAN
transmitter may cause the
WARN light to come on
temporarily. This signal is
too strong for proper
tracking.

ACTION
None.

PROBLEM

A station the unit is tracking
has gone off the air
temporarily .

ACTION
Check SNRs. Wait a few
minutes; the station will
normally come back on.

PROBLEM
Blink condition is occuring.

ACTION
Signal information appears
normal. The WARN light
goes out when the problem
clears.

PROBLEM
B EXT light is on.
Aircraft is on a baseline
extension.

ACTION
Select a more suitable chain
or manually select a more
suitable triad.

IN-FLIGHT (CONTINUED)

INDICATION Triad does not select automatically.	**PROBLEM** Poor LOP crossing angles. **ACTION** Select best triad manually, then reset automatic selection.

PROBLEM

"Contaminated" signal.

ACTION
Cycle power switch.

INDICATION
SYSTEM FAILURE is displayed and WARN light is on.

PROBLEM
Transient fault may have occured.

ACTION
Cycle power switch.

PROBLEM
Unit is malfunctioning.

ACTION
Unit needs service.

IN-FLIGHT (CONTINUED)

INDICATION
Bearing and distance displays
appear to be wrong.

PROBLEM
A mistake was made in
entering the LAT/LONG
coordinates of a PILOT
CREATED waypoint.

ACTION
Verify that coordinates of the
PILOT CREATED waypoint
are accurate. Check the
hemispheric identifier.

PROBLEM
Distorted signal.

ACTION
If the problem doesn't
correct itself in a few
minutes, cycle the power
switch.

Present Position display
appears to be wrong.

PROBLEM
The Alternate Solution is
displayed.

ACTION
Select the other solution.

PROBLEM
Pilot error in determining
position.

ACTION
Verify your position by
activating EMERGENCY
SEARCH. The correct
bearings/distances to the
airports should be displayed.

ON THE GROUND

INDICATION
WARN light stays on after
power-up.

PROBLEM
Wrong GRI is selected.

ACTION
Change to appropriate GRI.

PROBLEM
Required secondary is shut
down.

ACTION
Check SNRs to see if unit is
receiving signals from each
secondary. Check GRI to see
if a triad is being received.
Select another GRI. (if
available).

PROBLEM
Signal is weak due to
distance from transmitters.

ACTION
Check SNRs. If very low, you
may not obtain lock-on until
after takeoff.

ON THE GROUND (CONTINUED)

INDICATION
WARN light stays on after
power-up (continued).

PROBLEM
Aircraft may be parked near
something interfering with
the signal (APU, hanger,
high-voltage lines).

ACTION
Check SNRs and ECDs. If
SNRs are very low, or ECDs
high or changing rapidly,
move the aircraft. The unit
usually does not work inside
a hanger.

PROBLEM
Antenna phase jumper is
improperly set.

ACTION
Refer to Installation Manual
for procedure.

WARN light is on after
run-up.

PROBLEM
Noise generated from the
aircraft alternator or
magneto.

ACTION
Contact II Morrow dealer or
factory.

NOTES:

USING THE APOLLO® 618 TRAINING MANUAL

The purpose of the Training Manual is to provide you with a comprehensive ground school course in the operation of the Apollo® 618 LORAN-C. This manual is designed to be used on the ground in conjunction with a working receiver.

IMPORTANT

Do NOT use this manual while airborne. Safe flying requires pilots to practice SEE and AVOID procedures mandated by FAA regulations. For this reason, before using the Apollo® 618 in the air, you should be quite familiar with its operation.

INTRODUCTION

LORAN-C TERMS

ACCURACY, ABSOLUTE: a measure of the ability to determine true geographic position (Latitude and Longitude).

ACCURACY, REPEATABLE: a measure of the ability to RETURN to a specific position or location.

ACQUISITION: the process of "locating" the LORAN signal among background noise, and then tracking the signal.

ALTERNATE SOLUTION: There are two solutions to the LORAN's calculations. Normally the unit automatically displays the correct solution. The solution the unit does NOT display is the Alternate Solution.

ASF: Additional Secondary Phase Factor. These are calibration factors entered by the pilot into a LORAN-C receiver to compensate for local propagation variations in the LORAN-C signal.

BASELINE: the great circle line connecting the master transmitting station and a secondary transmitting station.

BASELINE EXTENSION: the extension of the baseline beyond either the master or secondary transmitting station.

BLINK: A transmitted signal that indicates signal information from that station may be inaccurate or missing.

CHAIN: a LORAN-C network consisting of a master station and from two to four secondary stations.

CODING DELAY: the time difference between the pulse groups transmitted by a master station and a secondary station.

CONTROL/MONITOR STATION: a station within a LORAN-C chain that insures proper signal transmission. It is normally an unmanned receiver site located within the prime LORAN coverage area, separate from all of the transmitter stations.

CROSSING ANGLE: the angle formed by two intersecting LOPs (Lines of Position).

CROSS-RATE INTERFERENCE: signal interference caused by over-lapping coverage areas from two or more LORAN-C chains.

CROSS TRACK DISTANCE: the distance, left or right, away from the desired course.

CYCLE SLIP: failure of the receiver to maintain synchronization of the Zero Crossing Tracking Points and phase coding of the LORAN-C pulses. This results in time measurement errors in multiples of 10 usec (microseconds). A cycle slip normally result s in a displayed position error of more than one mile, the magnitude of the error depending on the receiver's position in the LORAN coverage area.

DEFAULT PAGES/SETTINGS: Settings programmed into the unit as it leaves the factory. These settings can later be changed by the user.

DUAL RATED STATION: a LORAN-C transmitting station that operates in two LORAN-C chains.

ENVELOPE-TO-CYCLE DIFFERENCE (ECD): a measure of signal distortion determined by the phase shift between the pulse envelope and the 100 kHz carrier.

FIX: a position defined by two intersecting LOPs (Lines of Position).

GEOMETRIC DILUTION OF PRECISION (GDOP): a factor used to express all geometric causes of error in a fix.

GREAT CIRCLE ROUTE: the shortest distance between points along the curved surface of the earth.

GROUND WAVE: a radio wave that travels near or along the Earth's surface.

GROUP REPETITION INTERVAL (GRI): the number used to identify a particular LORAN-C chain. The four digit number indicates the time coded delay. For instance, the West Coast chain GRI is 9940, which refers to a time interval of 99,400 usec (microseconds).

LINE OF POSITION (LOP): a line representing the series of locations of constant time difference between the master and a secondary station.

LORAN: LOng RAnge Navigation.

LORAN-C: a long range navigation system using ground-based transmitters operating in the Low Frequency (LF) radio band. The "C" refers to the version of LORAN.

MASTER STATION: the controlling station of a particular LORAN-C chain which transmits the reference timing signals based on the GRI of that chain.

PRECIPITATION STATIC (P-STATIC): electromagnetic noise created by the rapid discharge of static electricity. An aircraft builds up a static electric charge by passing through charged particles (such as rain, ice, snow, or dust).

REPEATABLE ACCURACY: See ACCURACY, REPEATABLE.

SECONDARY STATIONS: the two to five secondary transmitting stations in a LORAN-C chain which transmit in sequence after the master station at fixed, predetermined, intervals.

SIGNAL-TO-NOISE RATIO (SNR): the ratio of the LORAN-C signal level to the level of background noise.

SKYWAVE: an indirect radio wave that reflects off of the ionosphere, rather than following a direct path from the transmitter to the receiver.

TIME DIFFERENCE (TD): the difference in time of arrival of two LORAN-C signals, one from the master station and the other from one of the secondary stations. TDs are measured in microseconds.

TRACKING: the process of maintaining synchronization of the receiver with the selected signals.

TRIAD: the master and two secondary transmitting stations used by a LORAN receiver to determine position.

WAYPOINT: a specific location on the earth.

NOTES:

NEAREST WPT
WAYPOINT
DATABASE
POWER
Apollo 618

TO   MODE
FRM SEL
APP ENT
ENR

II MORROW

Made in USA
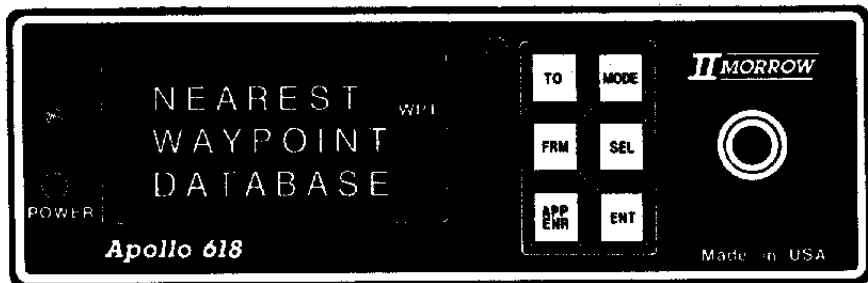
IMPORTANT FACTS

1. The NORTH AMERICA DATABASE and SEABASE\HELIPORT DATABASE are in permanent memory and cannot be altered.

2. Knobs may be turned in either direction.

3. Distance information is displayed in nautical miles only. One nautical mile = 1.15 statute miles.

4. Smaller size numbers follow a decimal point. For example, 3555 = 355.5

5. The smaller size numbers in latitude and longitude displays represent tenths and hundredths of a minute (not seconds). For example 44° 5474 = 44 degrees, 54.74 minutes. To convert seconds to a decimal equivalent, divide by 60. For example, 30 seconds = .5 minutes (30/60 = .5). Therefore 39° 21' 30" = 39° 21.5'.

NOTES:

```
┌──────────┬──────────┐
│    TO    │   MODE   │
├──────────┼──────────┤
│   FRM    │   SEL    │
├──────────┼──────────┤
│   APR    │   ENT    │
│   ENR    │          │
└──────────┴──────────┘
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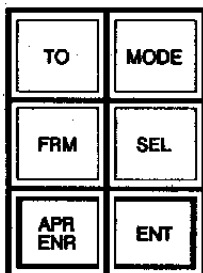
TO

Sets the displayed waypoint as the destination waypoint. Also, when in NAV mode, displays information on the "To" waypoint.

FRM

Sets the displayed waypoint as the departure waypoint. Pressing this button twice within one second sets your present position as the departure waypoint regardless of the current mode (except when displaying a waypoint in WPT mode).

APR
ENR

Select the approach or enroute sensitivity on the external CDI (for aircraft so equipped). The unit will not automatically switch secondary stations while in approach mode.

<u>Full Scale Deflection</u>

Enroute: 5.0 nautical miles
Approach: 1.25 nautical miles

Note

APR/ENR does not affect the internal CDI. When approach sensitivity is selected, the APP annunciator on the left side of the Information Display is lighted.

MODE
Selects the operating modes (NAV, WPT, AIRSP, SETUP). The current mode is displayed on the right side of the Information Display

SEL
Enables the selection of a displayed item to be changed. The selected item flashes. The displayed item is not entered until ENT is pressed.

ENT
Enters selected data.

APR
ENR and ENT
EMERGENCY SEARCH WITH SAFE - GLIDEᴛᴍ is activated when these two buttons are pressed simultaneously.

INFORMATION DISPLAY

Status
Annunciators

Mode
Annunciators

Baseline Extension
Caution Annunciator

Waypoint Display
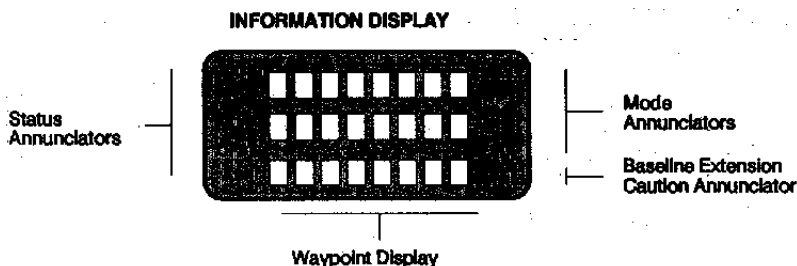
STATUS ANNUNCIATORS

WARN

Is lighted:

When the signal is not adequate for navigation.

When the computer determines the signal quality is below standard.

For one minute when a math error is detected, even though math errors are normally corrected by the unit in a matter of seconds.

When a Blink condition is detected. (See LORAN-C TERMS for a definition of BLINK.)

Is flashing:

Temporarily, when a new GRI is selected.

When the unit is first turned on. It stops flashing and stays on once it has "found" the signals from a Master and two Secondaries, indicating the acquisition process is proceeding normally.

Note

It may take a few minutes for the unit to determine its position, depending on location and possible interference. The WARN annunciator will go out when the unit determines the signal is suitable for navigation.

ARIV

Lighted when the aircraft is within 1 nautical mile of the destination waypoint for each 100 knots of ground speed. The minimum is 1 nautical mile at speeds below 100 knots. If the optional II Morrow encoding altimeter is installed, the ARIV annunciator will flash for a few seconds when the aircraft is approximately 2 minutes from the Top of Decent Point.

APP

Lighted when approach sensitivity is selected. This affects only the remote CDI, if installed.

OFST

Lighted when a course offset is entered.

ASF

Lighted when Latitude/Longitude calibration factors are entered.

B EXT

Lighted when the aircraft is positioned on or near a baseline extension, indicating possible degraded accuracy.

Navigation Mode   NAV

Waypoint Mode   WPT   MODE

Airspace Mode   AIRSP

Setup Mode   SETUP
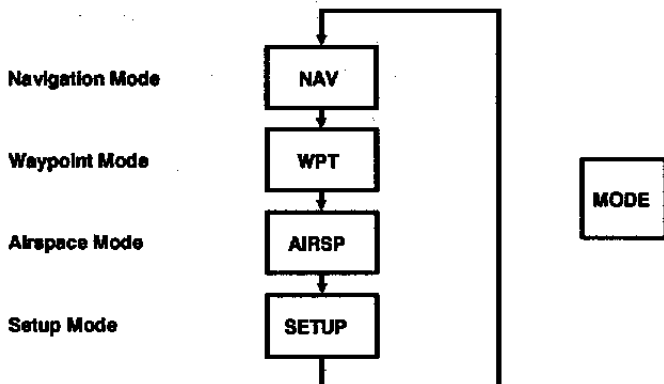
MODE ANNUNCIATORS

The MODE button advances through the modes from top (NAV) to bottom (SETUP), and then back to the top again. The lighted annunciator indicates the selected mode.

NAV

Navigation Mode - Displays the various "pages" for use when navigating.

WPT

Waypoint Mode - Displays waypoints contained in the unit's various databases.

AIRSP

Airspace Mode - Flashes to alert the pilot the aircraft is approaching a TCA, Restricted Area, Prohibited Area, Alert Area, ARSA, TRSA, MOA, Class C, CYA, CYD, and CYR. Airspace information may be displayed when AIRSP mode is selected with the mode button. When AIRSP mode is selected, the annunciator is lighted solid unless a new airspace alert is detected, in which case the annunciator will flash.

SETUP

Setup Mode - The pilot may display and alter the unit's settings for various features such as XTD SENS (Cross Track Sensitivity) and Airspace Alert. Also, signal information and diagnostic information may be displayed.

NOTES:

HOW LORAN-C WORKS

LORAN is an acronym for LOng RAnge Navigation, and "C" refers to the version of LORAN. A previous version of LORAN was called LORAN-A, and a military version is called LORAN-D.

Since LORAN-C signals are low frequency, they closely follow the contour of the earth, and as a result can be used for navigation on the ground, in the air, or at sea.

Sky waves are signals reflected back to earth from the ionosphere, and because they are subject to a number of variables, they are not suitable for normal navigation. II Morrow LORAN receivers reject sky wave contamination, and use only Ground Waves.

LORAN-C SIGNAL PROPAGATION
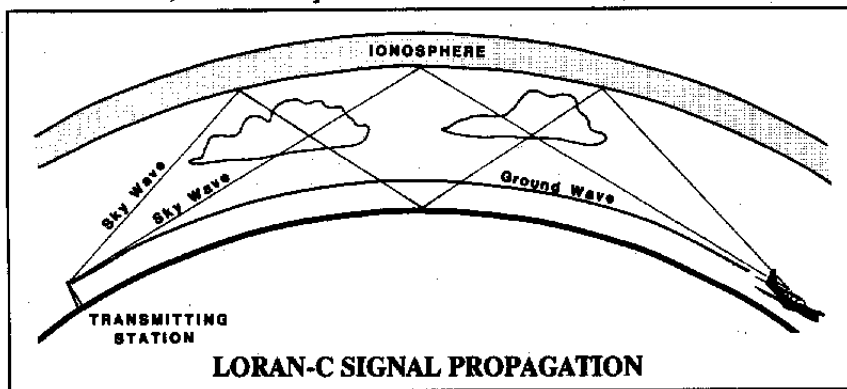
The LORAN receiver is a precise time measuring device. To visualize how this works, imagine you are flying somewhere within a LORAN-C coverage area. This means your unit is receiving signals from three ground stations. One station is the **Master**, and the other two are **Secondaries**. The Master and all of the Secondaries that define a LORAN-C coverage area are called a **Chain**. Each Chain contains one Master and up to 5 Secondaries. At any given time, the unit must be receiving the Master station and two of the Secondary stations. Together, these three stations form a **Triad**.

To distinguish between the various secondaries in a chain, they are named Whiskey, X-ray, Yankee, and Zulu.

You must manually select the desired chain with your Apollo 618, but the unit automatically chooses the best possible triad within that chain.

LORAN-C signals travel at the speed of light (approx. 186,000 miles per second). Suppose your unit is using secondaries Whiskey and X-ray. It measures the **Time Difference (TD)** between the arrival of the Master pulse and of the Whiskey pulse. From this, the unit can electronically "plot" a **Line of Position (LOP)** that represents that measured TD. That is to say, your aircraft is somewhere along this line, a line that represents a constant TD between the Master and Whiskey. The shape of this line is always a hyperbola.

The unit also measures the TD between the arrival of the Master pulse and of the X-ray pulse, defining another LOP. Your position is where the two LOPs intersect. The unit automatically converts this fix into latitude and longitude coordinates.
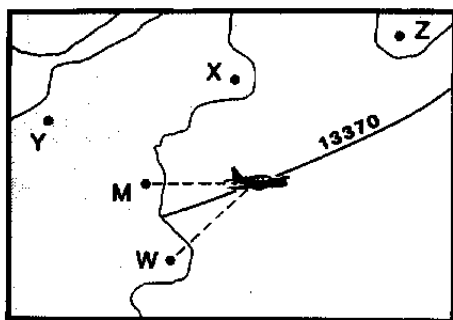
The unit electronically "plots" this LOP by measuring the TD between the arrival of the signal from the Master station and the arrival of the signal from the station Whiskey.
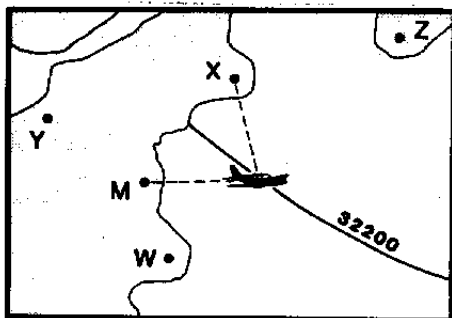
The unit electronically "plots" this LOP by measuring the TD between the arrival of the signal from the Master station and the arrival of the signal from the station X-ray.
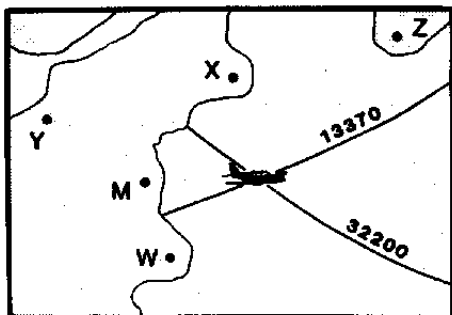
A fix is where the two LOPs intersect.

Each chain is assigned a time code called a **Group Repetition Interval** (GRI). The GRI is the time between the start of the Master station pulses and the beginning of the next series of Master pulses, and is measured in microseconds (usec.). For example, the U.S. West Coast chain is 9940, meaning the Master station pulse group repeats every 99,400 microseconds.

The accuracy of a fix is determined by the combination of receiver limitations, signal condition, and the operator. LORAN-C accuracy is affected somewhat by weather, terrain, power lines, and mineral deposits. The signal travels the greatest distance with a minimum of distortion over seawater or flat terrain and in clear weather.

Two types of accuracy are considered, **Repeatable Accuracy** and Absolute Accuracy.

TRANSMITTED POWER vs. RECEPTION DISTANCE
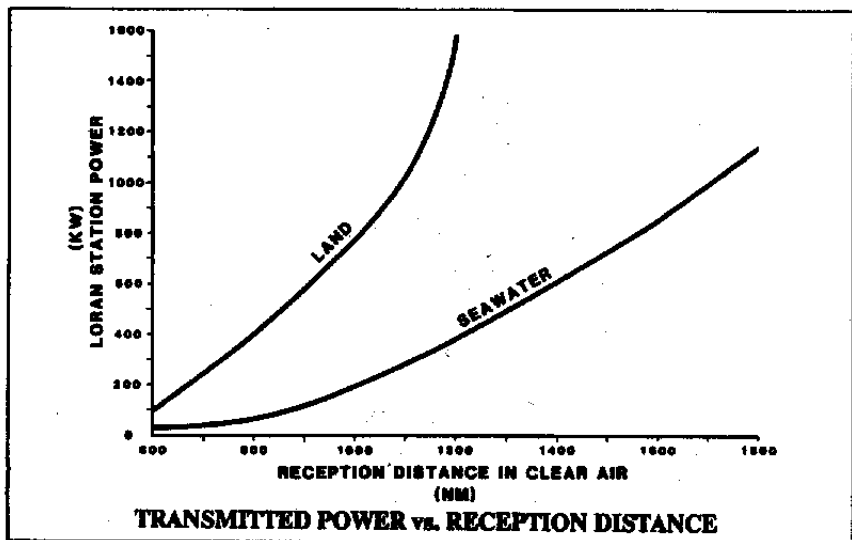
Absolute accuracy simply describes the ability of the system to determine geographic position. *Repeatable accuracy* refers to the ability to return to the same position. For example, imagine you've made a flight to another airport. Upon arrival, the accuracy of your displayed position would be based on *absolute accuracy*. Now suppose you return to your starting airport, that is, you fly to the same latitude/longitude that was "known" to your Loran when you departed. Now, the accuracy of your navigation system is "repeatable." Absolute accuracy, which varies (depending on condition) between 0.1 and 2.5 nautical miles, is less precise than repeatable accuracy, which typically varies less than .01 nautical miles.

One reason for varying accuracy is due to the aircraft's position within the triad. If the two LOPs cross each other so that the angle between them is approximately 90 degrees, the accuracy is optimum. However, if this **Crossing Angle** is less than 20 degrees, the resulting fix is less accurate.

An imaginary line between the Master station and a Secondary is called a **Baseline**. The crossing angles near a baseline will be good, but the crossing angles near a **Baseline Extension,** shown as dashed lines in the drawing below, will be poor. The crossing angles within a Loran C coverage area will vary, but reasonable accuracy is available anywhere within the coverage area.

All LORAN transmitters operate on the same 100KHz frequency, and the receiver picks up a maze of pulses from the Master and secondaries in many chains. A unit in the U.S. is likely pick-up signals from many of the

LORAN-C CROSSING ANGLES
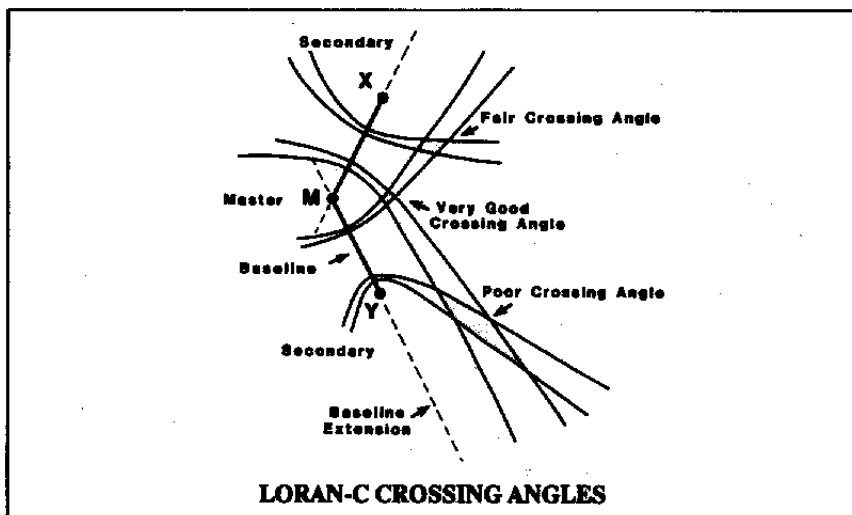
LORAN transmitters on the continent. The signals are actually pulses, which are all virtually identical. No pulse has a unique "signature" that identifies it as having come from a specific chain.

The receiver uses a rather complex strategy to "pick out" the desired pulses among the various pulses and background noise it's receiving, and to find the proper tracking point on the pulses. When the unit is in motion the process becomes more complex because the TDs between the Master and the secondaries are constantly changing. Once all the stations have been acquired, the unit must select the best triad. While these initialization processes are taking place in your Apollo LORAN, the WARN indicator will be lighted.

LORAN PULSE

NOTES:

NAVIGATION

NAVIGATION

APOLLO® 618

Note
Characters against a white background in the displays depicted
in the Training Manual indicate the characters are flashing.

FINDING YOUR PRESENT POSITION

Your Apollo 618 has the remarkable ability to "know" its precise location, but first it must be receiving a triad within a LORAN-C chain. Triad selection is automatic, but the LORAN chain must be selected by the pilot. Since LORAN chains cover vast areas, many pilots switch chains infrequently. From an operational standpoint, changing chains is similar to changing frequencies on a conventional radio, and it may be useful to think of it in these terms; however, keep in mind all LORAN signals are transmitted over the same 100 kHz frequency. Selecting a chain is actually selecting the Group Repetition Interval (GRI), i.e. the repetition rate of the Master station signal pulses.

Note
If in any of the exercises you get confused and wish to start over, press MODE until you enter the mode you want to work in. If you are working anywhere in the WPT mode, press MODE once and you'll enter the beginning of WPT mode. After that, pressing MODE will change the mode.

START-UP

1. **Power** - ON
   The entire information display is be lighted momentarily. The name of the current GRI will then appear briefly, after which the WARN light will be flashing. The WARN light turns solid once the unit has found the Master and two secondaries, "telling" you the acquisition process is proceeding normally. This process usually takes about 30 seconds, but to insure a high degree of accuracy, the unit spends additional time

"watching" the signal. You may use the unit for navigation once the WARN light goes out, which generally takes from two to four minutes after power-up. You may continue with this example WITHOUT waiting for the WARN light to go out.

2. **MODE - SETUP**

The page depicting the name and GRI of the currently selected chain appears momentarily, and then the unit will automatically display the page depicting the GRI on the top line.
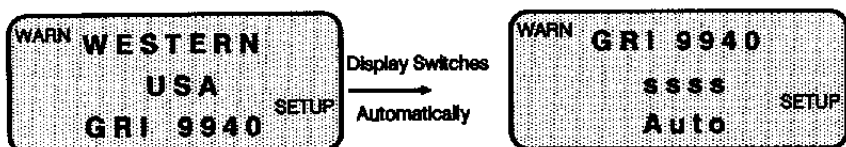
Display Switches → Automatically

Note

Each "s" indicates the unit is conducting a search to acquire a signal from the appropriate station in the chain. After each station signal has been acquired, the "s" changes to a small letter (except for the Master, which is always represented by a capital letter). When a triad is selected (either automatically or manually) the small letter representing each selected station will change to a capital letter. The Master (M) will always be in the triad.

3. **SEL - PRESS**

The display depicting the name of the currently selected chain reappears, and the GRI numbers flashes.

White background indicates characters are flashing

4. **SMALL KNOB** - TURN to display desired GRI.
   The GRI for your area may be found in the LORAN CHAINS section.
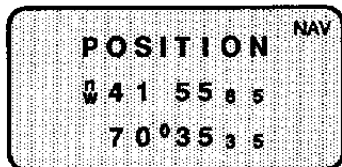   The North East chain is depicted below.

```
┌─────────────────────────┐
│ WARN                     │
│     N O R T H            │
│                          │
│     E A S T  U S A       │
│                    SETUP │
│     G R I  │9 9 6 0│     │
└─────────────────────────┘
```

5. **ENT** - PRESS
   The display depicting the GRI on the top line reappears, and "Auto"
   (Automatic triad selection) flashes. You are leaving the "Auto"
   setting. Manually selecting a triad is discussed in the SETUP MODE
   section.

```
┌─────────────────────────┐
│ WARN                     │
│     G R I   9 9 6 0      │
│                          │
│        S  S  S  S  S     │
│       │A U T O│   SETUP  │
└─────────────────────────┘
```

DISPLAYING PRESENT POSITION

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display Position page.

```
┌─────────────────────────┐
│                      NAV │
│    P O S I T I O N       │
│                          │
│    N 4 1   5 5 6 5       │
│                          │
│     7 0°3 5 3 5          │
└─────────────────────────┘
```

Note

If the WARN light is still on, the displayed position is the last position "known" to the LORAN when it was turned off. Therefore, if the unit is in the same location as it was when it was turned off (as is normally the case), it will accurately display your position, provided it had accurately determined a position before it was turned off. While this may be useful, because the displayed present position is accurate under these circumstances, keep in mind the unit cannot calculate a position until it has acquired a signal, selected a triad, and the WARN light has gone out. If the unit is in a new location since it was last turned off, be sure the WARN light is out before continuing.

DEFINING A COURSE

Suppose you would like to fly from your present position to Denver, CO (airport identifier--DEN).

1. **MODE - WPT**
   The last database used is the first database displayed when you reach WPT mode. In the example below, assume the last database was PILOT COPY DATABASE.

```
┌─────────────────────────┐
│  ┌──────────┐           │
│  │ P I L O T│    WPT    │
│  │ C O P Y  │           │
│  └──────────┘           │
│   DATABASE              │
└─────────────────────────┘
```

2. **SMALL KNOB or LARGE KNOB** - TURN to display the NORTH AMERICA DATABASE.
   All the databases (depicted below) may be displayed by turning the SMALL KNOB. Each database name flashes. The DEN listing is contained in the NORTH AMERICA DATABASE.

```
                    ┌──────────────────┐
                    │ ┌───────┐        │
                    │ │ PILOT │  WPT   │
                    │ │ COPY  │        │
                    │ └───────┘        │
                    │  DATABASE        │
                    └──────────────────┘

┌──────────────────┐                      ┌──────────────────┐
│ ┌────────┐       │        ( ○ )         │ ┌────────┐       │
│ │ NEAREST│  WPT  │                      │ │ NORTH  │  WPT  │
│ │WAYPOINT│       │                      │ │AMERICA │       │
│ └────────┘       │                      │ └────────┘       │
│  DATABASE        │                      │  DATABASE        │
└──────────────────┘                      └──────────────────┘

      ┌──────────────────┐        ┌──────────────────┐
      │ ┌────────┐       │        │ ┌─────────┐      │
      │ │ PILOT  │  WPT  │        │ │SEABASE/ │  WPT │
      │ │CREATED │       │        │ │HELIPORT │      │
      │ └────────┘       │        │ └─────────┘      │
      │  DATABASE        │        │  DATABASE        │
      └──────────────────┘        └──────────────────┘
```
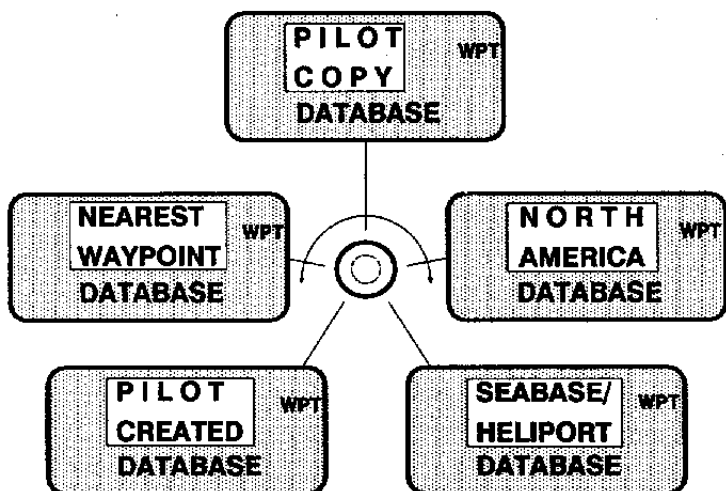
Note

The final character in the identifier for a PILOT CREATED DATABASE waypoint is always ^{C}*R, for a SEABASE "s", for a HELIPORT "h", NDB "n", and a VOR "v".*

3. **ENT** - PRESS

   The prompt LOOK FOR APT ID appears. APT ID, which stands for "Airport Identifier," flashes. Since the NORTH AMERICA DATABASE is very large, containing over 20,000 waypoints, it saves time when the unit can restrict its search to a specific type of waypoint, either an airport identifier, a city name, a VOR, an NDB, or an intersection. In this example you're looking for an airport identifier, so the displayed search selection, APT ID, is correct.

```
┌─────────────────────────┐
│  LOOK FOR  WPT          │
│ │APT    ID│             │
│  ─ ─ ─                  │
└─────────────────────────┘
```
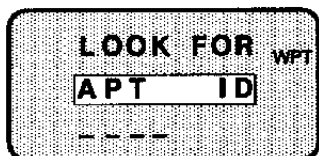
4. **ENT** - PRESS

   APT ID stops flashing, and a line in the first space in the bottom row begins to flash.

```
┌─────────────────────────┐
│  LOOK FOR  WPT          │
│  APT    ID              │
│ ⊟─ ─                    │
└─────────────────────────┘
```
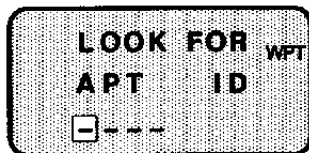
5. **SMALL KNOB** - SCROLL to display a flashing "D" in the bottom, left space.

```
┌─────────────────────────┐
│  LOOK FOR  WPT          │
│  APT    ID              │
│ D ─ ─                   │
└─────────────────────────┘
```
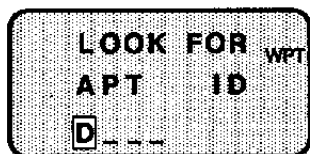
6. **ENT** - PRESS
   The "D" stops flashing , and the line to the right of the "D" flashes.

7. **STEPS 5 & 6** - REPEAT to enter the "E", "N" and "_".
   The "_" you entered "tells" the unit there's no fourth character in the identifier. The unit now locates and displays the listing for DEN.

```
DEN CO     WPT
DENVER
086°  859
```
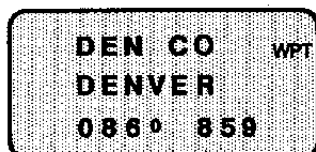
8. **TO** - PRESS
   The unit automatically switches to the NAV mode Flightplan page, displaying DEN as the "To" waypoint. Also, DEN is automatically be copied into the PILOT COPY DATABASE.

9. **FRM** - PRESS twice within one second. This defines your present position as your departure point. You have now defined a direct course to DEN.

Note

Normally you will select your present position as your departure waypoint; however, there are times when you may want to use a database waypoint as your departure point. If the WARN light is still on and the LORAN is not in the same location as it was when it was turned off, it may be more expedient to use the appropriate database listing for your departure waypoint rather than wait for the WARN light to go out and use present position. When using a database waypoint it isn't necessary to wait for the WARN light to go out before defining your departure waypoint. You enter a departure waypoint exactly as you do a destination waypoint, except you press FRM instead of TO.

NOTES:

SEARCHING DATABASES

You will normally use the LOOK FOR feature when searching the NORTH AMERICA DATABASE because scrolling such a large database would be too time-consuming; however, once you display a NORTH AMERICA DATABASE entry, you may scroll to "surrounding" identifier (according to alphanumeric order) entries with the LARGE KNOB.

In other databases you may use either LOOK FOR or scroll with the LARGE KNOB. Unless the PILOT COPY and PILOT CREATED Databases have a considerable number of entries, it will probably be easier to scroll with the LARGE KNOB than to use LOOK FOR.

When using LOOK FOR in any database except NORTH AMERICA, the step selecting and entering the type of waypoint (airport identifier, city, VOR, NDB, intersection) is not applicable and will be omitted.

If you wish to restore the last waypoint identifier you displayed using LOOK FOR, press ENT when the LOOK FOR page is displayed.

LOOK FOR always searches for waypoints that begin with the sequence you've entered. You may enter just the first character (or characters) in the sequence, and the unit displays the first listing found that begins with the character you've entered. You may then scroll the LARGE KNOB to the waypoint you're looking for.

If searching for a name that is longer than the eight characters it's possible to enter, only enter the first eight characters. If entering a city name that's more than one word, do not enter a space between the words.

NOTES:

INTERPRETING NAV PAGES

The NAV pages may be edited as explained in SETUP MODE. The default (factory) NAV pages are depicted below. Many pilots find the default pages very useful without editing.

The following list depicts and explains each line that may appear on a display. NAV pages may be customized in SETUP MODE. (See page S - 11). When customizing, any combination of display lines, in any order, may be selected to appear on a NAV display.
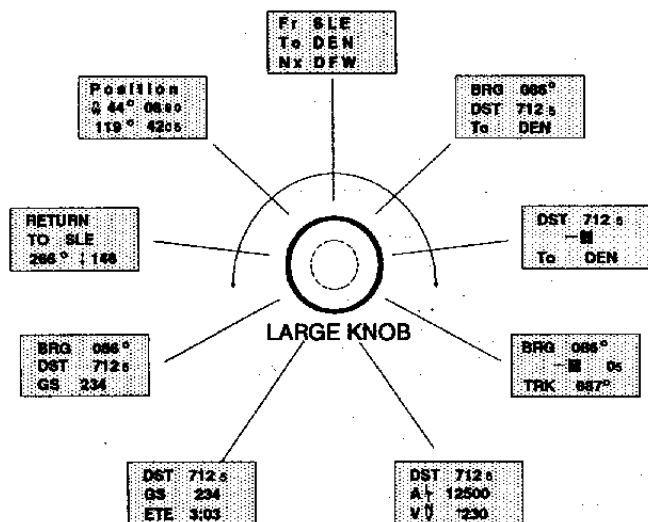
Display Line	Interpretation
To DEN	First leg destination identifier.
BRG 086°	Magnetic bearing from present position to destination.
DST 7125	Distance from present postion to destination. (In this example the distance is 712.5nm.)

-II   05   CDI display. In this example the course
                                       is to the left 0.5 miles. The numerical
                                       display is shown on the opposite side
                                       from the direction of the bar graph.
                                       When automatic XTD SENS (Cross
                                       Track Sensitivity, i.e., CDI Sensitivity) is
                                       selected, the sensitivity of the CDI
                                       automatically increases when you're
                                       within one nautical mile of your course.
                                       This feature is fully explained in the
                                       SETUP MODE section.

TRK   087°   Ground Track.

A⥮ 12500   To display your altitude, the unit MUST
                                       be connected to a II Morrow encoding
                                       altimeter and the altimeter setting
                                       checked. Setting the altimeter is
                                       discussed later in this section.

V⥮   2500   If your unit is NOT connected to a
                                       II Morrow encoding altimeter, begin
                                       your decent when this display matches
                                       your cruise altitude. To maintain your
                                       descent profile, adjust your descent so
                                       that your decent so that your altimeter
                                       matches the displayed altitude.

V⥮   230 ↓   If your unit IS connected to a II Morrow
                                       encoding altimeter, the unit will display
                                       the direction and amount of altitude
                                       change to maintain your present profile.
                                       Adjusting your target altitude and glide
                                       slope angle is discussed later in this
                                       section.

GS 234	Ground Speed
ETE 3:03	Estimated Time Enroute
ᴿₜ BRG 340	Bearing to return to the departure waypoint. (This line is not included in the default pages.)
ᴿₜ DST 127	Distance to return to the departure waypoint (This line is not included in the default pages.)
ᴿₜ TO SLE	Departure waypoint identifier. (This line is not included in the default pages.)

Note:
A blank line may also be selected.

The pages below may not be customized.

Fr SLE   NAV ◄──────── Departure identifier
To DEN ◄──────── First leg destination identifier
Nx SNA ◄──────── Second leg destination identifier

RETURN   NAV
TO SLE ◄──────── Departure identifier
266° 146

Distance from departure point
Direction (relative to aircraft) to departure point. For arrow to be displayed, unit must have calculated track (TRK).
Bearing to departure point

Position   NAV
44° 08 90 ◄──────── Your present Latitude
119° 42 05 ◄──────── Your present Longitude

Each of the default pages is designed to give information pertaining to specific phases of flight.

Examples:

This page defines either a one or two-leg flight.
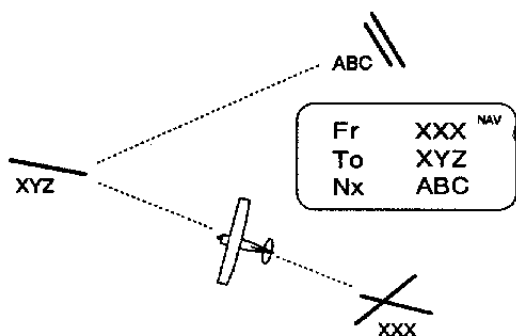
This page is very useful when lining-up with a runway. In the illustration below, continue on 270 degrees until the BRG is 300 degrees, then turn to 300 degrees. Press FROM twice to setup a straight-in course to runway 30.
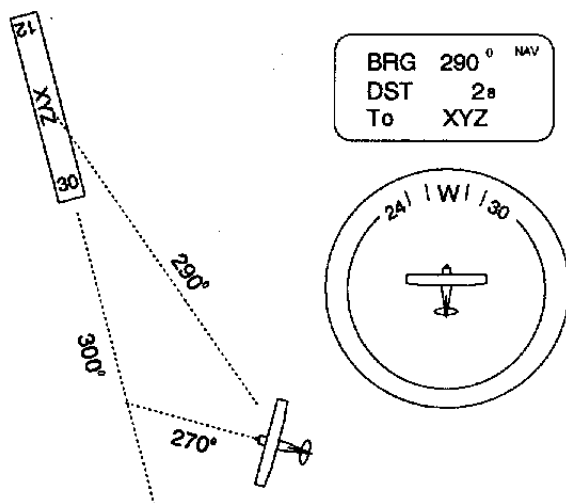
This page is particularly useful for enroute navigation.
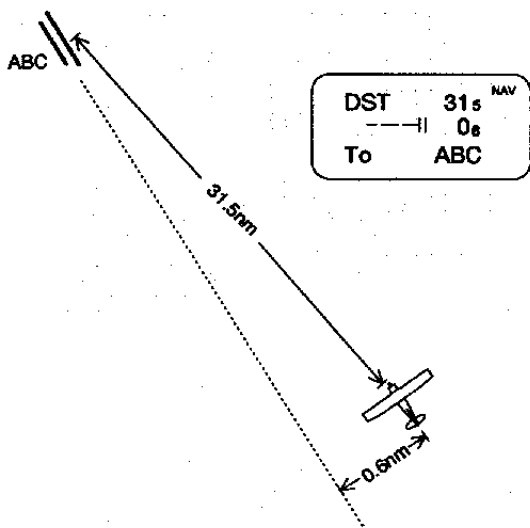
This page is useful for intercepting a course and fine-tuning your heading. In the illustration below, the aircraft is flying a heading of 270 degrees to intercept the 300 degree BRG to the destination. When the BRG approaches 300 degrees, turn 30 degrees right of your present heading to establish a track of 300 degrees.

```
┌─────────────────────┐
│ BRG   295°  NAV     │
│      ─┤  0₅         │
│ TRK      270        │
└─────────────────────┘
```

Intercepting a course
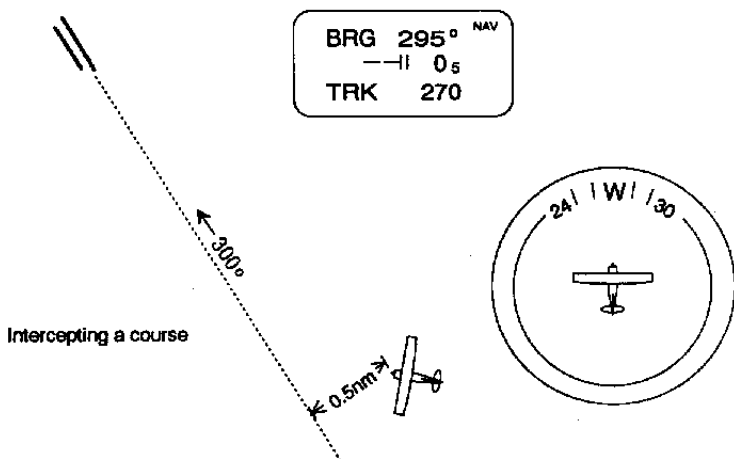
In the illustration below, the aircraft heading is 290 degrees and maintaining a TRK of 295 degrees. The desired track is 300, so the pilot should alter the heading slightly to the right to fly the desired course.

```
┌─────────────────────┐
│ BRG   301°  NAV     │
│ 0₁    ⊢             │
│ TRK      295        │
└─────────────────────┘
```

Wind →

Fine tune your heading
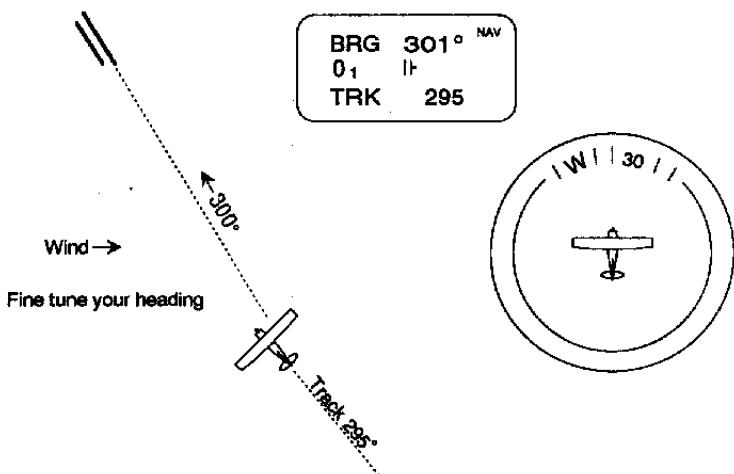
This page is used in descent planning and progress. The example below depicts VNAV with the optional II Morrow encoding altimeter installed.
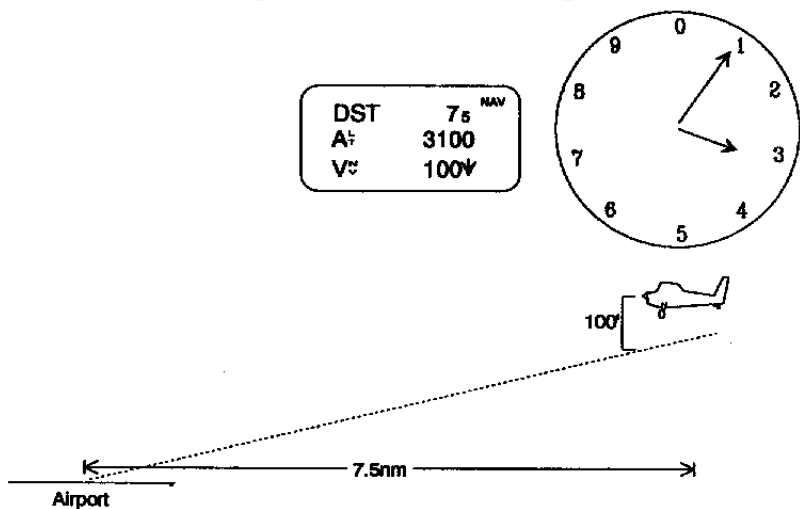
This page is useful in keeping track of your progress.
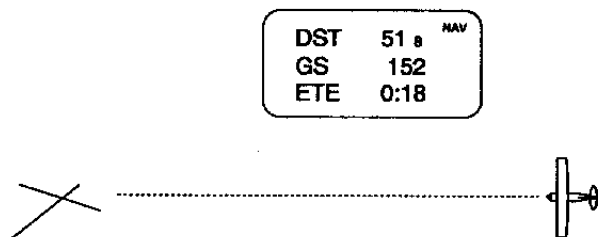
This page is useful when you want to return to your departure point.
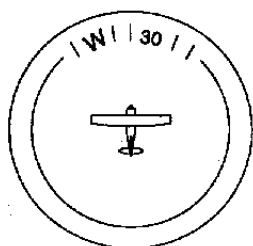

```
RETURN      NAV
TO  XYZ
290°    9₁
```
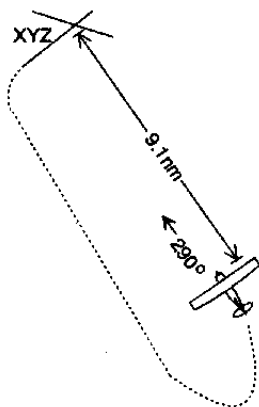
CREATING A WAYPOINT

Most commonly used waypoints are contained in the Apollo 618's extensive database; however, there may be times when you wish to create your own waypoint. The PILOT CREATED DATABASE is for this purpose, and you may create and store up to 500 waypoints in nonvolatile memory.

Note
If at anytime you get confused and want to start over, press MODE once to enter the beginning of WPT mode.

Suppose you want to create a waypoint over Mary's Peak, a peak in the central Oregon coast range.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT CREATED DATABASE.

```
┌─────────────────┐
│ PILOT     WPT   │
│ CREATED         │
│ DATABASE        │
└─────────────────┘
```

3. **ENT** - PRESS

4. **LARGE KNOB** - TURN ONE INCREMENT COUNTERCLOCKWISE to display ENT TO CREATE NEW WPT page. "ENT TO CREATE A NEW WAYPOINT" is at both ends of the PILOT CREATED DATABASE.

```
┌─────────────────┐
│  ENT TO   WPT   │
│  CREATE         │
│  NEW WPT        │
└─────────────────┘
```
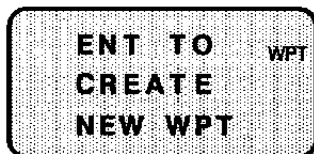
5. **ENT - PRESS**
   A prompt asking if you want to create a phantom waypoints appear.
   Creating a phantom waypoint is discussed later in the section.

```
 PHANTOM  WPT
 NO — SEL
 YES — ENT
```

6. **SEL - PRESS**
   Your present position is entered and assigned a numerical identifier.
   If this is the first entry you've made in your PILOT CREATED
   DATABASE, the assigned identification number is 001. The first
   number in the identifier flashes. You may elect to leave this number
   as the waypoint identifier, but it is generally easier to remember a
   waypoint if you assign it a name. In this example, use MRY (Mary's
   Peak) for your waypoint identifier.

   Note
   MRY is also the identifier for Monterey, CA (in the NORTH
   AMERICA DATABASE), but since ^{C}R is always the fifth
   character (and cannot be changed) in a PILOT CREATED
   DATABASE entry, the two waypoints can still be distinguished.

```
 [0]01  C_R    WPT
 045° 21.00
 122° 18.20
```

7. **SMALL KNOB** - SCROLL to display a flashing "M".

```
 [M]01  C_R    WPT
 045° 21.00
 122° 18.20
```
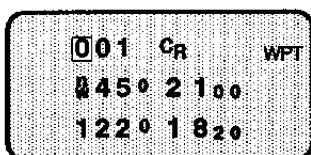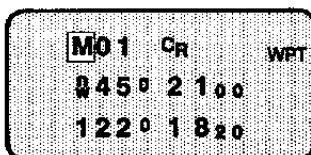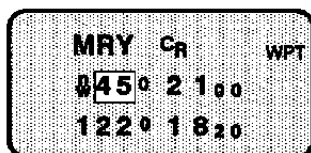
8. ENT - PRESS
    The "M" stops flashing, and the character to the right of the "M" will
    flash.
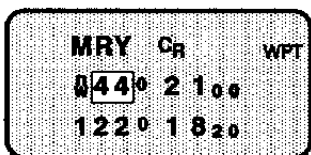
9. **Steps 7 & 8** - REPEAT to enter the "R", "Y" and "_".
    The degrees latitude flashes. The latitude at Mary's Peak is 44 degrees,
    30.20 minutes.

```
┌─────────────────────────┐
│   MRY  C_R        WPT    │
│  0 4 5° 2 1 00          │
│  1 2 2° 1 8 20          │
└─────────────────────────┘
```

10. **SMALL KNOB** - SCROLL to display 44 degrees latitude.

```
┌─────────────────────────┐
│   MRY  C_R        WPT    │
│  0 4 4° 2 1 00          │
│  1 2 2° 1 8 20          │
└─────────────────────────┘
```

11. **ENT** - PRESS
    44 stops flashing, and the latitude minutes display to the right of 44
    flashes.

12. **SMALL KNOB** - SCROLL to display 30 minutes latitude.

13. ENT - PRESS
    30 stops flashing, and the hundredths of a minute display to the right
    of 30 flashes.

14. **SMALL KNOB** - SCROLL to display 20 hundredths of a minute
    latitude.

15. **ENT** - PRESS

16. **Steps 10-15** - REPEAT to enter the longitude for MRY ^{C}R.
    The longitude at Mary's Peak is 123 degrees, 32.90 minutes. After the longitude is entered, the hemisphere display flashes. The globe is divided into the hemispheres depicted below. All of the US is in the North and West hemispheres (North latitude and West longitude).
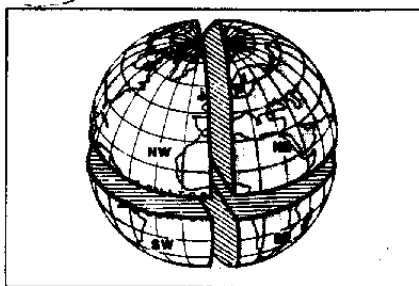
17. **SMALL KNOB** - TURN to display the NW (Northwest) hemisphere if the NW hemisphere is not already displayed.
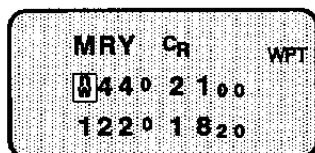
18. ENT - PRESS
    The waypoint is sorted alphanumerically, with letters before numbers, in the PILOT CREATED DATABASE. If you wish to create another waypoint, press MODE and the PILOT CREATED DATABASE page is displayed. You may not want to keep MRY^{C}R in your PILOT CREATED DATABASE, and a later example shows how to delete it.

Note.
Once the desired editing is accomplished, it is not necessary to press ENT repeatedly to fix the remaining values. For example, if you wished to edit only an identifier, and not the associated coordinates, you could press MODE or scroll LARGE KNOB immediately after editing the identifier.

CREATING A WAYPOINT USING PRESENT POSITION

The fastest and most accurate way to create a waypoint in your PILOT CREATED DATABASE is to enter the waypoint when you are actually at the waypoint location (either in the air or on the ground). You created a waypoint using your present position when you first created the MRY^{C}R waypoint, before you edited the latitude and longitude.

Since the repeatable accuracy of LORAN-C is more precise than its absolute accuracy (see "LORAN-C Terms" and "How LORAN-C Works" in the Introduction section), it's likely your entry is more accurate if you create a waypoint from your present position than if you use latitude/longitude coordinates from a chart.

Shortcut To Creating Waypoints Using Present Position

If you are planning to create waypoints while in flight, be sure the PILOT CREATED DATABASE is the last database used. This will eliminate having to turn to the PILOT CREATED DATABASE after entering WPT Mode.

After entering WPT Mode, press ENT, ENT, SEL. The waypoint will be created using your present position and will be assigned a numerical identifier. If you want to quickly create another waypoint, press MODE, ENT, ENT, SEL. This procedure allows you to quickly create a string of waypoints without taking time to give them names until the procedure is completed.

NOTES:

COPYING WAYPOINTS

The PILOT COPY DATABASE is a place to store any waypoints you intend to use. You may want to copy not only destination waypoints, but intersections and NAVAIDs near your destination as well. You may copy from any of the other databases into the PILOT COPY DATABASE.

Note
It's recommended all waypoints planned for use be copied into the PILOT COPY DATABASE. Reference waypoints for PHANTOM waypoints and entries made directly from the NAV Flightplan page can be made only from the PILOT COPY DATABASE.

Suppose you want to copy the LAX VOR (Los Angeles International VOR) and MRY ^C_R (the waypoint you created in the previous example) into your PILOT COPY DATABASE.

1. **MODE - WPT**

2. **SMALL KNOB or LARGE KNOB - TURN** to display the NORTH AMERICA DATABASE.

3. **ENT - PRESS**

4. **SMALL KNOB - TURN** to display flashing "VOR".

```
┌─────────────────────────┐
│                         │
│   L O O K  F O R  WPT    │
│  ┌─────┐                 │
│  │V O R│                 │
│  └─────┘                 │
│   _  _  _                │
│                         │
└─────────────────────────┘
```
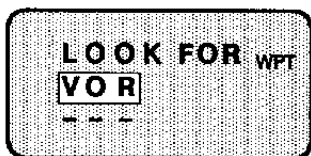
5. **ENT - PRESS**

6. **SMALL KNOB - TURN** to display a flashing "L".

7. **ENT - PRESS**

8. **Steps 6 & 7** - REPEAT to enter the "A" and "X".
   The LAX VOR listing is displayed.

   ```
   LAX v   CA  WPT
       113 6 0
   14 1 0   694
   ```
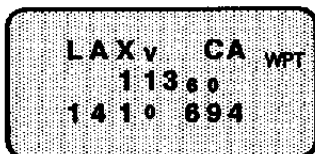
9. **ENT - PRESS**
   Pressing ENT with any waypoint displayed "tells" the unit to copy the waypoint. A message confirming the waypoint is copied appears briefly, and the waypoint is again displayed.

10. **MODE - WPT**
    Pressing MODE once causes you to enter the beginning' of WPT mode.

11. **SMALL KNOB** - TURN to display the PILOT CREATED DATABASE.

12. **ENT - PRESS**

13. **LARGE KNOB** - TURN to display the MRY ^{C}R entry.
    Pressing SEL instead of turning the LARGE KNOB would have allowed you to LOOK FOR the waypoint as you did in the NORTH AMERICA DATABASE; however, until there are a number of entries in your PILOT CREATED DATABASE, it's probably faster to scroll the LARGE KNOB to display the waypoint.

14. **ENT - PRESS**
    The waypoint is copied. A later example will show how to delete this entry from your PILOT COPY DATABASE.

CREATING A PHANTOM WAYPOINT

Suppose you would like to create a waypoint 20 miles from the LAX VOR on the 315 radial. You must have copied the LAX VOR in the previous example into the PILOT COPY DASTABASE before proceeding with this example.

Note
Any PILOT CREATED waypoint may be created as a PHANTOM WAYPOINT.

1. **MODE - WPT**

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT CREATED DATABASE.

3. **ENT - PRESS**

4. **LARGE KNOB** - TURN one increment counter clockwise to display ENT TO CREATE NEW WPT.

5. **ENT - PRESS**
   The prompt asking if you wish to create a PHANTOM waypoint appears.

6. **ENT - PRESS**
   The reference waypoint flashes.

```
REF  [- - - -]  WPT
RAD   000°
DST   000°
```

7. **SMALL KNOB** - TURN to display LAXv.

```
R E F  [LAXv]  WPT
R A D   000°
D S T   000°
```
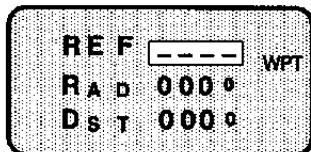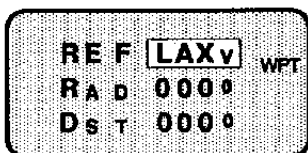
8. **ENT** - PRESS
   The first radial digit will flash.

```
R E F   LAXv   WPT
R A D  [0]00°
D S T   000°
```

9. **SMALL KNOB** - TURN to display "3".

```
R E F   LAXv   WPT
R A D  [3]00°
D S T   000°
```
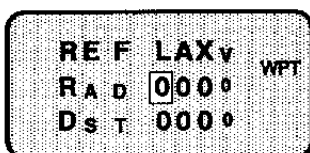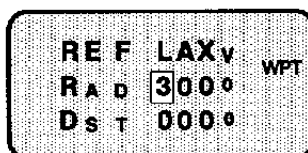
10. **ENT** - PRESS
    "3" stops flashing and the digit to the right of the 3 will flash.

11. **SMALL KNOB** - TURN to display "1".

12. **ENT** - PRESS
    "1" stops flashing and the digit to the right of the 1 will flash.

13. **SMALL KNOB** - TURN to display "5".

14. **ENT** - PRESS
    The first distance digit flashes.

15. **SMALL KNOB** - TURN to display "0", if "0" is not already displayed.

16. **ENT** - PRESS

17. **SMALL KNOB** - TURN to display "2".

18. **ENT** - PRESS

19. **SMALL KNOB** - TURN to display "0".

20. **ENT** - PRESS
    The tenths of a mile digit will flash.

21. **SMALL KNOB** - TURN to display "0".

22. **ENT** - PRESS
    The PHANTOM waypoint is created. Edit the identifier, as in the
    CREATING A WAYPOINT example, to read LV20. Once you have
    edited the identifier you may press MODE to enter the beginning of
    WPT mode. Since the latitude and longitude coordinates are correct,
    it is not necessary to edit them or fix them by pressing ENT repeatedly.

NOTES:

USING FLIGHTPLAN PAGE

Introduction

The 618 software version 4.2 allows for a total of 20 waypoints in the flight plan feature. These 20 waypoints can be used to create a combination of smaller flight plans which can be left in place indefinately for future use. The current destination waypoint (the current leg) is indicated by an arrow "--> " pointing to it. Each of these smaller flight plans can be easily reversed or deleted.

Additionally, the method which the 618 uses to sequence from one waypoint to the next has been modified. While in the enroute mode, the current destination waypoint must be within 5 nm before the arrow will sequence to the next waypoint in the flight plan. Pushing the "APR/ENR" button will initiate the approach mode and the flight plan will only sequence if the destination waypoint is within 1 nm. (Please note that the 618 is for VFR use only). Also, while in the approach mode, the 618 will not triad change, so it is recommended that the enroute mode be used except in cases where the distance from one waypoint to the next is less than 5 nm.

All waypoints must be saved to the pilot copy database before they can be used in the creation of a flight plan. To save a waypoint to the pilot copy database, retrieve the desired waypoint in the Waypoint mode and press the "ENT" button an additional time to display the message "SAVED TO COPY DATABASE".

Entering Waypoints for a Flightplan

In the NAV mode, turn the large knob to display the flight plan page. Turn the small knob to display the desired position where you want to begin entering the new flight plan. Press "SEL" and turn the small knob to display your first waypoint. Pressing "ENT" will enter that waypoint and begin the next subsequent waypoint to flash. Continue to change the flashing waypoints with the small knob and entering the desired waypoint with the "ENT" button.

It is important to leave a "blank" waypoint in between each group of waypoints which comprise individual flight plans, this is how the 618 knows where one flight plan ends and the next begins.

Changing the Destination Waypoint (moving the arrow)

To manually move the arrow "-->" to a waypoint, turn the small knob so the desired destination waypoint is shown on the top line of the flight plan display. Press the "SEL" button to make it flash, then press the 'TO" button to make the arrow move to this waypoint. The 618 will now navigate to this waypoint.

When a waypoint is flashing, pressing the "ENT" button will make the next waypoint flash. Pressing the "SEL" button when the waypoint is flashing will display information about that waypoint.

Creating a Sample Flightplan

Suppose you want to fly from your present position to the LAX VOR to MRY C_R. Before proceeding, these waypoints must be in the PILOT COPY DATABASE.

1. MODE - NAV

2. LARGE KNOB - SCROLL to display flightplan page.
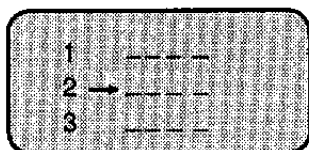
3. SMALL KNOB - TURN to desired position where you wish to begin entering the new flightplan.

NOTE:

It is important to note the location of the destination arrow. It may be located on a previously planned flightplan segment. In this case the arrow must be moved to the destination position before proceeding. To move the arrow, refer to Changing the Destination explained above.

4. FRM - PRESS TWICE within one second will select departure
waypoint (waypoint preceeding arrow) as your present position.

```
┌─────────────────┐
│  1   P P F R     │
│  2 ──▶ ─ ─ ─ ─   │
│  3   ─ ─ ─ ─     │
└─────────────────┘
```
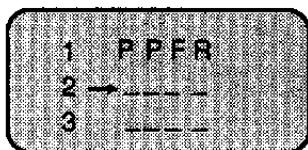
5. SMALL KNOB - SCROLL to position the "To" waypoint at the top
of the display (the arrow points to the "To" waypoint).

6. SEL - PRESS. The "To" waypoint flashes.

```
┌─────────────────┐
│  2 ──▶ ┌──────┐  │
│        └──────┘  │
│  3     ─ ─ ─ ─   │
│  4     ─ ─ ─ ─   │
└─────────────────┘
```

7. SMALL KNOB - TURN to display LAXv.

```
┌─────────────────┐
│  2 ──▶ │LAXv│    │
│  3     ─ ─ ─     │
│  4     ─ ─ ─     │
└─────────────────┘
```
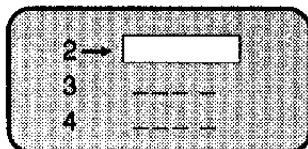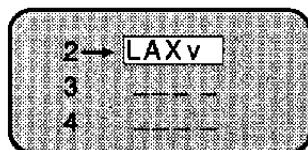
8. ENT - PRESS. The next waypoint flashes.

9. SMALL KNOB - TURN to display MRY $^C{}_R$.

```
┌─────────────────┐
│  2   LAXv        │
│  3 ──▶│MRY $^C{}_R$│ │
│  4   ─ ─ ─       │
└─────────────────┘
```
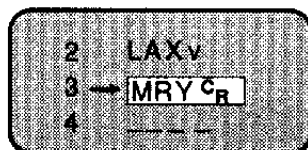
10. ENT - PRESS

11. Repeat steps 7 through 10 and enter each destination waypoint to complete the flightplan (up to 20 waypoints).

The NAV page now shows LAXv as your "To" waypoint. If you fly this route, after arriving at the LAX VOR, the ARIV (arrival) light will come on, and the waypoints will automatically sequence to MRY C_R.

Note

The ARIV light comes on when the aircraft is within 1 nautical mile per 100 knots of ground speed of your destination. One nautical mile is the minimum at which the ARIV light comes on.

DELETING FROM FLIGHTPLAN PAGE

Deleting Individual Waypoints

You are now deleting the waypoints you previously entered on the Flightplan page, MRY ^{C}R and LAXv. This does NOT delete them from any databases.

1. MODE - NAV

2. LARGEKNOB - TURN to display the Flightplan page.

3. SMALLKNOB - SCROLL to position the waypoint to be deleted, at the top of the display.

4. SEL - PRESS
    The selected waypoint flashes, in this case LAXv.

5. SMALLKNOB - SCROLL to display "- - -".
    "- - -" is at either end of the database.
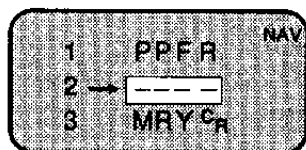
6. ENT - PRESS
    LAXv is deleted from the Flightplan. The flightplan automatically sequences, and MRY ^{C}R becomes the 'To" waypoint.
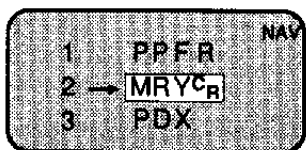
9. Repeat steps 4 through 6 to continue removing waypoints from the
    flightplan, or TURN the LARGE KNOB to stop.

Deleting the Active Flight Plan

While viewing the flight plan, turn the small knob counterclockwise
until the 618 displays "ENT TO DELETE FLT PLAN". Note that
pressing the "ENT" button will delete the flight plan that the arrow is
pointing at. If there are multiple flight plans entered, only the group of
waypoints which the arrow is pointing at will be deleted. If the arrow is
pointing at a "blank" waypoint, the message "NO WPTS IN FLT PLAN"
will be displayed.

1. MODE - NAV

2. LARGE KNOB - TURN to display the Flightplan Page.

3. SMALL KNOB - TURN counter clockwise to
    "ENT TO DELETE FLT PLAN".

4. ENT - PRESS to delete active flight plan.

```
┌─────────────────────┐
│   [ENT]   TO        │
│   DELETE            │
│   FLT PLN           │
└─────────────────────┘
```
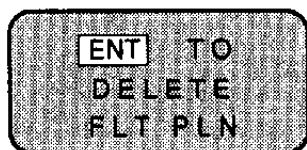
Reversing the Active Flightplan

To reverse the active flight plan (the group of waypoints which the
arrow is pointing at), turn the small knob clockwise to the display "ENT
TO REVERSE FLT PLAN". Pressing the "ENT" button will reverse
the order of the active flight plan. Any other inactive flight plans
(groups of waypoints which the arrow is not pointing at) will remain
unaffected. If the arrow is pointing at a "blank" waypoint, the message
"INVALID "TO -->" WAYPOINT" will be displayed.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display the Flightplan Page.

3. **SMALL KNOB** - TURN clockwise to "ENT TO REVERSE FLT PLAN".

4. **ENT** - PRESS to reverse active flight plan.
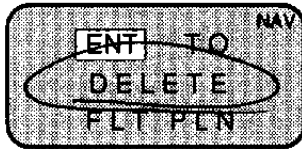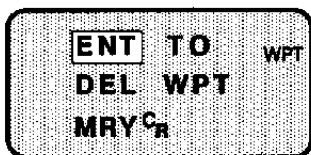
NOTES:

DELETING WAYPOINTS IN THE PILOT CREATED DATABASE

You now delete the waypoint you created in a previous example, MRY from the PILOT CREATED DATABASE. This automatically deletes the waypoint from the PILOT COPY DATABASE; however, deleting a waypoint from the PILOT COPY DATABASE does NOT delete it from any other database.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT CREATED DATABASE.

3. **ENT** - PRESS

4. **LARGE KNOB** - SCROLL to display the waypoint, MRY ^{C}R, or press SEL and use LOOK FOR to display the waypoint.

5. **SEL** - PRESS with the MRY ^{C}R waypoint displayed.
   The prompt, ENT TO DEL WPT appears.

```
┌─────────────────────┐
│  ┌───┐              │
│  │ENT│  T O    WPT  │
│  └───┘              │
│   DEL  WPT          │
│                     │
│   MRY ᶜ𝖱            │
└─────────────────────┘
```

6. **ENT** - PRESS
   The waypoint, MRY ^{C}R, is deleted from both the PILOT CREATED and PILOT COPY databases.

NOTES:

EDITING A PREVIOUSLY CREATED WAYPOINT

If you wish to edit a waypoint you have stored in the PILOT CREATED DATABASE, follow the procedure for deleting a PILOT CREATED waypoint, except in step 5, press SEL a second time to display ENT TO EDIT WPT. You may then edit the waypoint in the same manner as when creating a new waypoint.

NOTES:

DELETING IN THE PILOT COPY DATABASE

You are now deleting a waypoint you copied in a previous example, LAXv, from the PILOT COPY DATABASE.

1. **MODE - WPT**

2. **SMALL KNOB or LARGE KNOB** - TURN to display the PILOT COPY DATABASE.

3. **ENT - PRESS**

4. **LARGE KNOB** - SCROLL to display LAXv, or press SEL and use LOOK FOR to display the waypoint.

5. **SEL - PRESS**
   The prompt, ENT TO DEL WPT, appears.

6. **ENT - PRESS**
   The waypoint is deleted from the PILOT COPY DATABASE.

Note
A waypoint that is being used in the Flightplan cannot be deleted.

NOTES:

DUPLICATE NDB IDENTIFIERS

There are no duplicate identifiers within any one state in the NORTH AMERICA DATABASE with the exception of a small number of NDBs, all of which have two-letter identifiers. Anytime you access an NDB with a two-letter identifier, check to be sure you've found the one you wanted. If another NDB exists with the same identifier, it exists "next door" in the database. You may access it by turning the LARGE KNOB one increment.

NOTES:

DISPLAYING INFORMATION

The NORTH AMERICA DATABASE contains all U.S. public-use airports, all intersections with five alpha-character designators, all VORs and NDBs, all public-use heliports and seaplane bases, and all major military bases. Also, information such as the longest runway length, all ATIS frequencies, tower frequencies, VOR frequencies, NDB frequencies, and ground frequencies are contained in this database.

CAUTION
All three-character military base identifiers are bracketed by a heavy bar (Example: ▮ SUU ▮). Four-character military identifiers are displayed with ▮ after the last character in the identifier. Do not land at a military base unless you have an emergency or prior approval.

NOTES:

INTERPRETING INFORMATION

Begin by displaying the NORTH AMERICA DATABASE LISTING FOR LAX (Los Angeles International Airport).

1. **MODE** - WPT

2. **SMALL KNOB** - TURN to display the NORTH AMERICA DATABASE.

3. **ENT** - PRESS

4. **ENT** - PRESS again to select APT ID.

5. **SMALL KNOB** - SCROLL to display a flashing "L".

6. **ENT** - PRESS

7. **Steps 6 & 7** - REPEAT to enter the "A", "X", and "_".
    The LAX listing is displayed.

Note

The entire LAX listing contains a considerable amount of information. When a waypoint is first located in a database, only the first (top) three lines of the listing are displayed. The entire LAX listing is depicted on the following page in the left column. An explanation of each item in the list is shown in the column on the right. Think of the three line display on the unit as a "window" over this list. If you turn the SMALL KNOB one increment clockwise, the window will move down three lines; turn it one increment counterclockwise, and the window will move up three lines. If the window is already at the top of the list, and you turn the SMALL KNOB counterclockwise (up), it will "circle" to the bottom of the list. If the window is already at the bottom of the list, and you turn the SMALL KNOB clockwise (down), it will circle to the top of the list. Pressing "SEL" will cause the first information page to be displayed.

"Window"

LAX CA **LOSANGLE** 175 1214	Identifier and State City Bearing and Distance from your position
ATIS 13565 13380	ATIS frequencies
U 12295	Unicom Frequency
TWR 13390 11960	Tower frequencies
TWR 120 9 5	
GND 12165 12175	Ground control frequencies
CLR DEL 12140	Clearance Delivery frequency
APP/DEP 12520 12430	Approach and Departure frequencies
APP/DEP 1285 0 124 9 0	
APP/DEP 124 5 0	
ILS 1111 0 11170	ILS frequencies
ILS 108 5 0 109 9 0	
RUNWAYS 7L/25R 7R/25L	Displayed in descending order, longest first Runway 7 Left/25 Right Runway 7 Right/25 Left

RUNWAYS	
6R/24L	Runway 6 Right/24 Left
6L/24R	Runway 6 Left/24 Right

12000 L	Longest rwy 12,000' (rounded down to nearest 100'); L = lighted.
PAVED	Runway surface paved (NOT PAVD = not paved)
ELV 126	Airport Elevation 126'

FUEL YES	Fuel is available

LAX CA	Identifier and state
33°5655	Latitude
118°2443	Longitude

LAX has a full-time tower, so there is no CTAF page displayed, but a typical example is shown below.

CTAF	Common Traffic Advisory Frequency
12290	

Note

CTAF is for use when Tower or Unicom operations are closed, or do not exist.

Turning the LARGE KNOB allows you to display "nearby" (according to alphanumeric order) listings in the NORTH AMERICA DATABASE. For example, if you are viewing LAX and you turn the LARGE KNOB clockwise one increment, you are displaying the listings for LA01 (Basile, LA). When viewing LAX, turn the LARGE KNOB one increment counterclockwise, you are displaying the listings for LAW (Lawton, OK). Note that all waypoints are sorted in alphanumeric order according to IDENTIFIER. Therefore, the listing for Newport, OR is not in the "Ns", but rather in the "Os", because the airport identifier is ONP.

NOTES:

INTERPRETING NAVAID INFORMATION

The information available on Navaids and intersections is depicted below. VORs are all listed together alphanumerically in the database as are NDBs and intersections. For example, if you locate a VOR entry, the entries "surrounding" it will also be VORs. Each NAVAID listing is two pages long. All NDBs have "n" after the final character in the identifier, and all VORs have "v" after the final character in the identifier.

Note

NAVAID displays depict bearing to, not radial from, the NAVAID. The only time the unit recognises a Radial From is when defining a PHANTOM WPT as a Radial From a reference point.

NAVAID

UBGv OR	Identifier and State
11740	Frequency
343 92	Bearing and Distance from your position

UBGv OR	Identifier and state
45° 2120	Latitude
122° 5862	Longitude

INTERSECTION

ACORN TX	Identifier and State
093 1512	Bearing and Distance from your position

ACORN TX	Identifier and state
31° 5537	Latitude
095° 1780	Longitude

NOTES:

SEARCHING BY CITY

Suppose you wanted to find information on Newport, OR, but you did not know the airport identifier was ONP.

Note
The NORTH AMERICA DATABASE is sorted alphanumerically according to identifier, not city.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display NORTH AMERICA DATABASE.

3. **ENT** - PRESS

4. **SMALL KNOB** - TURN to display city.

5. **ENT** - PRESS

Note
If you wanted to restore the name of the last city you searched for, press ENT again. With the name restored, pressing ENT once more will initiate the search. Press "SEL" to go to the desired character to change.

6. **SMALL KNOB** - SCROLL to display "N".

7. **ENT** - PRESS

8. **Steps 6 & 7** - REPEAT to enter the E, W, P, O, R, T, _.
   The first waypoint found is Newport, VT, instruct the unit to continue its search.

9. **SEL - PRESS**
   CONTINUE LOOKING FORWARD is displayed.

```
CONTINUE WPT
LOOKING
FORWARD
```

Note
You normally search the database FORWARD according to
alphanumeric order; however, if you wish to display a waypoint
you previously elected to pass-up, you may select BACKWARD
with the SMALL KNOB after completing Step 9.

10. **ENT - PRESS**
    This time the search locates the listing for Newport, ME, and again
    you must instruct the unit to continue its search.

11. **SEL - PRESS**

12. **ENT - PRESS**
    This time the search locates the listing for Newport, AR, continue the
    search.

13. **SEL - PRESS**

14. **ENT - PRESS**
    The unit displays the listing for Newport, Oregon.

```
ONP     OR WPT
NEWPORT
226°  48
```
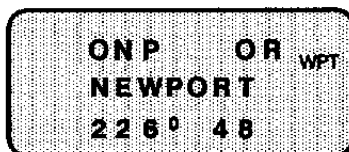
15. **SMALL KNOB** - TURN to display additional information on Newport,
    OR (ONP).

NOTE
Names like "Los Angeles" must be entered without the space
between the words

SEARCHING FOR A NAVAID OR INTERSECTION

After selecting the LOOK FOR feature in the NORTH AMERICA DATABASE, turn the SMALL KNOB to display either NDB, INTERSEC, or VOR, as required, and execute the search according to the waypoint identifier.

NOTES:

ABBREVIATED SEARCHES

At times you may not know the entire identifier for a waypoint, or you may not know the spelling of a city name. Also, you may not want to enter all the characters in a long city name, or the city name may contain more than the eight characters it is possible to display. The unit always "searches" for matches that begin the same as the sequence you've entered.

Suppose you're planning a flight to Syracuse, KS, but you're not sure how to spell the city name, and you don't know the airport identifier.

1. **MODE** - WPT

2. **SMALL KNOB** - TURN to display the NORTH AMERICA DATABASE.

3. **ENT** - PRESS

4. **SMALL KNOB** - TURN to display "CITY".

5. **ENT** - PRESS

6. **SMALL KNOB** - SCROLL to display "S".

7. **ENT** - PRESS

8. **Steps 6 & 7** - REPEAT to enter Y, R, _.
   The first city found is Syracuse, NY. Instruct the unit to continue its search.

9. **SEL** - PRESS
   CONTINUE LOOKING FORWARD appears.

10. **ENT** - PRESS
    The listing for Syracuse, KS is displayed.

NOTES:

EMERGENCY SEARCH WITH SAFE - GLIDE™

IMPORTANT

EMERGENCY SEARCH WITH SAFE - GLIDE™ may be a valuable resource in an actual emergency; however, the information it provides should be considered advisory. The course of action a pilot chooses in an emergency should be based on the existing conditions. EMERGENCY SEARCH DOES NOT "CONSIDER" TERRAIN. The unit has no way of "knowing" if a mountain or other obstruction lies between you and an airport. Also, the unit DOES NOT CONSIDER WIND.

SAFE - GLIDE™ is incorporated in the EMERGENCY SEARCH Feature. When EMERGENCY SEARCH WITH SAFE - GLIDE™ is used, the airports are ordered according to the altitude and distance required to reach the them. For example, an airport with an elevation of 2,500 ft MSL may be the closest to your location; however, an airport with an elevation of 500 ft MSL, while being somewhat further, may require less altitude to reach it. In this case, SAFE - GLIDE™ prioritizes the airports so that the airport at 500 ft MSL displays first. Before using EMERGENCY SEARCH WITH SAFE - GLIDE™, the feature must be set in SETUP MODE. (See the SETUP MODE section.)

Using Emergency Search With Safe - Glide ™

Without II Morrow encoding altimeter:

| APR
(AIRPORT
REFERENCE
POINT) | RUNWAY
THRESHOLD |

----------- = ALTITUDE REQUIRED

.... = AIRCRAFT GLIDE PATH
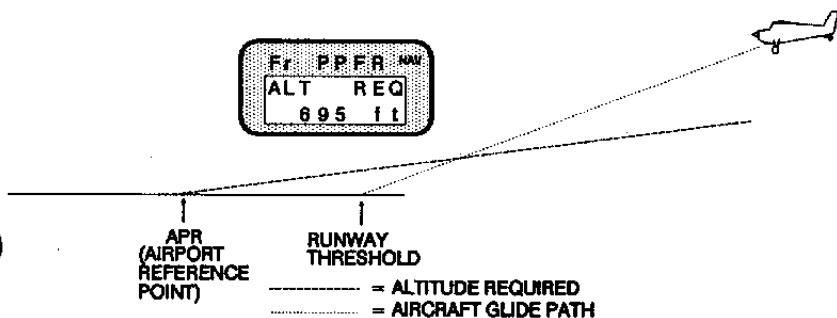
1. **APR/ENR & ENT** - PRESS simultaneously.
   After searching for the nearest waypoints, the altitude required to glide to the first airport is displayed on the top line. The length of the longest runway is displayed on the middle line, and the bearing and distance are displayed on the bottom line. Press SEL to view airport identifier, state, and city name. To view information on the displayed airport turn the small knob. If the runway length at the first airport is insufficient or the airport is otherwise undesirable, turn the LARGE KNOB cw to display the next airport. While viewing information, if you want to return to the first information page for the airport, press SEL.

Display alternates between ALT & REQ.

Meaning: altitude required to glide to the airport

Bearing   Distance

Length of longest runway
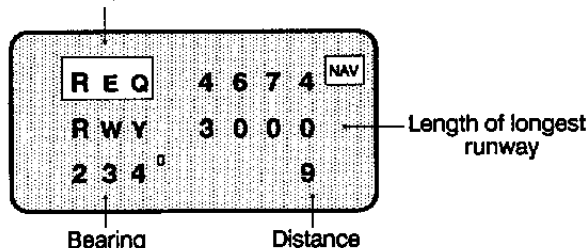
IMPORTANT

Your glidepath is based on the information defined in SETUP Mode. SAFE - GLIDE™ DOES NOT CONSIDER WIND; however, as you glide toward the airport the ALTITUDE REQUIRED display will be continuously updated so you can monitor your progress. You should periodically check the required altitude as you proceed, especially if you have a headwind component. During your approach, if the aircraft's altitude becomes less than the required altitude, the airport is out of range; however, during final approach the required altitude is above the aircraft's altitude because SAFE - GLIDE™ brings the aircraft to the Airport Reference Point, not to the runway threshold.

If you want to exit Emergency Search without defining an emergency airport as your To waypoint, press APR/ENR and ENT simultaneously. (If you do not wish to exit Emergency Search, and you want to navigate to the displayed airport, continue with step 2).

2. **TO** - PRESS

   The unit switches to NAV mode and the emergency airport is the To
   waypoint. The SAFE - GLIDE™ information periodically displays
   over the NAV pages.

```
┌─────────────────────────┐
│   Fr    P P F R   NAV   │
│  ┌──────────────────┐   │
│  │ A L T      R E Q │   │
│  │     3 7 2    f t │   │
│  └──────────────────┘   │
└─────────────────────────┘
```
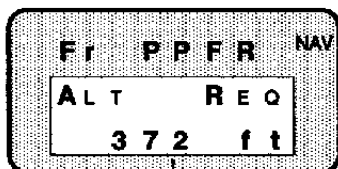
Periodically flashes over NAV page

3. **MODE** - PRESS

   ENT TO DISABLE SAFGLIDE appears. This is to allow you to
   disable SAFE - GLIDE™ if you are not in an engine-out emergency.
   (If you do not wish to exit Safeglide, Press MODE four times to
   re-enter NAV Mode).

                                 NOTE
          Changing the Flightplan disables SAFE - GLIDE™

```
┌─────────────────────────┐
│  ┌─────┐         NAV    │
│  │E N T│      T O       │
│  └─────┘                │
│   D I S A B L E         │
│   S A F E G L I D       │
└─────────────────────────┘
```

4. **ENT** - PRESS

   SAFE - GLIDE™ displays are discontinued.

With II Morrow encoding altimeter:

MARGIN
(HOW FAR THE AIRCRAFT
COULD GLIDE BEYOND THE APR)
1.1 nm   GLIDE OK

                                              TOO FAR

        APR   RUNWAY
        (AIRPORT   THRESHOLD
        REFERENCE   ---------- = BEST GLIDE (DEFINED IN SETUP MODE)
        POINT)   .... = AIRCRAFT GLIDE PATH
                         ---------- = POSSIBLE GLIDE
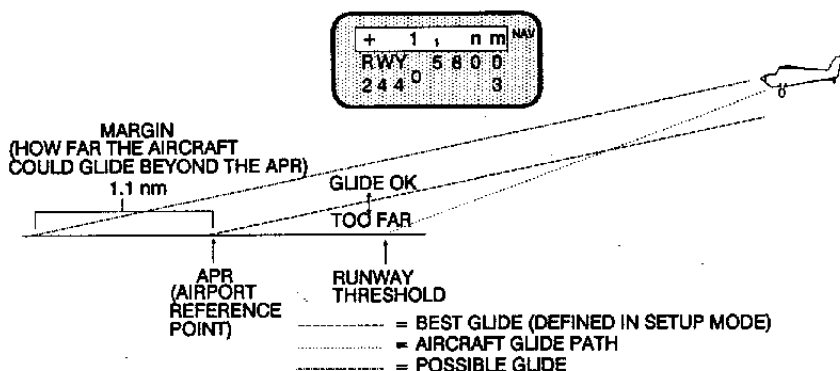
1. **APR/ENR & ENT** - PRESS simultaneously.
   After searching for the nearest waypoints, the length of the longest
   runway is displayed on the middle line, and the bearing and distance
   is displayed on the bottom line. If the displayed airport is within the
   gliding range of the aircraft GLIDE OK appears on the top line. This
   display alternates with a display showing how far (proceeded by a "+"
   sign) the aircraft could glide after reaching the airport. If the airport
   is out of range, TOO FAR appears and alternates with the distance
   (proceed by a "- " sign) the aircraft would land short of the airport.
   Press SEL to view airport identifier, state, and city name.   To view
   information on the displayed airport turn the small knob. If the runway
   length at the first airport is insufficient or the airport is otherwise
   undesirable, turn the LARGE KNOB cw to display the next airport.
   While viewing the airport identifier, state, and city name, press SEL to
   again view the GLIDE OK/TOO FAR page. If the Identifier/State/City
   page is displayed, and the airport is out of range, the city name flashes.

Indicates aircraft will glide 3.7 nm beyond airport.

Indicates airport is within gliding range.

Top line of display alternates back and forth.
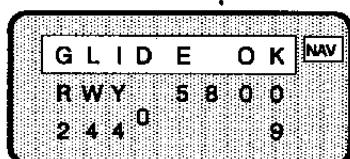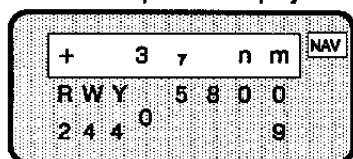
Indicates airport is 1.7 miles too far.

Indicates airport is too far.

Top line of display alternates back and forth.
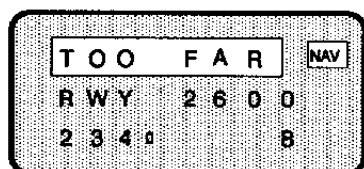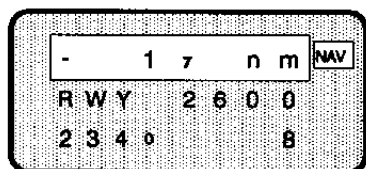
IMPORTANT

Your glidepath is based on the information you defined in SETUP Mode. SAFE - GLIDE™ DOES NOT CONSIDER WIND; however, as you glide toward the airport the GLIDE OK/TOO FAR display will be continuously updated so you can monitor your progress. You should periodically check this information as you proceed, especially if you have a headwind component. During your approach, if the aircraft's altitude becomes less than the required altitude, the airport is out of range, and TOO FAR appears. However, on short final approach TOO FAR may appear because the required altitude is above the aircraft's altitude. This is because SAFE - GLIDE™ brings the aircraft to the Airport Reference Point, not to the runway threshold.

If you want to exit Emergency Search without defining an emergency airport as your To waypoint, press APR/ENR and ENT simultaneously.

2. **TO - PRESS**
   The unit switches to NAV mode and the emergency airport is the To
   waypoint. The SAFE - GLIDE™ information periodically appears
   over the NAV pages.

```
┌─────────────────────────┐
│   F r   P P F R   NAV    │
│   +    0 2    n m        │
│   G L I D E    O K       │
└─────────────────────────┘
```

Periodically flashes with NAV page

3. **MODE - PRESS**
   ENT TO DISABLE SAFGLIDE appears. (If you do not wish to exit
   SAFE - GLIDE™, press MODE as necessary to re-enter NAV Mode).

NOTE
Changing the flight plan disables SAFE - GLIDE™.

```
┌─────────────────────────┐
│   E N T      T O NAV     │
│   D I S A B L E          │
│   S A F E G L I D        │
└─────────────────────────┘
```
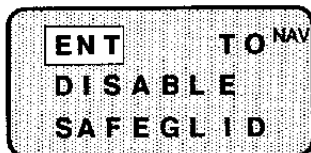
4. **ENT - PRESS**
   SAFE - GLIDE™ displays are discontinued.

ALTITUDE SELECT

This feature alerts you as your aircraft enters the selected altitude or if your aircraft strays above or below the selected altitude by a user-specified value. The unit must be connected to a II Morrow altitude encoder and the altimeter setting must be input. Also, the feature must be set in SETUP MODE. (See the SETUP MODE section.)

Using Altitude Select

Nav Mode Alert:

After setting-up Altitude Select (if Altitude Select is on), as you fly into the selected altitude range while in NAV or AIRSP Mode, ALTITUDE flashes on the bottom line of the NAV display and the buzzer (if connected and selected) sounds four double beeps. When leaving the selected altitude range, the alert ("Altitude" Flashing and buzzer beeping) continues until you acknowledge it by pressing ENT or return within the altitude range.

NOTE
Single beeps indicate the WARN light has come on. Double beeps indicate Altitude Alert.
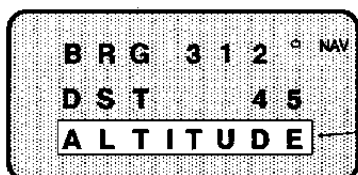
Flashes on NAV page until alert is acknowledged by pressing ENT.

Acknowledging An Alert:
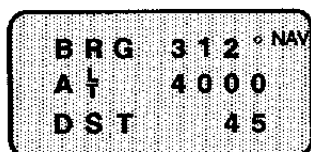
This procedure stops the alert.

1. ENT - PRESS
   The alert ceases.

Selecting a New Altitude Setting in NAV Mode:
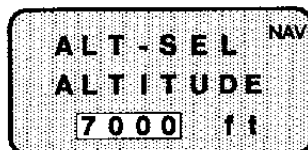
This procedure changes the Altitude Select setting while in NAV mode.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display any page except Present Position and Flightplan page.
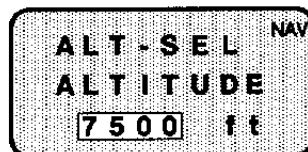
```
B R G    3 1 2 ° NAV
A L T      4 0 0 0
D S T         4 5
```

3. **SEL** - PRESS
   The ALT - SEL page appears and the current selected altitude flashes.
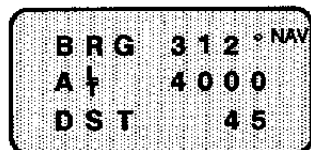
```
A L T - S E L   NAV
A L T I T U D E
   7 0 0 0    f t
```

4. **SMALL KNOB** - TURN to select the new altitude.

```
A L T - S E L   NAV
A L T I T U D E
   7 5 0 0    f t
```

5. **ENT** - PRESS
   The NAV page reappears, and the new selected altitude entered.

```
B R G    3 1 2 ° NAV
A L T      4 0 0 0
D S T         4 5
```

USING NAV PLANNER

Note

The primary purpose of NAV PLANNER is to display bearing and distance to a waypoint from a waypoint other than your present position. You may use NAV PLANNER to view bearing and distance from your present position provided your present position has been determined as the original waypoint; however, this information is on the bottom line of the first page of each waypoint listing. To use NAV PLANNER, the waypoints you are interested in MUST first be copied into the PILOT COPY DATABASE.

1. **MODE** - WPT

2. **SMALL KNOB or LARGE KNOB** - TURN to display PILOT COPY DATABASE.

3. **ENT** - PRESS

4. **LARGE KNOB** - SCROLL to display ENT FOR NAV PLANNER, located at both ends of the PILOT COPY DATABASE.

```
┌──────────────────────┐
│  ENT  FOR  WPT        │
│      NAV              │
│   PLANNER            │
└──────────────────────┘
```

5. **ENT** - PRESS
   The NAV PLANNER page is displayed.

```
┌──────────────────────┐
│  F r  SLE   WPT       │
│  To   PDX             │
│  0 0 4    4 4₂        │
└──────────────────────┘
```
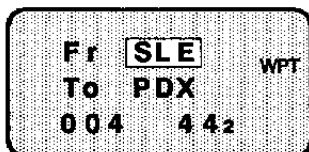
6. **SMALL KNOB** - SCROLL to display desired "Fr" waypoint.
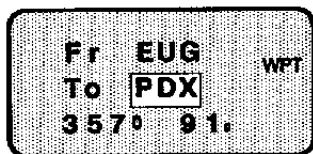
```
Fr  EUG   WPT
To  PDX
357°  91.
```

7. **ENT** - PRESS

8. **SMALL KNOB** - SCROLL to display "To" waypoint.
   The bearing and distance is displayed on the bottom line. You may scroll the SMALL KNOB to display bearing and distance to other waypoints in the PILOT COPY DATABASE.
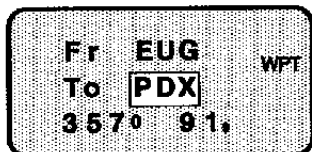
```
Fr  EUG   WPT
To  PDX
357°  91.
```

Displaying Information When Using NAV PLANNER

1. **Desired waypoint** - DISPLAY flashing identifier using NAV PLANNER feature.

2. **SEL** - PRESS

3. **SMALL KNOB** - SCROLL to display information.

4. **SEL** - PRESS to return to the NAV PLANNER page.
   If it is not on the first information page, press "SEL" twice to return to the NAV PLANNER page.

ALTIMETER AND VNAV SETUP

Note

Your unit MUST be connected to a II Morrow encoding altimeter, and the altimeter set before your altitude (ALT) is displayed. Since you may edit (customize) the NAV pages, it is possible to have your ALT and VNV read-outs on separate pages, or on the same page in the reverse order (from top to bottom) from the default (factory) page. If you have reversed the order of the read-outs, VNAV setup is enabled before SET ALTIMETER, the reverse of the order discribed here. Setting the altimeter is possible without the altitude encoder installed, but in this case no altitude information is available to the LORAN. If you have edited the default page so that VNV and ALT are on different pages, you are only able to adjust VNAV on the VNV page, and SET ALTIMETER on the ALT page. VNAV and ALTIMETER Setup is disabled when you are currently editing NAV pages.

To Set Altimeter

1. **MODE - NAV**

2. **LARGE KNOB** - TURN to display page with ALT.
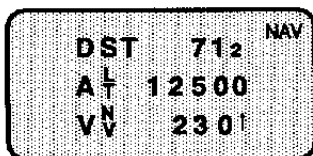
```
          DST    71₂  NAV
          A ᴸᵀ  12500
          V ᴺᵥ    230ı
```

3. **SEL - PRESS**
    Press SEL twice if the altimeter has already been set. ENT TO SET ALTIMETR is displayed.

```
          ENT   TO  NAV
              SET
          ALTIMETR
```

4. **ENT** - PRESS

```
SET   ALT ᴺᴬⱽ
   2992
A┼ 12500
```
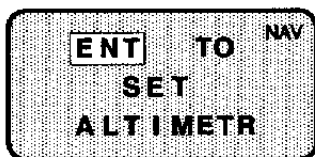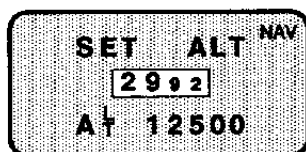
5. **SMALL KNOB** - SCROLL to set current altimeter setting or field elevation.

```
SET   ALT ᴺᴬⱽ
   3020
A┼ 12780
```
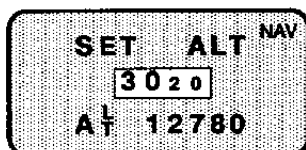
Note

When you turn the power on, the unit will note any change in the barometric pressure since it was shut off, provided your position has not changed and you do not acknowledge the altimeter setting until the WARN light goes out. The unit will automatically adjust the altimeter setting to maintain the previous elevation.
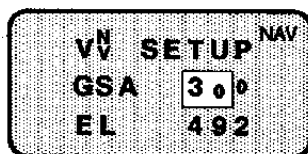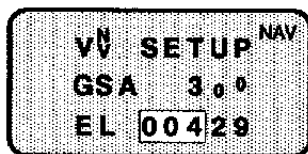
6. **ENT** - PRESS

To Adjust VNAV Settings

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display VNV page.

3. **SEL** - PRESS three times
    If your unit is not connected to a II Morrow encoder, only press SEL
    twice. ENT FOR VNAV SETUP is displayed.

```
 ┌─────────────────────┐
 │  [ENT]   FOR  NAV   │
 │    V N A V          │
 │    S E T U P        │
 └─────────────────────┘
```

4. **ENT** - PRESS

```
 ┌─────────────────────┐
 │  V ᴺᵥ  SETUP  NAV   │
 │  GSA   [2 5]        │
 │  E L     4 9 2      │
 └─────────────────────┘
```
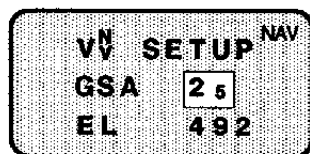
5. **SMALL KNOB** - TURN to adjust the desired GSA (Glide Slope
Angle). The possible settings range from 0.0 to 9.9 degress.

```
 ┌─────────────────────┐
 │  V ᴺᵥ  SETUP  NAV   │
 │  GSA   [3 0]⁰       │
 │  E L     4 9 2      │
 └─────────────────────┘
```

6. **ENT** - PRESS

```
 ┌─────────────────────┐
 │  V ᴺᵥ  SETUP  NAV   │
 │  GSA    3 ₀ ⁰       │
 │  E L  [0 0 4]2 9    │
 └─────────────────────┘
```

7. **SMALL KNOB** - TURN to adjust the first three EL digits. This defines
    the altitude you wish to descend to.

Note

When you are flying to an airport in the NORTH AMERICA DATABASE, the EL altitude is automatically set to the elevation of the destination airport.

8. **ENT** - PRESS

9. **Steps 7 & 8** - REPEAT to enter the remaining two EL digits.

Note

If your unit is connected to a II Morrow encoding altimeter, the ARIV light will flash approximately two minutes before reaching the Top of Descent Point. The ARIV light continues to flash for approximately 20 seconds.

CHANGING COURSE WHILE ENROUTE

Any number of factors, such as weather along your route of flight or ATC instructions, may cause you to deviate from your intended course. Once off course, it's often preferable to define a new course direct to your destination from your present position rather than return to your original course.

1. **FRM** - PRESS twice.
   Regardless of the mode you're in, the unit automatically inserts your present position as the departure waypoint, and switches to NAV mode.

NOTES:

LINING-UP WITH A RUNWAY

You may wish to line-up with a runway to execute a straight-in approach before you have the runway in sight. Suppose you are approaching your destination airport from the SE, without the airport in sight, and you would like to line-up with runway 30.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display BRG.

3. **Aircraft heading** - TURN to intercept the 300 bearing to your destination. In this example a heading of 270 would provide a 30 degree intercept angle.

4. **BRG display** - MONITOR, and when it approaches 300, complete Step 5.

5. **Aircraft heading** - TURN to 300.

6. **FRM** - PRESS twice within one second.
   You have defined a straight-in course to runway 30.
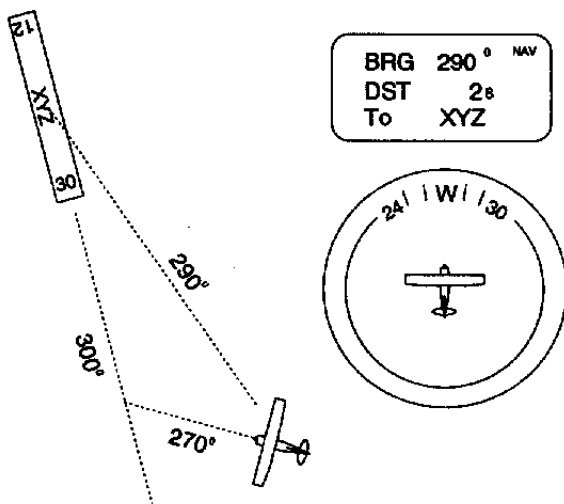
NOTES:

POSITION CALIBRATION

Due to local conditions, the NAV Position Display may be slightly in error. These errors are generally so small they are insignificant for normal operations. However, if highly precise navigation is called for, calibration factors (also called ASFs--Additional Secondary Phase Factors) may be entered.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display Position page.

3. **SEL** - PRESS
   "ALT POS?" (Alternate Position) flashes on the top line.
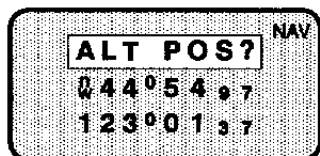
```
                    ┌─────────────┐ NAV
                    │  ALT  POS?  │
                    │ 044°54 9 7  │
                    │ 123°01 3 7  │
                    └─────────────┘
```

4. **SMALL KNOB** - TURN to display LAT CAL? (Latitude Calibration) or LON CAL? (Longitude Calibration), as required.

```
                    ┌─────────────┐ NAV
                    │  LAT  CAL?  │
                    │ N44°54 9 7  │
                    │ W           │
                    │ 123°01 3 7  │
                    └─────────────┘
```

5. **ENT** - PRESS

```
                    ┌─────────────┐ NAV
                    │ LAT  +0 0 0 │
                    │ N44°54 9 7  │
                    │ W           │
                    │ 123°01 3 7  │
                    └─────────────┘
```
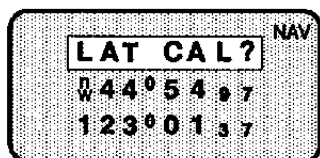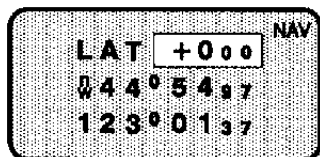
6. **SMALL KNOB** - TURN (clockwise for +, counterclockwise for -) to display the known latitude or longitude.

```
  LAT  +0o7   NAV
  044°54o4
  123°01o7
```
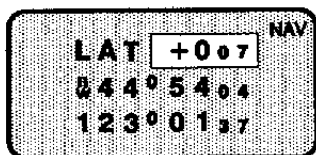
7. **ENT** - PRESS
   The ASF light is on as a reminder calibration factors are in use. To remove calibration factors, repeat the above procedure, selecting a calibration factor of "0" in step 6.

ALTERNATE SOLUTION

LOPs intersect in two locations, so there are two possible solutions to the unit's position calculations. Normally the unit is able to "determine" which solution is correct. On rare occasions, however, the unit may display the wrong solution. This error is usually quite easy to recognize because it is a considerable magnitude. The alternate solution is generally at least several hundred miles from your position. If the unit is displaying the wrong solution, you can manually select the correct solution.

1. **MODE** - NAV

2. **LARGE KNOB** - TURN to display Position page.

3. **SEL** - PRESS

```
          ┌─────────────────────┐ NAV
          │  ┌───────────────┐   │
          │  │ ALT  POS?     │   │
          │  └───────────────┘   │
          │   044° 5 4 9 7       │
          │   123° 0 1 3 7       │
          │                      │
          └─────────────────────┘
```
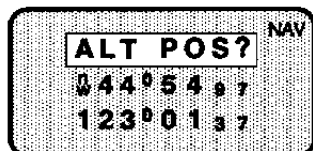
4. **ENT** - PRESS
   The other solution is displayed.

5. **ENT** - PRESS
   If you wish to use the displayed position.

NOTES:

NEAREST WAYPOINT SEARCH

1. **MODE - WPT**

2. **SMALL KNOB** - TURN to display NEAREST WAYPOINT DATABASE.

```
NEAREST    WPT
WAYPOINT
DATABASE
```

3. **ENT - PRESS**

```
LOOK  FOR  WPT
NEAREST
APT    ID
```

4. **SMALL KNOB** - TURN to display APT ID, INTERSEC, VOR, NDB, or CREATED.

```
LOOK  FOR  WPT
NEAREST
VOR
```

5. **ENT - PRESS**
The nearest waypoint will be displayed. Turning the LARGE KNOB clockwise will display the 25 nearest waypoints in succession, with the nearest first. If you wish to navigate to one of these waypoints, display the waypoint and press TO.

Note

If the WARN light is on, the unit cannot accurately determine your position. NEAREST WAYPOINT uses the last "known" position until the WARN light goes out.

AIRSPACE ALERT

The AIRSP light flashes when you are approaching or entering the following U.S. and Canadian airspace areas: TCAs, TRSAs, ARSAs, MOAs, Alert Areas, Prohibited Areas, Restricted Areas, CYAs, CYDs, CYRs, and Class C Control Zones. The configuration of AIRSP mode is depicted below.

Large Knob

Small Knob

ARSA 1 Beale AF 337 . 2	ARSA 2 Sacramen 163 . 6	MOA 3 Hummer 1 017 . 26	MOA 4 China 340 . 36	MOA 5 Maxwell 283 . 61
41 SFC	41 SFC	180 120	180 16AGL	180 110
SAC APP 120 . 119 .	SAC APP 127 . 119 .	OAK CTR CALL CTR OR FSS	OAK CTR CALL CTR OR FSS	OAK CTR CALL CTR OR FSS

SAC APP
124 .
125 .

↓
**1 to 4 pages
of frequencies**
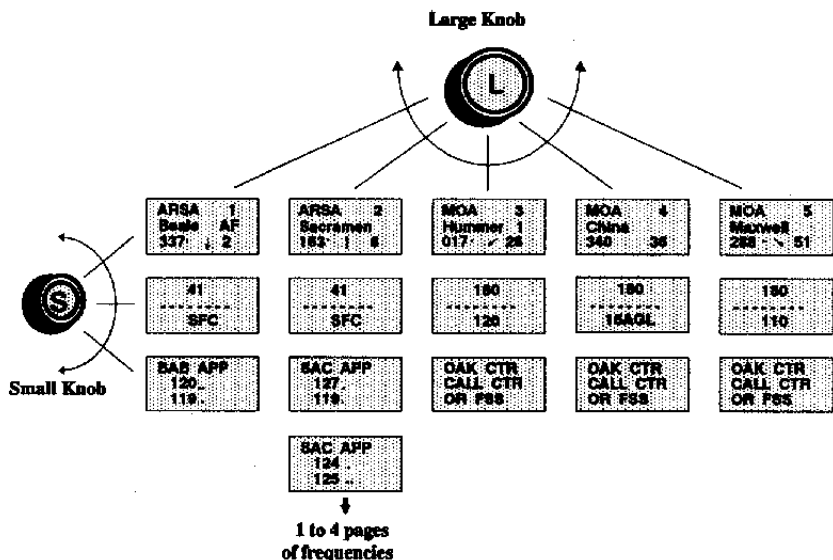
Distance and Altitude Buffers

Note
*Adjusting the Distance Buffer and Altitude Buffer is explained
in the SETUP MODE section of this manual. The unit comes
with factory settings in these buffers, so it is NOT necessary for
you to make any adjustments in SETUP mode before
proceeding with this example.*

The DISTANCE BUFFER defines the distance from airspace areas at which you would like to be alerted. If your unit is connected to a II Morrow encoding altimeter, an ALTITUDE BUFFER is also available. This tells

The DISTANCE BUFFER defines the distance from airspace areas at which you would like to be alerted. If your unit is connected to a II Morrow encoding altimeter, an ALTITUDE BUFFER is also available. This tells the unit the altitude above or below airspace areas that you would like the AIRSP light to come on. For example, if you were flying 1,200 ft above the ceiling of a TCA, and your ALTITUDE BUFFER were set at 1,000 ft, the unit does not bother you with an alert. If your altitude was 800 ft above the TCA, you would be alerted.

Note
The ALTITUDE BUFFER is not available unless your unit is connected to a II Morrow encoding altimeter.

T C A	⊢ Terminal Control Area
A R S A	= Airport Radar Service Area
T R S A	⊢ Terminal Radar Service Area
P R H B	= Prohibited Area
R S T R	= Restricted Area
A L R T	⊢ Alert Area
M O A	⊢ Military Operation Area
C Y A	= Canadian Alert Area
C Y D	⊢ Canadian Danger Area
C Y R	⊢ Canadian Restricted Area
CLASS C	⊢ Canadian Airport Class C Control Zone

Indicates you are IN the airspace.

ARSA I N 1
Sacramen
020° —   2   AIRSP

Name will flash until you press ENT to acknowledge the alert. (If name is longer than eight characters, press SEL to scroll name).

4 1
— — — — — — —   AIRSP
S F C

[SEL]
[ENT]

Saves new altimeter setting

S E T   A L T
2 9 ₉ ₂   AIRSP
A: 1 0 5 0 0

The small knob will slew the altimeter setting

A P P C O N
1 2 7 ₃₀
1 2 0 ₁₀   AIRSP

Controlling agency

Communication frequencies

A P P C O N
1 3 5 ₂₀   AIRSP

INTERPRETING AIRSPACE ALERT INFORMATION

Suppose you're making the flight depicted below, from Red Bluff (RBL), California to Cameron Airpark (O61), California. The approximate locations where you would receive airspace alerts have been assigned letters, and following those letters in the text is an explanation of the displays you would encounter. This depiction is based on the setting of 20nm in the DISTANCE BUFFER, and assumes the unit is either NOT connected to a II Morrow encoding altimeter, or that you're flying within the boundaries of the ALTITUDE BUFFER.
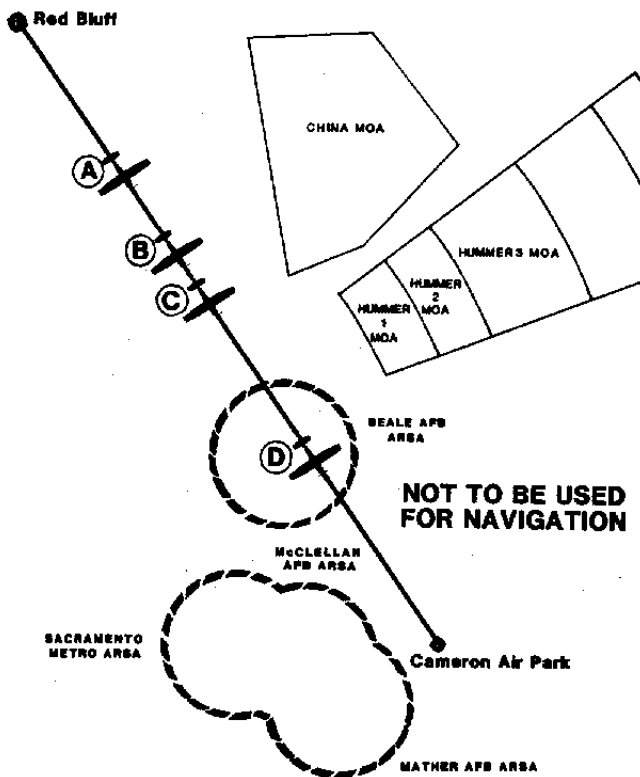
A. When your aircraft comes within 20nm of the China MOA, the AIRSP light alerts you by flashing. The AIRSP light will stop flashing only after you have acknowledged the alert by displaying the flashing airspace name and pressing ENT.

1. **MODE - AIRSP**
   The name of the airspace (CHINA) is flashing.

Type

Ranking - according to proximity to your position

Name

Distance from edge of airspace

Direction, relative to aircraft, towards closest edge of the airspace

Heading towards closest edge of the airspace
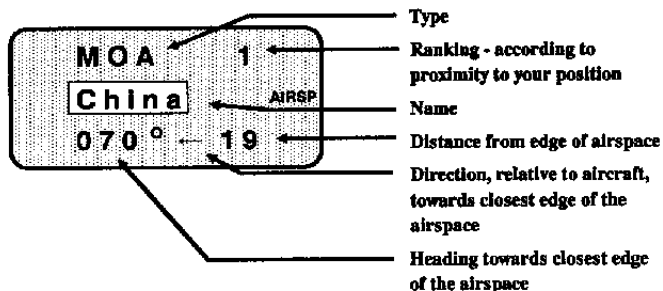
2. **ENT - PRESS**
   This acknowledges the alert. CHINA and the AIRSP light stop flashing.

3. **SMALL KNOB** - TURN for information.

Note
The unit displays an abbreviated name of the controlling agency for Restricted Areas, Alert Areas, and MOAs. Communication frequencies are displayed for ARSAs, TRSAs, and TCAs.

Resetting the II Morrow Encoding Altimeter

If while displaying information on CHINA MOA you wanted to change your altimeter setting, you could use the following procedure.

a. **SMALL KNOB** - TURN to display (in AIRSP mode) the page depicting the vertical boundaries of the airspace. This page is one click clockwise from the page displaying the name of the airspace.

```
        1 8 0

  - - - - ~ - - - AIRSP
      1 5 A G L
```
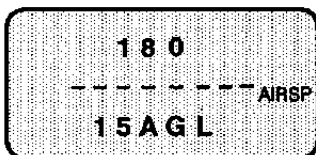
b. **SEL** - PRESS
SET ALT is displayed, and the current altimeter setting flashes.

```
     S E T    A L T  NAV
         2 9 9 2
      A T  1 0 5 0 0
```
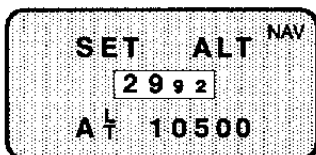
c. **SMALL KNOB** - SCROLL to display correct altimeter setting.

d. **ENT** - PRESS

4. **MODE** - NAV

B. Your proximity to BEALE AFB ARSA has activated the alert.

1. **MODE** - AIRSP
Since you are still closer to the CHINA MOA than to the BEALE AFB ARSA, the first page displayed is the CHINA MOA, but the name (CHINA) is not flashing because you have already acknowledged it.

2. **LARGE KNOB** - TURN one increment clockwise.
The BEALE alert page is displayed.

```
ARSA      2
Beale    AF AIRSP
124°    20
```
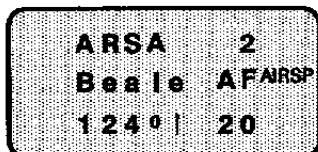
3. **ENT - PRESS**

Note

Normally, after you acknowledge an alert, the AIRSP light turns solid. However, if a new alert is detected while you're looking at a previous alert, the AIRSP light does NOT turn solid until the new alert is acknowledged as well. The AIRSP light continues to flash until all alerts are acknowledged. The unit can recognize up to a maximum of 9 alerts at one time.

4. **SMALL KNOB** - TURN to display information.

C. Suppose while you're looking at information on BEALE AFB ARSA, your proximity to HUMMER MOA triggers another alert. The AIRSP light, which had turned solid when you acknowledged the BEALE AFB ARSA, begins flashing again.

1. **LARGE KNOB** - TURN one increment clockwise.
You were diplaying the number 2 alert; therefore, this takes you to the new alert page, displaying HUMMER MOA as the number 3 alert area. Regardless of whether you're displaying information or viewing the main alert page, turning the LARGE KNOB clockwise displays the next alert, or counter-clockwise the previous alert.

Note

HUMMER MOA is made up of five areas, HUMMER 1, HUMMER 2,...HUMMER 5. The unit does NOT recognize these individual sections, but rather HUMMER 1-5 MOA as a whole. The altitude of the highest section is considered the top of the entire area, and the altitude of the lowest floor, the floor of the entire area.

2. **ENT** - PRESS

● **D.** A new alert is triggered by the SACRAMENTO METRO ARSA.

1. **MODE** - AIRSP

2. **LARGE KNOB** - TURN to display the SACRAMENTO ARSA.

```
A R S A        4
S a c r a m e n^AIRSP
1 6 4 °  ⁄  2 0
```
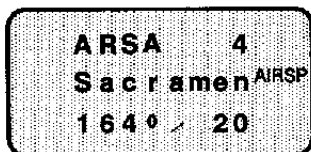
Note
Two other ARSAs are adjacent to the SACRAMENTO ARSA,
but the unit   recognizes all three ARSAs as the
SACRAMENTO ARSA.

● 3. **ENT** - PRESS

4. **SMALL KNOB** - TURN to display information.

Suppose while your viewing information on the SACRAMENTO ARSA, the CHINA MOA goes out of the range set in the DISTANCE BUFFER. The unit no longer considers CHINA MOA as one of the five closest areas, and no longer displays it in AIRSP mode. When you return to the alert page, the SACRAMENTO ARSA will be renumbered to indicate the new order.

```
A R S A        3
S a c r a m e n^AIRSP
1 6 5 °  ⁄  1 9
```
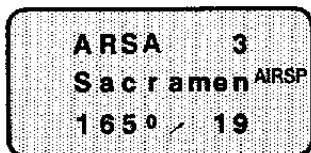
Note
Anytime the order, according to proximity to your position, of
the alert areas changes, they are automatically   renumbered
and rearranged according to the new order. If you are displaying
an area that drops out of range, the display, AREA OUT OF
RANGE, appears.

The inverted wedding cake detail of a TCA is not included in the Apollo 618 memory. Only the outer boundary and the ceiling of TCA's, ARSA's, and TRSA's are used for alert purposes to simplify the display and minimize the number of alerts the pilot must acknowledge. The surface is used as the floor of the entire area for all airport related special use airspace.

```
              ┌─────────────────────────┐
              │                         │
              │        T C A            │
              │                         │
              │    ┌─────────────┐      │
              │    └──────┌───┐──┘      │
              │          └───┘          │
──────────────┘                         └─────────────
```
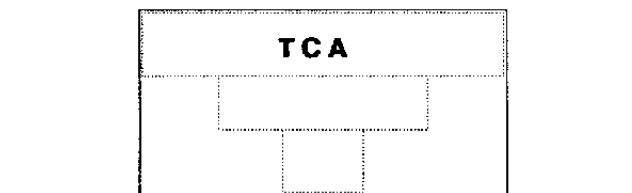
Some Restricted Areas and Military Operation Areas (MOA's) have a published floor above the surface.

```
        ┌─────────────────────────────────┐
        │                                 │
        │                                 │
        │        RESTRICTED  AREA         │
        │                                 │
        │                                 │
        └─────────────────────────────────┘
```
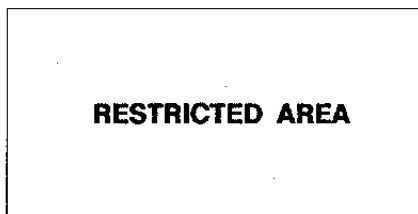
GENERAL

The SETUP Mode configuration is depicted below, and each display is paired with a page number so that an explanation of that display can easily be located in this section. The LARGE KNOB is used to scroll through the SETUP Mode pages. Some of the pages are not applicable to normal operations. The SERVICE DISPLAYS are normally meaningful only to service personnel. The SIGNAL INFORMATION displays are likewise not applicable to normal operations; however, if the pilot encounters an
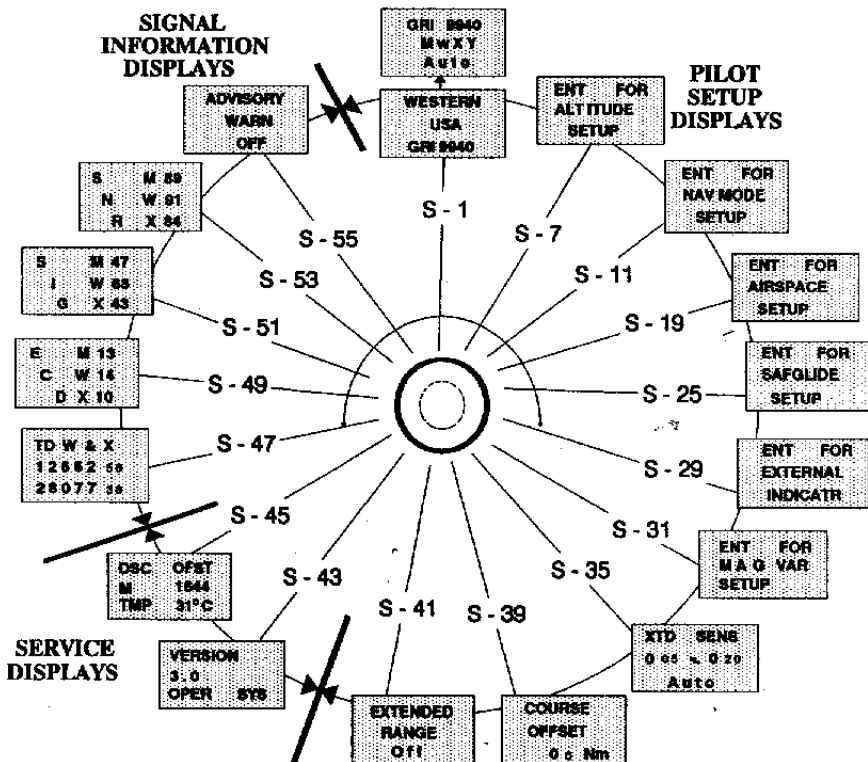
unexpected WARN light, or if the WARN light fails to go out within four minutes after the power is turned on, the pilot may want to view the ADVISORY WARN page to determine the reason for the WARN light. If the aircraft is used by more than one pilot, it's important to scroll through the PILOT SETUP pages before flight to insure the unit is properly set up. Begin by entering SETUP Mode

Note

In graphic displays, such as the ones on page S-4, a white background indicates that the item will be flashing. The exact displays you will see on your unit may differ due to previously entered settings.

PILOT SETUP PAGES

Pilot Setup contains ten main pages, and is used to customize displays and make setting adjustments. For example; XTD SENS is used to adjust the sensitivity of the CDI, and NAV MODE SETUP is used to customize NAV displays and turn on/off AUTO NAV SCROLL.

GRI AND TRIAD SELECTION

Look in the LORAN CHAINS section of the Pilot's Operating Handbook (POH) to find the chains that provide coverage in the area(s) you'll be flying in.

When you first enter SETUP mode, the page depicting the name and the GRI of the currently selected chain will appear momentarily, and then the unit will automatically display the page that depicts the GRI on the top line.
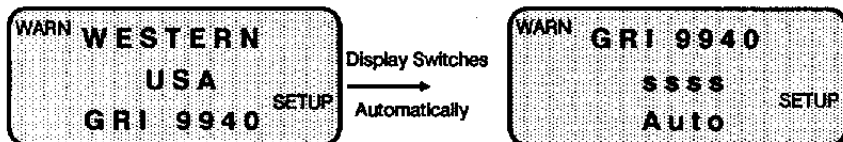
Note

Each "s" indicates the unit is conducting a search to acquire a signal from the appropriate station in the chain. After each station signal has been acquired, the "s" will change to a lower-case letter (except for the Master, which is always represented by an upper-case letter), either M,w,x,y or z. When a triad is selected, either automatically or manually, the lower-case letter representing each selected station will change to upper-case. The Master (M) station will always be in the triad.

1. **SEL - PRESS**
   The display depicting the name of the currently selected chain will reappear, and the GRI numbers will flash.

   White background
   indicates characters
   are flashing

   ```
   WARN  W E S T E R N
              U S A
                         SETUP
          G R I  9 9 4 0
   ```

2. **SMALL KNOB** - TURN to display the desired GRI.
   The North East USA chain is depicted below.

   ```
   WARN  N O R T H
         E A S T U S A
                        SETUP
         G R I  9 9 6 0
   ```
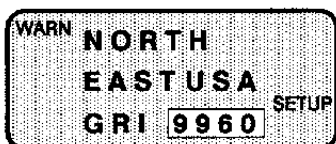
3. **ENT - PRESS**
   The page depicting the GRI on the top line will reappear, and "Auto" will be flashing on the bottom line. This refers to automatic triad selection. Normally you will use automatic triad selection. Anytime the power switch is cycled, automatic triad selection is activated.

   ```
       G R I  9 9 6 0
           S S S S S
                       SETUP
          A u t o
   ```

If Manual Triad Selection is Desired:

   a. **SMALL KNOB** - TURN to display "Manual" after warn lite goes out.

   ```
       G R I  9 9 6 0
          M W X Y Z
                       SETUP
          M a n u a l
   ```

b. **ENT** - PRESS
The letters representing the secondaries in the chain will flash.

```
GRI 9960
M W X Y Z      SETUP
Manual
```

c. **SMALL KNOB** - TURN to display desired secondaries in upper case letters.

```
GRI 9960
M W x Y z      SETUP
Manual
```
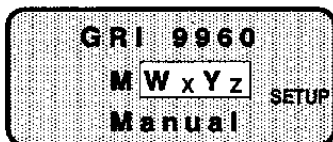
d. **ENT** - PRESS
The station letters will stop flashing. To return to automatic triad selection press SEL twice, select "Auto" with SMALL KNOB, and press ENT.

NOTES :

ALTITUDE SETUP

This procedure is used to select the target and buffer altitudes for the Altitude Select feature, and to set the altimeter. This is only applicable to units connected to a II Morrow Encoding Altimeter.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR ALTITUDE SETUP.

```
┌─────────────────────────┐
│   ENT    FOR            │
│  ALTITUDE              │
│   SETUP      SETUP     │
└─────────────────────────┘
```
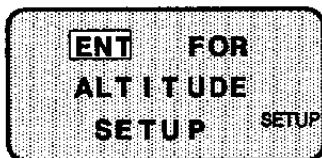
3. **ENT** - PRESS
   ALT-SEL ALTITUDE will appear.

```
┌─────────────────────────┐
│   ALT-SEL              │
│   ALTITUDE            │
│        0  ft  SETUP   │
└─────────────────────────┘
```
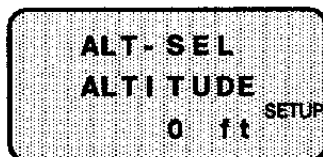
4. **SEL** - PRESS
   The current Altitude Select setting will flash.

```
┌─────────────────────────┐
│   ALT-SEL              │
│   ALTITUDE            │
│        0  ft  SETUP   │
└─────────────────────────┘
```
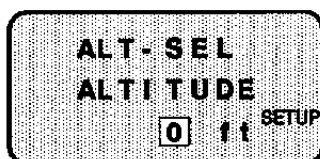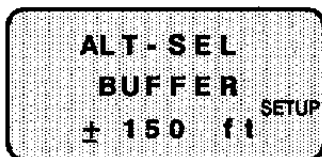
5. **SMALL KNOB** - TURN to select the altitude.
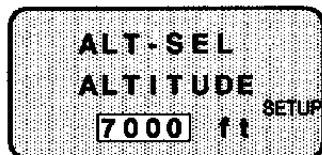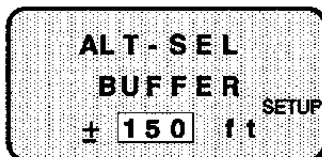
```
┌─────────────────────────┐
│   ALT-SEL              │
│   ALTITUDE    SETUP   │
│      7000  ft         │
└─────────────────────────┘
```

6. **ENT** - PRESS

```
ALT-SEL
ALTITUDE
7000  ft  SETUP
```
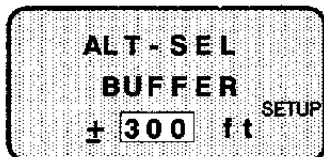
7. **SMALL KNOB** - TURN one click cw.
   The ALT-SEL BUFFER page will appear.

```
ALT-SEL
BUFFER
± 150  ft  SETUP
```
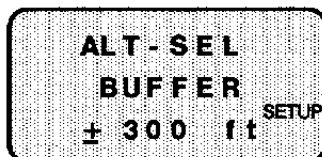
8. **SEL** - PRESS
   The current buffer altitude will flash.

```
ALT-SEL
BUFFER
± 150  ft  SETUP
```

9. **SMALL KNOB** - TURN to select the buffer altitude.

```
ALT-SEL
BUFFER
± 300  ft  SETUP
```

10. **ENT** - PRESS

```
ALT-SEL
BUFFER
± 300  ft  SETUP
```

11. **SMALL KNOB** - TURN to display the ALTITUDE SELECT ON/OFF page.

ALTITUDE SELECT will not operate unless ON is selected. To change the current setting, complete steps 12 through 14; otherwise, skip to Step 15.

```
┌─────────────────────────┐
│                         │
│    ALTITUDE             │
│    SELECT               │
│       ON        SETUP   │
│                         │
└─────────────────────────┘
```
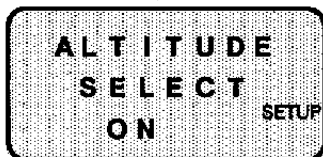
12. **SEL** - PRESS

The current setting (ON or OFF) will flash.

```
┌─────────────────────────┐
│                         │
│    ALTITUDE             │
│    SELECT               │
│      OFF        SETUP   │
│                         │
└─────────────────────────┘
```
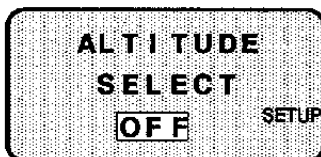
13. **SMALL KNOB** - TURN to select ON or OFF.

```
┌─────────────────────────┐
│                         │
│    ALTITUDE             │
│    SELECT               │
│       ON        SETUP   │
│                         │
└─────────────────────────┘
```

14. **ENT** - PRESS

```
┌─────────────────────────┐
│                         │
│    ALTITUDE             │
│    SELECT               │
│       ON        SETUP   │
│                         │
└─────────────────────────┘
```
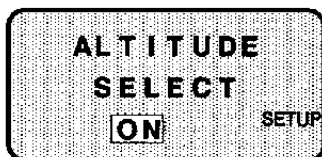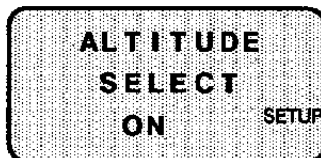
15. **SMALL KNOB** - TURN one click cw to display the SET ALT page.

```
┌─────────────────────────┐
│                         │
│    SET    ALT           │
│     29₉2                │
│   A↑   5500     SETUP   │
│                         │
└─────────────────────────┘
```
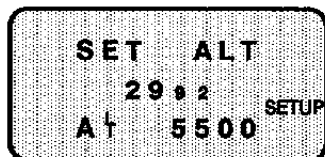
16. **SEL** - PRESS
    The altimeter setting will flash.

```
        SET    ALT
          2 9 9 2
                        SETUP
        A ↑    5 5 0 0
```
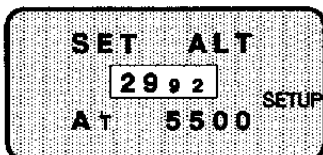
17. **SMALL KNOB** - TURN to display the correct altimeter or altitude setting.

```
        SET    ALT
          3 0 2 0      SETUP
        A ↑    5 7 8 0
```

18. **ENT** - PRESS
    The altimeter will be set.

```
        SET    ALT
          3 0 2 0
                        SETUP
        A ↑    5 7 8 0
```
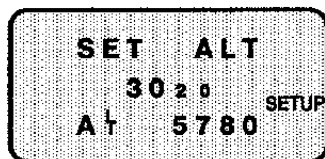
NAV   MODE   SETUP

This feature allows you to customize your NAV displays and adjust and activate AUTO NAV SCROLL.

Note
The NAV mode Position page, Flightplan page, and RETURN TO page are fixed and cannot be edited.

Editing (customizing) NAV Pages

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR NAV MODE SETUP.

```
┌─────────────────────────┐
│   ┌─────┐               │
│   │ENT│  F O R         │
│   └─────┘               │
│   N A V M O D E        │
│                 SETUP   │
│     S E T U P          │
└─────────────────────────┘
```

3. **ENT** - PRESS

```
┌─────────────────────────┐
│                         │
│   E D I T   N A V      │
│                         │
│   P A G E S            │
│                 SETUP   │
│     O F F              │
└─────────────────────────┘
```

4. **SEL** - PRESS
   "Off" will flash.

```
┌─────────────────────────┐
│                         │
│   E D I T   N A V      │
│                         │
│   P A G E S            │
│         ┌─────┐  SETUP  │
│         │O F F│         │
│         └─────┘         │
└─────────────────────────┘
```

5. **SMALL KNOB** - TURN to display "On".

```
┌─────────────────────────┐
│  ╔═══════════════════╗  │
│  ║   EDIT  NAV       ║  │
│  ║   PAGES           ║  │
│  ║    ┌─────┐  SETUP ║  │
│  ║    │ O N │        ║  │
│  ║    └─────┘        ║  │
│  ╚═══════════════════╝  │
└─────────────────────────┘
```

6. **ENT** - PRESS
   The unit will automatically switch to NAV mode. The page displayed
   will be the first page of the six Nav pages that may be customized. If
   using the default NAV pages, this page will be the BRG/DST/To page.

```
┌─────────────────────────┐
│  ╔═══════════════════╗  │
│  ║  BRG 004 °   NAV  ║  │
│  ║                   ║  │
│  ║  DST   44 ₂       ║  │
│  ║                   ║  │
│  ║  To   JFK         ║  │
│  ╚═══════════════════╝  │
└─────────────────────────┘
```
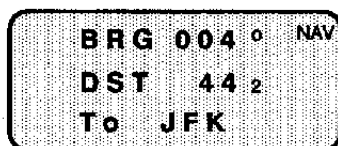
7. **LARGE KNOB** - TURN to display the NAV page you would like to
   edit. The DST/CDI/To page is depicted below.

```
┌─────────────────────────┐
│  ╔═══════════════════╗  │
│  ║  DST   44 ₂  NAV  ║  │
│  ║  0 ₅   ╟─         ║  │
│  ║  To   JFK         ║  │
│  ╚═══════════════════╝  │
└─────────────────────────┘
```
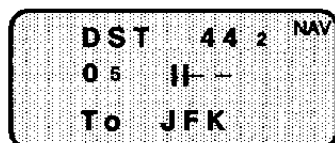
8. **SEL** - PRESS once, twice, or three times to cause the line you wish to
   edit to flash. The middle line is shown as flashing in the illustration
   below.

```
┌─────────────────────────┐
│  ╔═══════════════════╗  │
│  ║  DST    44 ₂  nav ║  │
│  ║  ┌─────────────┐  ║  │
│  ║  │ 0 ₅   ╟─    │  ║  │
│  ║  └─────────────┘  ║  │
│  ║  To   JFK         ║  │
│  ╚═══════════════════╝  │
└─────────────────────────┘
```
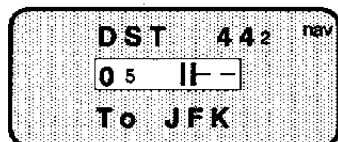
9. **SMALL KNOB** - TURN to display the desired NAV information.
   In the illustration below, GS replaces the CDI line.

   ```
   D S T    4 4 2   nav
   G S       1 8 0
   To   J F K
   ```
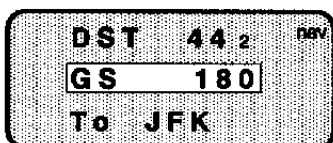
10. **ENT** - PRESS
    If you edited the top or middle line, the next line down will flash. Press
    ENT if you do not want to edit the flashing line, or turn the SMALL
    KNOB if you want to edit the line and then press ENT. If you want to
    edit another page, turn the LARGE KNOB to display the desired page,
    and then proceed with steps 6, 7, and 8. Once you leave NAV mode,
    the editing feature will automatically be set to "Off."

Restoring Default NAV Pages

Before proceeding, display in SETUP mode the ENT FOR NAV MODE
SETUP page.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR NAV MODE SETUP.

   ```
   E N T    F O R
   N A V M O D E   SETUP
   S E T U P
   ```

3. **ENT** - PRESS

   ```
   E D I T  N A V
   P A G E S
   O f f   SETUP
   ```

4. **SEL** - PRESS

```
EDIT NAV
  PAGES
    Off        SETUP
```

5. **SMALL KNOB** - TURN to display "Default".

```
EDIT NAV
  PAGES
  Default      SETUP
```
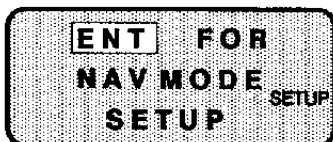
6. **ENT** - PRESS
   The Default NAV pages will be restored.

Auto Nav Scroll

This feature will cause selected NAV pages to scroll at a selected rate.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR NAV MODE SETUP.

```
ENT FOR
NAV MODE       SETUP
  SETUP
```

3. **ENT** - PRESS
   The EDIT NAV PAGES page will be displayed.

```
EDIT NAV
  PAGES        SETUP
   Off
```
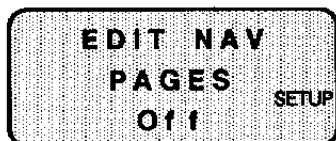
4. **SMALL KNOB** - TURN to display AUTO NAV SCROLL page.

```
AUTO NAV
  SCROLL
    Off      SETUP
```

5. **SEL** - PRESS
   "Off" will flash.

```
AUTO NAV
  SCROLL
   |Off|     SETUP
```

6. **SMALL KNOB** - TURN to display "On".

```
AUTO NAV
  SCROLL
   |On|      SETUP
```

7. **ENT** - PRESS
   HOW MANY PAGES TO SCROLL will be displayed.

```
HOW MANY
PAGES TO     SETUP
SCROLL |2|
```
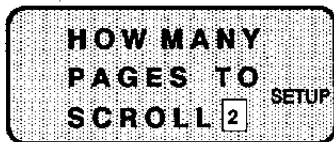
8. **SMALL KNOB** - TURN to display the number of NAV pages you want
   to scroll.

```
HOW MANY
PAGES TO     SETUP
SCROLL |4|
```

9. **ENT** - PRESS

```
       ■ B R G
  # 1  ■ D S T
       ■ T o     SETUP
```
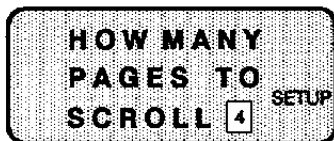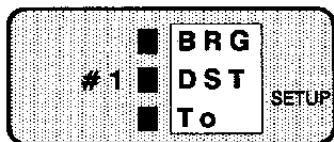
10. **SMALL KNOB** - TURN to display the first page you want in the scroll.

```
       ■ D S T
  # 1  ■ X T D
       ■ T o     SETUP
```

11. **ENT** - PRESS

```
       ■ D S T
  # 2  ■ X T D
       ■ T o     SETUP
```
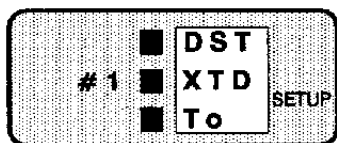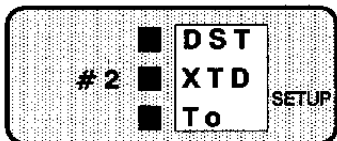
12. **Steps 10 & 11** - REPEAT to enter remaining pages you want include in the scroll.
   When this is completed DISPLAY EACH NAV PG will be displayed.

```
     D I S P L A Y
     E A C H N A V
     P G  3  S e c   SETUP
```
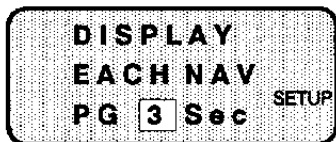
13. **SMALL KNOB** - TURN to display the number of seconds you want each page to be displayed.

```
     D I S P L A Y
     E A C H N A V
     P G  2  S e c   SETUP
```

14. ENT - PRESS

The unit will automatically switch to NAV mode, and the selected pages will scroll.

To Pause AUTO NAV SCROLL On The Displayed Page

Turning any knob, or pressing any button (except MODE or TO) stops NAV SCROLL.

To Reactivate AUTO NAV SCROLL After Pausing

1. ENT - PRESS

To Turn AUTO NAV SCROLL Off

Select "off" in Step 6 of the Auto Nav Scroll procedure.

Note
When the power switch is cycled, AUTO NAV SCROLL will default to the last setting used ("on" or "off").

NOTES:

AIRSPACE SETUP

This procedure is used to turn Airspace Alert On/Off, and select the buffer
altitude and distance.

Activating/Deactivating AIRSPACE ALERT

Note
Thereafter, when the power is turned on, the unit will default
to the last setting used.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR AIRSPACE SETUP.

```
┌──────────────────────┐
│   ┌─────┐            │
│   │E N T│  F O R     │
│   └─────┘            │
│   A I R S P A C E    │
│                      │
│     S E T U P  SETUP │
└──────────────────────┘
```

3. **ENT** - PRESS

```
┌──────────────────────┐
│                      │
│   A I R S P A C E    │
│                      │
│     A L E R T        │
│                SETUP │
│       O f f          │
└──────────────────────┘
```

4. **SEL** - PRESS

```
┌──────────────────────┐
│                      │
│   A I R S P A C E    │
│                      │
│     A L E R T        │
│                SETUP │
│     ┌─────┐          │
│     │O f f│          │
│     └─────┘          │
└──────────────────────┘
```

5. **SMALL KNOB** - TURN to display "Off" or "On", as desired.

```
AIRSPACE
ALERT
        SETUP
 O n
```

6. **ENT** - **PRESS**

```
AIRSPACE
ALERT
        SETUP
  O n
```

Setting DISTANCE BUFFER

This feature allows you to select the distance from the various airspace areas that you would like to alerted that you are approaching an airspace area. If you have just completed Activating/Deactivating AIRSPACE ALERT, leave the AIRSPACE ALERT page displayed, and skip to Step 4.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR AIRSPACE SETUP page.

```
ENT   FOR
AIRSPACE
        SETUP
 SETUP
```

3. **ENT** - PRESS

```
AIRSPACE
ALERT
        SETUP
  O n
```

4. **SMALL KNOB** - TURN to display the DISTANCE BUFFER page.

```
 DISTANCE
 BUFFER
 2 0   n m  SETUP
```

5. **SEL** - PRESS

```
 DISTANCE
 BUFFER
 2 0   n m  SETUP
```

6. **SMALL KNOB** - SCROLL to display the desired distance.

```
 DISTANCE
 BUFFER
 1 0   n m  SETUP
```

7. **ENT** - PRESS

```
 DISTANCE
 BUFFER
 1 0   n m  SETUP
```

Setting ALTITUDE BUFFER

The altitude buffer "tells" the unit the altitude above or below airspace areas at which you want the AIRSP light to alert you. For example, if you were flying 1,200 ft above the ceiling of a TCA, and your ALTITUDE BUFFER were set at 1,000 ft, the unit would not bother you with an alert; however, if your altitude were 800 ft above the TCA, you would be alerted. With the same 1000 foot setting, if you were flying 1500 foot below the floor of a Restricted Area, you would not be bothered with an alert. If you have just completed setting the DISTANCE BUFFER, leave the DISTANCE BUFFER page displayed, and skip to Step 4.

Note
If your unit is not connected to a II Morrow encoding altimeter,
the ALTITUDE BUFFER will not exist.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR AIRSPACE SETUP page.

```
ENT    FOR
AIRSPACE
         SETUP
SETUP
```

3. **ENT** - PRESS

```
AIRSPACE
ALERT
         SETUP
On
```

4. **SMALL KNOB** - TURN to display the ALTITUDE BUFFER page.

```
ALTITUDE
BUFFER
          SETUP
1000    ft
```

5. **SEL** - PRESS
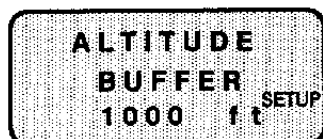
> **ALTITUDE**
> **BUFFER**
> [**1000**] **f** t SETUP
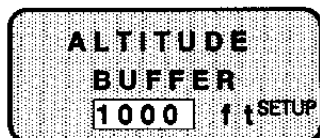
6. **SMALL KNOB** - TURN to display the desired buffer altitude.
   If you select "Unlimited," you will be alerted to all airspace areas,
   regardless of your altitude.

> **ALTITUDE**
> **BUFFER**
> [**1200**] **f** t SETUP

7. **ENT** - PRESS.

> **ALTITUDE**
> **BUFFER**
> **1200** **f** t SETUP
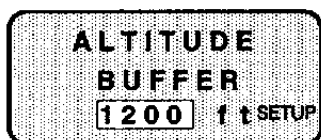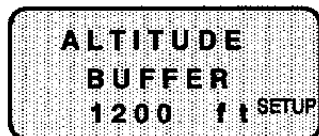
NOTES:

SAFE - GLIDE™   SETUP

It will be necessary to input the descent rate and best glide speed in the SETUP mode using aircraft flight manual data to take full advantage of this feature. This procedure defines the distance the aircraft glides while descending 1000 feet, and the best glide speed for your aircraft. The unit uses this distance plus the airport elevation to determine the altitude required for your aircraft to glide to the airport. The best glide speed is used only as a reminder. Consult the Pilot's Operating Handbook (POH) for your aircraft to determine best glide speed, and the distance your aircraft will travel while descending 1,000 ft. You may want to verify these figures for your specific aircraft using simulated engine-out power, on an evaluation flight.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR SAFGLIDE SETUP.

```
┌─────────────────────┐
│  ┌───┐              │
│  │ENT│    FOR       │
│  └───┘              │
│  SAFGLIDE           │
│   SETUP      SETUP  │
└─────────────────────┘
```

3. **ENT** - PRESS

```
┌─────────────────────┐
│  DESCENT =          │
│   1.1   nm    /     │
│  1000   ft    SETUP │
└─────────────────────┘
```
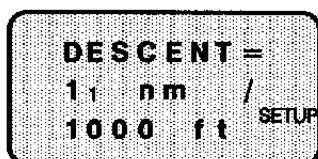
4. **SEL** - PRESS
   The distance value will flash.

```
┌─────────────────────┐
│  DESCENT =          │
│  ┌────┐             │
│  │1.1 │ nm    /     │
│  └────┘             │
│  1000   ft    SETUP │
└─────────────────────┘
```
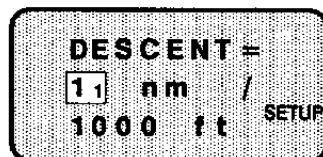
5. **SMALL KNOB** - TURN to select the distance your airplane will glide while descending 1000 feet.

```
DESCENT =
2 0   n m      /
1 0 0 0   f t   SETUP
```

6. **ENT** - PRESS

```
DESCENT =
2 0   n m      /
1 0 0 0   f t   SETUP
```
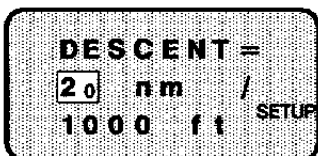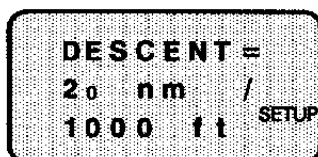
7. **SMALL KNOB** - TURN one click either direction. The BEST GLIDE page will appear.

```
B E S T
G L I D E   SETUP
6 5    n m
```
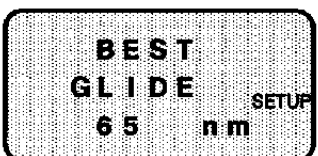
8. **SEL** - PRESS
   The best glide airspeed value will flash.

```
B E S T
G L I D E   SETUP
6 5    n m
```

9. **SMALL KNOB** - TURN to select the best glide speed.

```
BEST
GLIDE      SETUP
5 7    n m
```

10. **ENT** - PRESS

```
BEST
GLIDE      SETUP
5 7    n m
```
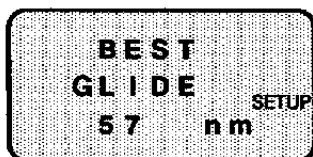
NOTES:

EXTERNAL INDICATOR SETUP

This feature allows you to control the external warning output from the Loran to meet your specific needs. Three selections are available:

VFR LITE

If the Apollo 618 is being used to replace an IFR certified unit such as the model 612, you may choose to select VFR LITE. This causes the LORAN VFR annunciator, used in IFR installations, to be lighted continuously assuring that the pilot is notified the 618 is not certified for IFR use.

BUZZER

If you choose to install an external warning indicator such as an audio alert or special purpose warning light, you can activate this indicator by selecting BUZZER. This selection will cause the LORAN to activate the warning for the following:

— Approaching the selected altitude (See Altitude Select in Navigation section).

— An Altitude excursion (See Altitude Select in Navigation section).

— If the WARN light goes on while in flight.

NONE

This selection turns both of the above features off.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display ENT FOR EXTERNAL INDICATOR.

```
┌─────────────────────┐
│  ┌─────┐            │
│  │ENT│   F O R     │
│  └─────┘            │
│  E X T E R N A L    │
│                SETUP │
│  I N D I C A T R    │
└─────────────────────┘
```

3. **ENT** - PRESS
   The current selection appears.

```
EXTERNAL
IND MODE
          SETUP
VFR LITE
```

4. **SMALL KNOB** - TURN to display your selection on the bottom line.

```
EXTERNAL
IND MODE
          SETUP
BUZZER
```

5. **ENT** - PRESS

```
EXTERNAL
IND MODE
          SETUP
BUZZER
```
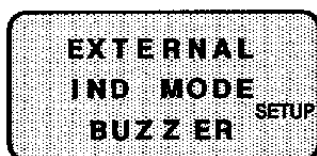
If Buzzer Is Not Selected:
   — The pilot must always acknowledge an alert by pressing ENT.

IF Buzzer Is Selected:
   — A brief altitude arrival reminder will be given.

   — An altitude excursion will be canceled automatically upon returning to the altitude range.

   — You may also cancel any alert manually by pressing ENT.

MAG VAR (Magnetic Variation)

Your Apollo "knows" the variation for the area you're flying in, and automatically references NAV pages to Magnetic Course. Magnetic variation changes slightly from year-to-year, so you will "tell" the unit what year it is.

Entering the MAG YEAR

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR MAG VAR SETUP page.

```
 ENT    FOR
 MAGVAR
 SETUP        SETUP
```

3. **ENT** - PRESS
   The page depicting the current MAG VAR settings will be displayed.

```
 MAG  VAR
 17° E
 Auto       SETUP
```

4. **SMALL KNOB** - TURN to display MAG YEAR page.

```
 MAG YEAR
              SETUP
 1989
```
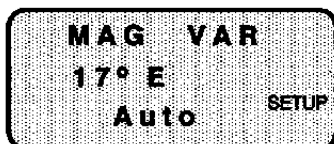
5. **SEL** - PRESS
    The current MAG YEAR setting will flash.

```
┌─────────────────────────┐
│     M A G  Y E A R       │
│                          │
│     │1 9 8 9│   SETUP     │
└─────────────────────────┘
```

6. **SMALL KNOB** - Turn to display the desired MAG YEAR.

```
┌─────────────────────────┐
│     M A G  Y E A R       │
│                          │
│               SETUP      │
│     │1 9 9 0│            │
└─────────────────────────┘
```

7. **ENT** -PRESS

```
┌─────────────────────────┐
│     M A G  Y E A R       │
│                          │
│               SETUP      │
│       1 9 9 0            │
└─────────────────────────┘
```

Selecting "Manual" MAG VAR Setting

If desired, you may manually enter the variation. The Apollo 618TCA comes from the factory with MAG VAR set to automatic. Thereafter, when you turn the power on, the unit will default to the last setting used. If you have just completed setting the MAG YEAR, turn the SMALL KNOB to display the page depicting the current MAG VAR settings, and to Step 4.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ENT FOR MAG VAR SETUP
    page.

```
┌─────────────────────────┐
│    │E N T│   F O R       │
│    M A G V A R           │
│                 SETUP    │
│      S E T U P           │
└─────────────────────────┘
```

3. **ENT - PRESS**

```
MAG VAR
20° E
       Auto   SETUP
```

4. **SEL - PRESS**

```
MAG VAR
20° E
       Auto   SETUP
```

5. **SMALL KNOB** - TURN to display "Manual".

```
MAG VAR
20° E
       Manual  SETUP
```
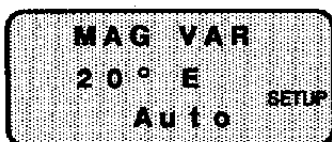
6. **ENT - PRESS**
   The current variation setting will flash.

```
MAG VAR
20° E
       Manual  SETUP
```

7. **SMALL KNOB** - SCROLL to display desired variation, clockwise for westerly, counterclockwise for easterly (W=West/E=East).

```
MAG VAR
15° W
       Manual  SETUP
```

8. ENT - PRESS

```
        MAG  VAR
         1 5 °   W
             Manual   SETUP
```

XTD SENS (Cross Track or CDI Sensitivity)

You may adjust the sensitivity of the CDI manually, or use Auto (Automatic) sensitivity. When using "Auto", the sensitivity automatically becomes more sensitive when you are within one nautical mile of your desired course. The CDI bar graph, made up of a series of dots, is only one dot wide when you are using automatic sensitivity and are within one nautical mile of your desired course. When using automatic sensitivity and you are more than one nautical mile off-course, the bar graph will be three dots wide. When using manual sensitivity, the bar graph display will be two parallel rows of dots. The Apollo® 618 comes from the factory with XTD SENS set to "Auto". Thereafter, when the power is turned on, the unit will default to the last setting used. In the illustration below, each bar represents five dots; the individual dots are not depicted.

DESIRED COURSE

1 MILE RIGHT

MANUAL

AUTOMATIC

```
DST  245₆ ᴺᴬⱽ
0₈  ||▭▭
XYZ
```

```
DST  245₆ ᴺᴬⱽ
--▮|  0₇
XYZ
```

```
DST  245₆ ᴺᴬⱽ
▪▪▮|  3₀
XYZ
```

Manual XTD Sens --
2 rows of dots (no middle row) each dot selectable between 0.01 miles per dot (0.05 per bar) to 1.0 (5.0 miles per bar)
Depicted above: 0.1 per dot.

Automatic XTD Sens -
Single row of dots within 1 mile.
Each dot = 0.05 miles
Each bar = 0.25 miles
(five dots per bar)

Automatic XTD Sens --
3 rows of dots beyond 1 mile.
Each dot = 0.2 miles
Each bar = 1.0 miles
(Five dots per bar)

Selecting Auto or Manual Sensitivity

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the XTD SENS page.

```
XTD   SENS
0 05 — =0 20 SETUP
     Auto
```

3. **SEL** - PRESS

```
XTD   SENS
0 05 — =0 20 SETUP
   │Auto│
```
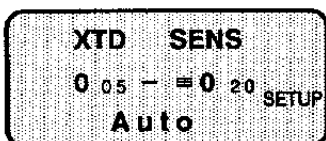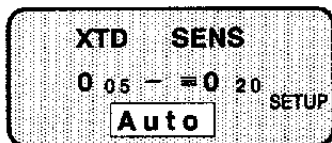
4. **SMALL KNOB** - TURN to display "Auto" or "Manual", as desired.

```
XTD   SENS
0 05 — =0 20 SETUP
  │Manual│
```

5. **ENT** - PRESS

```
XTD   SENS
0 05  n m  SETUP
   Manual
```
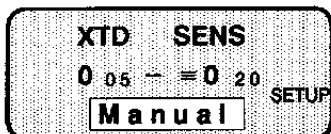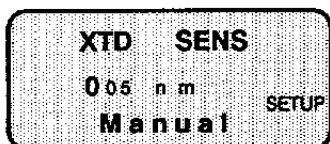
Adjusting Manual Sensitivity

After entering MANUAL sensitivity, the sensitivity value will flash.

```
┌─────────────────────┐
│     XTD   SENS      │
│   ┌───┐              │
│   │0 05│  n m        │
│   └───┘       SETUP  │
│     M a n u a l      │
└─────────────────────┘
```
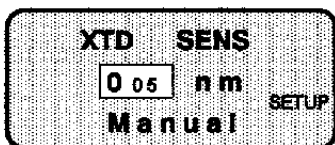
1. **SMALL KNOB** - SCROLL to display the desired sensitivity. Sensitivity values for each dot of deflection range from .01 to 1.0 nm.

```
┌─────────────────────┐
│     XTD   SENS      │
│   ┌───┐              │
│   │0 02│  n m        │
│   └───┘       SETUP  │
│     M a n u a l      │
└─────────────────────┘
```

2. **ENT** - PRESS.

```
┌─────────────────────┐
│     XTD   SENS      │
│     0 02   n m       │
│               SETUP  │
│     M a n u a l      │
└─────────────────────┘
```
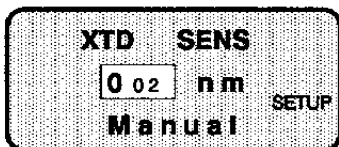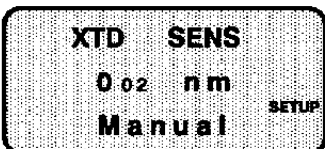
NOTES:

COURSE OFFSET

This feature allows you to fly a course parallel to the original course, at a specified distance. The parallel course may be either left or right of the original course, at a distance from 0.1 to 99.9 nautical miles (selected in 0.1 nm increments). Normally you will leave the offset value at 0.

Setting COURSE OFFSET

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the COURSE OFFSET page.

```
┌──────────────────────┐
│   C O U R S E        │
│   O F F S E T        │
│                SETUP │
│        0  0   N m    │
└──────────────────────┘
```

3. **SEL** - PRESS

```
┌──────────────────────┐
│   C O U R S E        │
│   O F F S E T        │
│              SETUP   │
│       0  0    N m    │
└──────────────────────┘
```
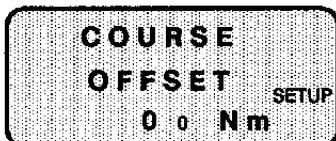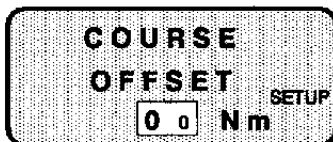
4. **SMALL KNOB** - TURN to display the desired offset value.
   Turning the SMALL KNOB left will define a course to the left of the original course, and turning the SMALL KNOB right will define a course to the right of the original course.

```
┌──────────────────────┐
│   C O U R S E        │
│   O F F S E T        │
│                SETUP │
│   R    0  5   N m    │
└──────────────────────┘
```

5. ENT - PRESS
    The offset value will stop flashing, and course guidance will be
    referenced to the offset course. The OFST indicator will be lighted as
    a reminder the offset feature is in use. Repeat the above steps to reset
    the offset to 0.

```
          C O U R S E
          O F F S E T
                           SETUP
          R      0 ₅ N m
```
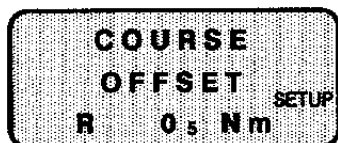
EXTENDED RANGE

This feature allows the pilot to navigate into fringe Loran-C coverage areas. When EXTENDED RANGE is activated, the Apollo 618 will lock onto the current tracking point of the Loran-C pulses. Normally you will leave EXTENDED RANGE "Off".

Activating EXTENDED RANGE

Activate this feature only in an area with adequate coverage, BEFORE flying into fringe areas.

1. **MODE** - SETUP

```
EXTENDED
R A N G E   SETUP
O f f
```
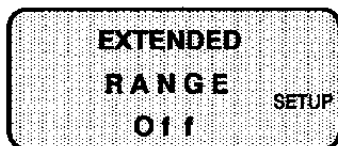
2. **LARGE KNOB** - TURN to display the EXTENDED RANGE page.

Note
EXTENDED RANGE is automatically set to "Off" when the power switch is cycled. When EXTENDED RANGE is activated, LAT/LONG CAL factors may be adjusted within a range of +/- 99.9 minutes, instead of the normal range of +/- 9.99 minutes. If EXTENDED RANGE is turned off while the unit is on, calibration factors exceeding 9.99 will automatically be set to 9.99; however, calibration factors less than +/- 9.99 will be retained until you remove them. Before proceeding, display in SETUP MODE the EXTENDED RANGE page.

3. **SEL** - PRESS

```
EXTENDED
R A N G E
O f f      SETUP
```

4. **SMALL KNOB** - TURN to display "On".
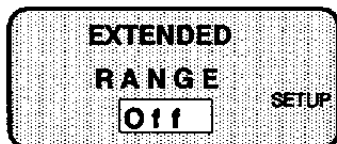
```
EXTENDED
R A N G E    SETUP
   On
```
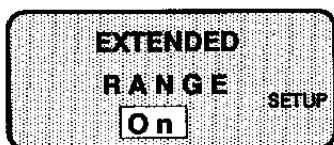
5. **ENT** - PRESS
   Repeat the above procedure to reenter the "Off" setting.

```
EXTENDED
R A N G E    SETUP
   On
```
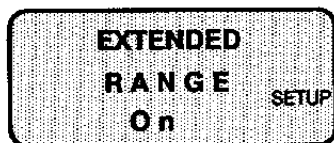
SERVICE DISPLAYS

There are two service displays. Their purpose is to help technicians diagnose problems. They do not apply to normal operations; however, it's extremely helpful if you have the information on these displays available when you contact your dealer or the factory concerning a problem.

VERSION

This is used to display the software version number for the operating system (OPER SYS), the Database Version, the Datecode for the North America and Seabase/Heliport database (the date the software was last updated), the Front End Processor (FEP) version number, and the Datecode for the Airspace database. If you contact your dealer or the factory, have these numbers handy.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the VERSION (OPER SYS) page.

```
VERSION
3 . 0        SETUP
OPER  SYS
```
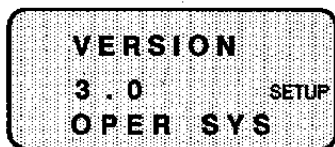
3. **SMALL KNOB** - TURN one click cw to display the VERSION (DATABASE) page.

```
VERSION
3 . 0        SETUP
DATABASE
```

4. **SMALL KNOB** - TURN one click cw to display the DATECODE DATABASE page.
   This displays the date of the North America and Seabase/Heliport database.

```
DATECODE
09/21/89 SETUP
DATABASE
```

5. **SMALL KNOB** - TURN one click cw to display the VERSION (FEP) page.

```
VERSION
2.1      SETUP
FEP
```
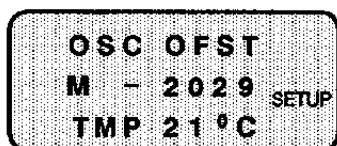
6. **SMALL KNOB** - TURN one click cw to display the DATECODE AIRSPACE page.
   This displays the date of the Airspace database.

```
DATECODE
09/19/89 SETUP
AIRSPACE
```

OSC OFST/TMP (Oscillator Offset/Temperature)
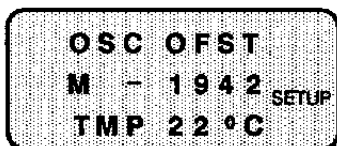
This is used to display the OSCs for each station in the chain. This information is used by service personal to determine crystal operating parameters. The TMP display (bottom line) indicates the internal temperature of the crystal in degrees Celsius. OSC OFST/TMP values will vary slightly. The following displays are examples only.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the OSC OFST page.
   The OFST for M (Master) will be displayed.

```
┌─────────────────────────┐
│      O S C   O F S T     │
│      M  –  2 0 2 9  SETUP│
│      T M P   2 1 º C     │
└─────────────────────────┘
```

3. **SMALL KNOB** - TURN one click cw to display the OSC OFST value for W (Whiskey).

```
┌─────────────────────────┐
│      O S C   O F S T     │
│      M  –  1 9 4 2  SETUP│
│      T M P   2 2 º C     │
└─────────────────────────┘
```

4. **STEP 3** - REPEAT as necessary to display the OFST for the remaining secondaries.

NOTES:

SIGNAL INFORMATION

There are five main pages contained in signal information displays. They are used to evaluate the signals from the stations on the selected chain . They generally do not apply to normal operations; however, if the WARN light comes on or will not go off, view the ADVISORY WARN page to determine the reason for the WARN light. If you encounter a problem, try to record the SNRs, SIGs, and ECDs. This information may be valuable to service personnel.

TD (Time Difference)

This is used to display TDs for the stations in the LORAN CHAIN. TDs reflect the distance a receiver is from a station, and are used by the receiver to define two intersecting LOPs.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the TD page.
   The TDs (in microseconds) between the Master and two of the secondaries are displayed on the middle and bottom lines.

```
  TD  W& X
  1 2 6 6 2 5 6
  2 8 0 7 7 3 6  SETUP
```

SMALL KNOB - TURN one click cw to display the TDs between the Master and the remaining secondaries in the chain.

```
  TD  Y
  4 3 9 2 1 3 0
               SETUP
```

NOTES:

ECD (ENVELOPE-TO-CYCLE DIFFERENCE)

This is used to display the ECD values for stations in the selected chain. They are used to monitor the distortion of the LORAN-C signal.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ECD page.
   The ECD for the Master is displayed on the top line, and for two of the secondaries on the middle and bottom lines.

3. **SMALL KNOB** - TURN one click cw or ccw to display ECDs for the remaining secondaries. Use the chart at the bottom of this page to help evaluate ECDs.

+5 Unreliable
+4 Poor
+3 Fair
+2 Good
+1 Good
 0 Good
-1 Good
-2 Good
-3 Fair
-4 Poor
-5 Unreliable

NOTES:

SIG (Signal Level)

This is used to display the Signal Levels for the stations in the selected chain. Values range from 0 to 100. Provided the receiver has locked onto the signal, and the SNR values are adequate, the SIG values may drop very low and still provide adequate navigation information.

1. **MODE** - SETUP

```
    S        M  4 7
      I      W  6 8
           G X  4 3  SETUP
```

2. **LARGE KNOB** - TURN to display the SIG page.
   The signal level for the Master is displayed on the top line, and for two of the secondaries on the middle and bottom lines.

```
    S        M  4 7
      I      Y  7 1
           G          SETUP
```

3. **SMALL KNOB** - TURN one click cw or ccw to display the signal levels for the remaining secondaries.

NOTES:

SNR (Signal to Noise Ratio)

This is used to display SNRs for the stations in the selected chain. SNR values range between 0 and 100, with the higher values indicating a stronger signal in relation to the amount of noise being received. If the SNR becomes less than 25, the WARN indicator will come on.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the SNR page.
   The SNR for the Master is displayed on the top line, and for two of the secondaries on the middle and bottom lines.

```
    S      M 8 9
       N    W 9 1
                      SETUP
          R  X 8 4
```
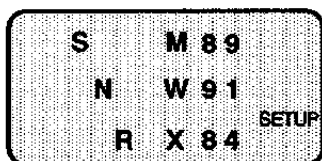
3. **SMALL KNOB** - TURN one click cw or ccw to display SNRs for the remaining secondaries.
   A reference guide at the bottom of this page is given below to help evaluate SNR values.

```
    S      M 8 9
       N    Y 8 5
          R          SETUP
```
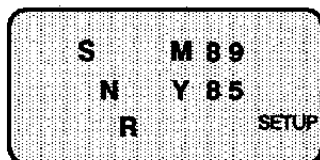
70 to 100	Excellent
40 to 69	Good
30 to 39	Fair
6 to 29	Poor
0 to 5	No signal

Low SNR values can be caused by one or more of the following factors:

1) A position in, or near, a fringe coverage area.

2) Improper installation of the antenna, power cables, or grounding.

3) Atmospheric interference caused by storms, lightning, sunspots, etc.

4) Strong Low Frequency transmissions.

5) Noisy local conditions with interference being generated by industrial switching equipment, local telephone transmissions, precipitation static, etc.

6) Operating in a shielded area, such as in a hangar, or near power lines.

ADVISORY

When the WARN indicator is lighted, this is used to display the reason for the warning.

1. **MODE** - SETUP

2. **LARGE KNOB** - TURN to display the ADVISORY page.
   If the WARN indicator is off, the bottom line will display OFF. If the WARN indicator is lighted, one of the following messages will appear on the bottom line of the display: GRI, SNR, BLINK, TRACKING, or MATH ERR.. The meaning of these messages is shown at the bottom of this page.

```
  ADVISORY
    WARN    SETUP
     OFF
```

GRI - Displayed when insufficient transmitters (i.e. fewer than a master and two secondaries) are being tracked, or automatic triad selection has not been completed.

SNR - Displayed when the SNR of a transmitter in the triad is insufficient.

BLINK - Displayed when a secondary blink condition is detected.

TRACKING - Displayed when a secondary has jumped 10 or more microseconds.

MATH ERR - Displayed when the computer has detected an error in its mathematical calculations.

NOTES:

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X