

**NORTHSTAR M1
LORAN NAVIGATOR
OPERATOR'S MANUAL**

**SUMMARY OF OPERATING INSTRUCTIONS
FOR THE NORTHSTAR M1 LORAN**

This manual is a condensed supplement to the Northstar M1 Reference Manual, which you should read before navigating with the Northstar M1.

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NORTHSTAR AVIONICS

CAUTION

Information contained within the Northstar M1's database is obtained from several sources. While we have made every effort to assure its accuracy, it is important to remember that any source of navigational data is subject to possible error which could impair accuracy of navigation. The pilot must not use the M1 in a manner whereby an error could endanger the safety of the flight. Northstar Avionics cannot be responsible for any consequential damages resulting from the use of the M1.

If you become aware of any errors, please notify Northstar Avionics as soon as possible so that corrections may be verified and included in the next system update.

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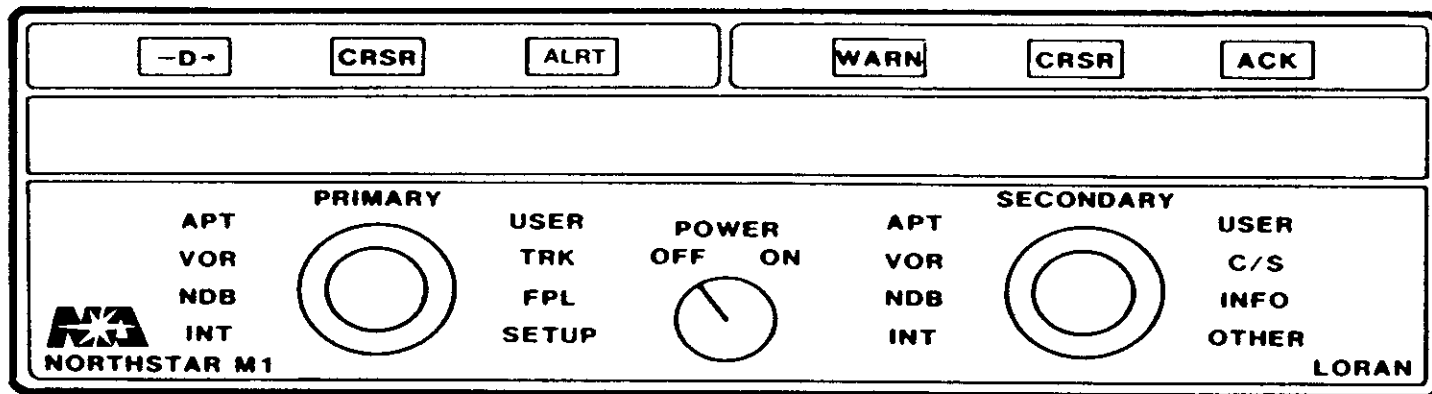
A single navigational device should never be relied upon by the pilot to the extent that the safety of the aircraft, passengers or crew is put in jeopardy.

Navigational aids are just that, aids, and must be utilized as such. Information from navigational aids should be analyzed and cross-checked against other sources to determine their reliability.

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1. USING THE CONTROLS



PUSHBUTTONS

- D→** (Direct) Sets a flight path from your present position direct to the waypoint or flight plan leg displayed in the **PRIMARY** readout. (Follow by pressing **ACK**.)
- CRSR** (Cursor) Turns flashing cursor on and off for data entry.
- ALRT** (Airalert™) Flashes to warn of impending penetration of, or present position within, a TCA or ARSA. Press to display current alert condition (button will remain lighted until you exit the controlled airspace and the alert condition ceases).
- WARN** (Warn) Flashes when a warning condition occurs. Press to display the condition. Press again to return to normal display.
- ACK** (Acknowledge) 1. Flashes when waiting to be pushed for entering data, or displaying an advisory message.
2. Press to instantly save present position (see *Northstar M1 Reference Manual*, Section 3.5.3).

ROTARY SWITCH FUNCTIONS

APT, VOR, NDB, INT, and USER Selects a waypoint category from the M1's database (see Section 4).

Use the *small* knob to select a particular waypoint. Distance and bearing to that waypoint are automatically calculated and displayed.

TRK (Track) Displays information about the current desired track (current track is specified by pressing **-D→** and then pressing **ACK**, or by activating a flight plan).

Use the *small primary* knob to select the specific track information to be displayed (see Section 7).

FPL (Flight Plan) Enter, review, modify or activate a flight plan (see Section 8).

Use the *large secondary* knob to select flight plan function.

SETUP Accesses setup and service functions (see Section 2).

Use the *small primary* knob to select function.

C/S Course and Ground Speed, Winds Aloft (see Section 10).

INFO (Information) Shows additional information about the waypoint displayed in the **PRIMARY** readout.

Use the *small secondary* knob to show facility name, city, state, frequencies, runways, etc.

OTHER Shows lat/lon, loran TDs and SNRs.

2. SETUP FUNCTIONS

TCA/ARSA alert control (*Airalert*[™] function - See Section 9).

1. Turn the *large primary* knob to **SETUP**.
2. Turn the *small primary* knob one click to the right to display current *Airalert*[™] status message such as:
**ALL TCAs & ARSAs AIRALERT ON
ATLANTA TCA NO AIRALERT**
3. Turn the *small secondary* knob to select desired new status.
4. Press **ACK**.

Enter a PARALLEL OFFSET:

1. Turn *large primary* knob to **SETUP**.
2. Turn *small primary* knob to display
PARALLEL OFFSET: NONE.
3. Turn *small secondary* knob to select the offset.
4. Press **ACK**.

CDI SENSITIVITY

1. Turn the *large primary* knob to **SETUP**.
2. Turn the *small primary* knob to display
CDI SENSITIVITY: 1 DOT = 1M.
3. Turn the *small primary* knob to select the desired sensitivity, from 1/32 to 1 mile per dot.
4. Press **ACK**.

TIME OF DAY

If your unit is equipped with the real-time clock option, the time will be set automatically every time you turn on your M1. If your unit does not have the real-time clock option, or you wish to reset the clock, proceed with the following steps:

1. Turn the *large primary* knob to **SETUP**.
2. Turn the *small primary* knob to display (for example)
TIME IS 09:05:30 EASTERN DST
3. Turn the *small secondary* knob to select the desired time zone and either Daylight Savings Time (**DST**) or Standard Time (**STD**).
4. Press left **CRSR** button.
5. Turn the *small primary* knob to set the first digit of the time.
6. Turn the *large primary* knob to move the flashing cursor to the next digit.
7. Repeat steps 4 and 5 to enter remaining digits of the time.
8. Press **CRSR**.

To change the **TIME ZONE** only:
Perform steps 1 through 3 above, then press **ACK**.

GRI (Transmitter chain)

1. Turn the *large primary* knob to **SETUP**.
2. Turn the *small primary* knob to display "GRI", and the four-digit identifier and coverage area of the current chain.
GRI 9960 90% NORTHEAST US
3. Turn the *small secondary* knob to select the desired new chain and coverage area.
4. Press **ACK**.

MAGNETIC VARIATION: entering the current year

If your unit is equipped with the real-time clock option the magnetic variation will be set automatically to the current year in your M1. If your unit does not have the real-time clock option, proceed with the following steps to update the year:

1. Turn the *large primary* knob to **SETUP**.
2. Turn the *small primary* knob to display (for example)
MAG. VAR 16° WEST YEAR: 1990
3. Turn the *small secondary* knob to select the current year.
4. Press **ACK**.

ANTENNA LOCATION (top or bottom)

As part of the installation procedure, the M1 must be told whether the antenna is located on the top or bottom of the aircraft.

1. Turn the *large primary* knob to **SETUP**.
2. Turn the *small primary* knob to display
ANTENNA LOCATION
3. Turn the *small secondary* knob to select **TOP** or **BOTTOM**, as appropriate, and press **ACK**.

UNIT INFORMATION

250 USER POS' NS. STILL AVAILABLE

Indicates the number of spaces left in the M1 for user-entered waypoints to be entered.

REVISED 28JUN90 COPR 1990 DMEC

Indicates the database revision date.

S/N N10102 PROGRAM REV 216.0

Indicates unit's serial number and current software revision level.

See the *M1 Reference Manual* for other **SETUP** functions.

3. PRESENT POSITION

Displaying your position as distance and bearing to a known local waypoint is usually the easiest way to find out where you are (you may use either the **PRIMARY** or **SECONDARY** controls and readouts).

To display present position relative to nearby database waypoints:

1. Turn *large* knob to desired waypoint category.
2. Turn *small* knob to select waypoint identifier.

The distance and bearing to selected waypoint is displayed.

↳ BOS 118° 19.4M

Or use any of the methods described in Section 4 to access a particular waypoint in the database.

- scan local waypoints
- scan all waypoints
- enter the identifier
- enter airport name
- enter airport city

To display present position as latitude/longitude:

1. Turn *large secondary* knob to **OTHER**.
2. Turn *small secondary* knob all the way to the left to display your present latitude and longitude.

42° 26.1' 71° 25.9'

To display additional waypoint information:

1. Display desired waypoint on the *primary* readout.
2. Turn the *large secondary* knob to **INFO**.
3. Use the *small secondary* knob to scan through database information for that waypoint.

4. ACCESSING THE DATABASE

On either readout, turn the *large* knob to select the waypoint category desired.

20 NEAREST WAYPOINTS (any category, on either readout)

Turn the *small* knob all the way to the left to go into the **LOCAL** group (you must pause briefly at the ←←LOCAL ALL→→ message before continuing past it). Nearest airports in the local group are displayed in order of distance; VORs, NDBs and intersections are displayed in alphabetical order.

NEAREST AIRPORT

At any time, you may press the -D→ and left **CRSR** buttons simultaneously to instantly show the nearest airport and its longest runway.

ALL WAYPOINTS (on either readout)

Turn the *small* knob to the right to go into the **ALL** group (pause briefly at the ←←LOCAL ALL→→ message). Scan through to find the waypoint you wish to use.

ENTERING the IDENTIFIER (on either readout)

To select a waypoint by entering its identifier:

1. Press **CRSR**.
2. Turn the *small* knob to scan through the alphabet, selecting the first character of the identifier.
3. Turn the *large* knob to the right to move the flashing cursor over to the next character.
4. Repeat steps 2 and 3 to enter the remaining characters.
5. Press **CRSR** to turn off the flashing cursor.

ENTERING the CITY or NAME (For Airports, VORs and NDBs)

1. Using **INFO**, display the city or name of any database waypoint in the category you want.
2. Press **CRSR** on the *secondary* readout.
3. Using the *small* and *large* knobs, enter the first few characters of the city or name.
4. If necessary, turn the *small primary* knob to scan through those waypoints which match the characters you entered.
5. After you find the waypoint you want, press **CRSR**.

5. ADDING YOUR OWN WAYPOINTS

First, give your new waypoint a new identifier that is not already being used within the M1.

Enter the new identifier as follows:

1. Turn either *large* knob to desired waypoint category.
2. Press **CRSR**.
3. Turn the *small* knob to select and display the first character of the new identifier.
4. Turn *large* knob to move cursor to next position.
5. Repeat steps 3 and 4 for remaining characters.
6. Press **CRSR** again to turn the cursor off. The M1 displays
XXX UNKNOWN: STORE IT? ACK?
7. Press **ACK**.

Now, enter the new waypoint's position:

8. Turn *small secondary* knob to choose entry method:

To enter present position:

XXX DEF' N. IS: THIS POS' N. ACK?

Press **ACK**.

To enter latitude/longitude coordinates:

XXX DEF' N. IS: LAT/LON. ACK?

1. Press **ACK**. Then, using *small* and *large* knobs:
2. Enter latitude and press **ACK**.
3. Enter longitude and press **ACK**.

To enter distance and bearing from existing waypoint:

XXX DEF' N IS: D/B FR. WPT. ACK?

1. Press **ACK**. Then, using *small* and *large* knobs:
2. Enter distance from existing waypoint and press **ACK**.
3. Enter bearing from existing waypoint and press **ACK**.
4. Select waypoint category and identifier and press **ACK**.

To use one of ten previously-saved positions:

XXX DEF' N IS: SAVED POS' N. ACK?

1. Press **ACK**. Then, using *small secondary* knob:
2. Select desired saved position, and press **ACK**.

To ERASE A USER-ENTERED WAYPOINT:

1. Display the waypoint on the **PRIMARY** readout.
2. Turn the *large secondary* knob to **INFO**.
3. Turn the *small secondary* knob to display
ERASE XXX ACK?
4. Press **ACK**.

6. SIMPLE NAVIGATION

FLYING DIRECT to a waypoint:

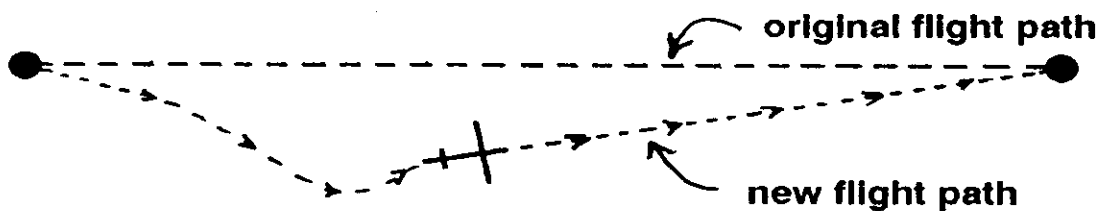
First, display the waypoint in the **PRIMARY** readout using any method described in Section 4.

Then, to fly to the waypoint:

1. Press **-D→ (Direct)**.
2. Press **ACK**.
The **PRIMARY** readout switches automatically to the **TRK** function.
3. Turn small primary knob to choose the desired navigation display (see Section 7).

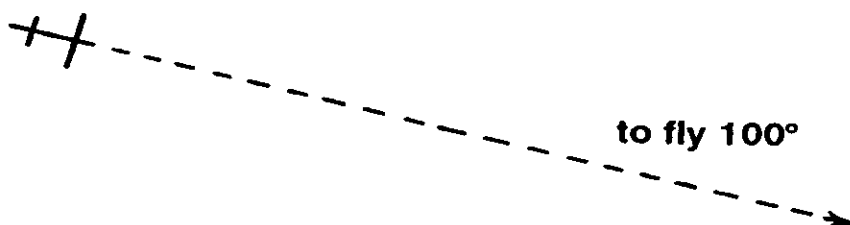
To **RESET** the **CDI** to **CENTER**:

1. Turn the *large primary* knob to **TRK**.
2. Press **-D→**.
3. Press **ACK**.
The desired flight path is shifted to run from your present position direct to the waypoint.



To **FLY A COURSE**:

1. Turn the *large primary* knob to **TRK**.
2. Press **-D→**.
3. Turn the *small primary* knob to select your desired course.
4. Press **ACK**.



7. TRACK DISPLAYS

1. Turn *large primary* knob to TRK.
2. Turn *small primary* knob to select track data (not all of these displays will appear in all situations):

The lat/long of your starting point:

F 42° 26.2' 71° 25.8'

The lat/long of the waypoint:

W 42° 21.9' 71° 00.8'

The track you are following: (any one of the following may appear, depending on how you specified the track).

W BOS V DIRECT (to a waypoint)
FLYING 247° (flying a heading)
FLYING TO LEG 1 (to a flight plan)
F BED A W BOS V (in a flight plan)

The bearing and distance to the waypoint:

W BOS V 118° 19.3%

Course Deviation Indicator:

[. . . | 0 . . .]

Ground Speed and Estimated Time Enroute:

GS 135% ETE 1:38

Bearing of next leg of flight plan:

FLY 035° IN 5:43

Cross-track distance (distance off course):

FLY RIGHT 1.2%

Estimated time of arrival:

ETA 2:44 Z

Turn the *large secondary* knob to INFO to display track data on the **SECONDARY** readout also.

8. FLIGHT PLANS

CANCEL a flight plan: (if a flight plan is presently activated)

(Note: Cancelling a flight plan does not erase it.)

1. Turn the *large primary* knob to **FPL**.
2. Turn the *large secondary* knob all the way to display
CANCEL PLAN ACK?
3. Press **ACK**.

ERASE a flight plan: (to enter a new one)

1. Turn the *large primary* knob to **FPL**.
2. Turn the *large secondary* knob to display
ERASE PLAN ACK?
3. Press **ACK** twice.

ENTER a flight plan:

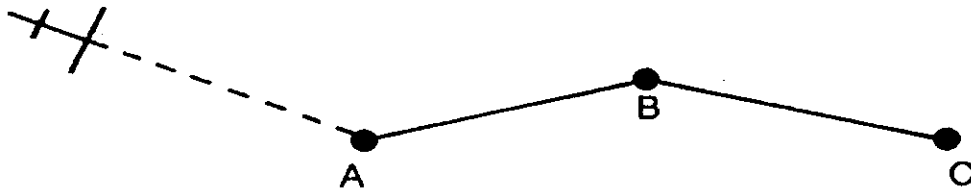
1. Turn the *large primary* knob to **FPL**.
2. Turn the *large secondary* knob to display
ADD WAYPT. ACK?
3. Press **ACK**.
4. Turn the *large secondary* knob to display the category of the first waypoint.
5. Turn the *small secondary* knob to display the identifier of the first waypoint. (Or, press the right **CRSR** button and use the *small* and *large secondary* knobs to enter the identifier of the waypoint.)
6. Press **ACK**.
7. Repeat steps 3, 4, 5 and 6 for the remaining waypoints.

MODIFY a flight plan by editing it:

1. If you are presently following the flight plan, **CANCEL** it as described above.
2. Then, turn the *large primary* knob to **FPL**.
3. Turn the *large secondary* knob to display a leg number.
4. Turn the *small primary* knob to show the leg you wish to edit.
5. Turn the *large secondary* knob to **INSERT**, **DELETE**, or **CHANGE** a waypoint.
6. Press **ACK**.
7. For **INSERT** or **CHANGE**, select the new waypoint and press **ACK**.

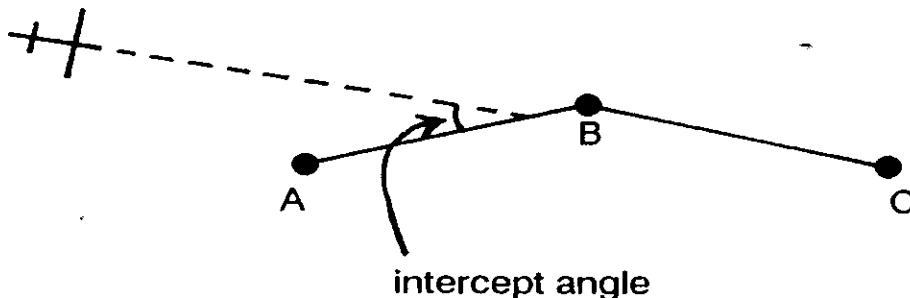
FOLLOW a flight plan (this step activates a previously-entered flight plan):

1. Turn the *large primary* knob to **FPL**.
2. If necessary, turn the *large secondary* knob to the left to display the leg number.
3. Turn the *small primary* knob to display the leg you wish to start at. The flashing arrow indicates the first waypoint you will fly to when you initiate the flight plan.
4. Press **-D->**. The M1 displays
FLY 135° DIRECT TO BOS ACK?
- 5a. To fly direct to the waypoint shown, press **ACK**.



- 5b. To intercept the leg at a point between the two waypoints, turn the *small primary* knob to display the desired heading and intercept angle, then press **ACK**.

FLY 110° INTERCPT AT 25° ACK?



DIVERT away from a flight plan to a new waypoint or fly a heading as described in Section 6.

FLY TO A DIFFERENT LEG of the flight plan:
See above: **FOLLOWING** a flight plan.

REVERSE a flight plan:

1. If you are presently **FOLLOWING** the flight plan, **CANCEL** it as described on the previous page.
2. Turn the *large primary* knob to **FPL**.
3. Turn the *large secondary* knob to
REVERSE FLIGHT PLAN.
4. Press **ACK**.

Automatic Waypoint Sequencing

Figure 1 shows how the Northstar M1 guides you from one leg to the next as you approach a waypoint. It calculates the point at which you should start a two-minute turn in order to start the next leg with the same amount of cross-track distance as you had going into the turn. One minute before you reach this point, the M1 flashes the **ACK** button (asking you to press it). When you press **ACK**, you will see the heading of the next leg, and the time remaining before you should start the turn. When this time counts down to zero, make a two-minute turn to this new heading and you should end up on the new leg. (Note: The M1 does not take account of any winds which might change the time at which you should start the turn.)

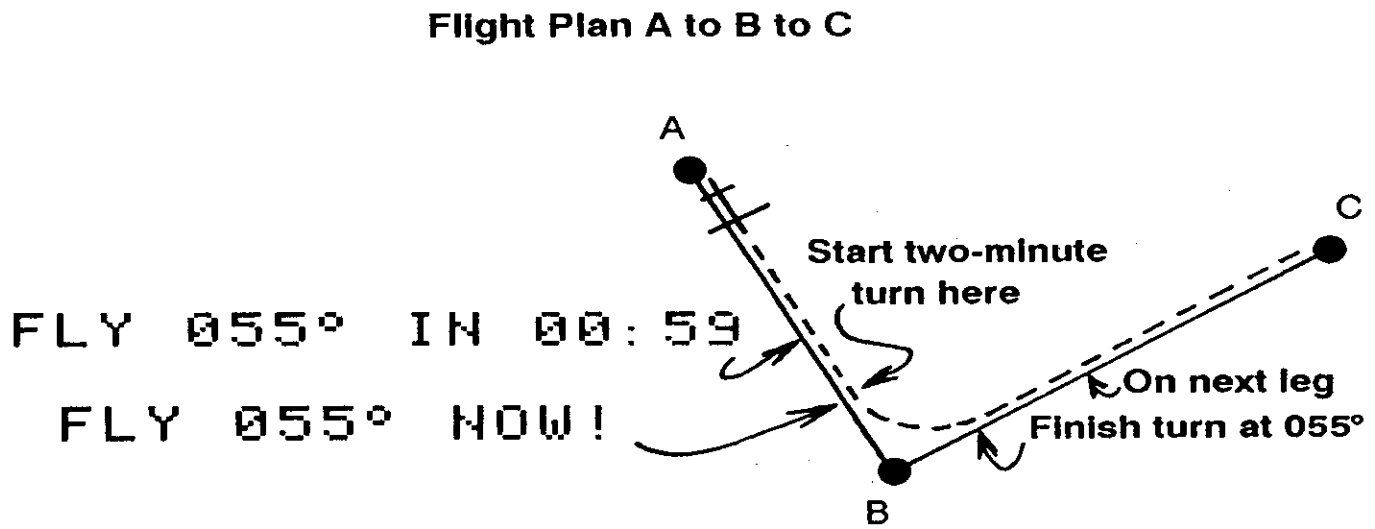


Figure 1
Changing Waypoints

If you are off-course by more than four miles coming into the turn, the M1 does not attempt to guide you around the turn, but simply tells you when it has switched to the next leg.

As you might expect, if you are far off-course and not really attempting to follow the flight plan, the M1 may appear to act strangely as it attempts to give you instructions to get you back on the flight plan. Don't be alarmed. You may **CANCEL** the flight plan if you no longer wish to follow it, or you may tell the M1 to fly direct to another waypoint, thus cancelling the flight plan.

9. AIRALERT™ Controlled Airspace Warning

Airalert™ warns when you are likely to enter a TCA or an ARSA. A *continuous* alert is given when you are:

1. About 10 minutes from penetrating an outer boundary, or
2. Inside a controlled area, or
3. Within about 5 miles in any direction of a controlled area.

A *one-time* alert is given when your desired track will pass through a controlled area at some point in the future.

Press the flashing **ALRT** button to display the alert message. Press **ALRT** again to return to the normal navigation display. The **ALRT** button remains illuminated while you are in or near controlled airspace. You may press **ALRT** any time it is illuminated to check the time to the outermost boundary or the distance to the center.

For the continuous alert, the following information is displayed and continuously updated:

Name of the TCA or ARSA
Bearing and distance to the center of the area
Time to penetration of the outermost boundary of the area
Radio call name and frequency for entering the area

Example: If you were approaching the Providence ARSA, you would see the following two messages alternating on the readout:

```
PROVIDENCE ARSA 237° 17.2nm 3:10  
QUONSET: 118.6 237° 17.2nm 3:10
```

The center of the ARSA is 17.2nm at 237°. The radio call for Providence is **QUONSET APPROACH**, on 118.6 MHz.

The **bearing** and **distance** are to the *center* of the area, and let you figure your distance to inner, lower altitude boundaries of the area.

The **time** displayed is the estimated time remaining before penetrating the *outermost boundary* of the area, based on your present track angle and ground speed as calculated by the M1.

The word **INSIDE** means you are now inside the area.

The word **CLOSE** means there is a controlled area within about five miles of your present position, but you will not penetrate it.

The symbol **☐** is an abbreviation for **CLOSE**, and is displayed when you will penetrate an area, and are within about five miles of that area or a different area.

The one-time alert displays a message such as
BOSTON TCA IN FUTURE TRACK

Limitations:

1. The M1 assumes you are flying at the altitude corresponding to the **largest** diameter of the area. Once you are under a TCA, you must monitor your distance to the boundary that corresponds to your particular altitude.
2. You may see a lag of up to two minutes or so after you change your heading or speed before any alert made necessary by that change is shown.
3. It is possible for the M1 to simultaneously indicate that you are near one controlled area but will soon penetrate another area (the time-to-penetration indicated may refer to a different area than the **☐** symbol). When you unexpectedly see the **☐** symbol, it's best to check your chart unless you know the area well.
4. The time-to-penetration may show substantial jitter -- this calculation is quite complex and is intended as an approximation.

Note: The New York TCA is split into 3 separate sections (for JFK, EWR and LGA airports), and the Washington TCA is split into 2 sections (for DCA and ADW airports).

To turn the alert off or on:

To turn off the alert for one controlled area, or for all areas, see Section 2, Setup Functions: TCA/ARSA alert control.

Mode C capability has been added to the M1's *Airalert*[™] feature. The display format is the same as the TCA and ARSA alerts, except that, instead of the TCA or ARSA name, the M1 displays:

MODE C ALERT 351° 242M SQUAWK

A new function has been added under the **SETUP** category to separately disable this alert function:

MODE C ALERT ON ACK?
MODE C ALERT OFF ACK?

Turn the *large primary knob* to **SETUP**. Turn the *small primary knob* to display the above function. Turn the *small secondary knob* to display **ON** or **OFF** as desired, and then press **ACK**.

In addition, disabling any TCA alerts will also disable **MODE C** alerts for those TCA areas.

10. MISCELLANEOUS FUNCTIONS

To display **COURSE** and **GROUND SPEED**:

1. Turn *large secondary knob* to **C/S**.

CRS 235° GS 153%

Note: These calculations are computed from your track during the previous two minutes and thus are not accurate until two minutes after a course or speed change.

To calculate and display **WINDS ALOFT**:

1. Turn *large secondary knob* to **C/S**.
2. Turn the *small secondary knob* to display the last heading you entered.

HEADING IS 145°?

3. Press **CRSR**, and use the *small* and *large secondary* knobs to enter your present compass heading. Press **ACK**.
4. The M1 displays the last True Air Speed figure you entered.

TAS IS 137%?

5. Press **CRSR**, and use the *small* and *large secondary* knobs to enter your present True Air Speed. Press **ACK**.
6. The M1 displays the direction and speed of the calculated Winds Aloft.

WIND: 313°T 20%

In keeping with normal conventions, you must enter your heading as magnetic, but the displayed wind is shown as a true direction.