INAC

Astnav89 is an implementation of navigational algorithms in the TI89 calculator.

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Program: Implementation of Navigational Algorithms on Computers (INAC)
Have any questions or comments? Please email.

You may use this program how you wish but I am not reliable for any incidents resulting from its use. You are allowed to modify the code as long as you do not spread the code to others without my explicit permission. Usage of this program constitutes an agreement with the disclaimer in this document.

This program is a scientific program for use around the world, all units are METRIC.

Thank you for downloading this program and reading the directions.

Installation:

1. Put the INAC.89g on your calculator.
2. Press **<diamond><5>** to launch the setup program.
3. The following screen will appear.

4. When this screen appears, press <enter>. After pressing enter a series of screens will appear, while INAC is installed.

5. When the above screen appears, press <enter> to start the main program.

Quick Start Guide

1) Use a method under F1 to put in your initial position.
2) Put in two or more LOPs from the F2 menu
    a. Can be from same object, but must be at different times and/or dates.
3) Do a fix with the F3 button.
4) New location is found.

Contents

Notes:

- Upper and lower limb of the celestial object should use either 'u' or 'l' to indicate which side of the object is used.
- Near and far IC adjustments should use either 'n' or '-' OR 'f' or '+'. This indicates whether the IC (also known as Index error) should be added or negated from the sextant reading.
- Pressing ESC at any time in the menu will exit the program and return to the previous program or exit to the main screen.
- When asked 'lat name' it is referring to north, south, east, west, use them respectively i.e. Latitude is north, south and longitude is east, west.(use 'n' for north, 'e' for east 'w' for west and 's' for south).
- The 'fix' command will not work if you only have one LOP.
- All settings for the AMS are saved and recovered after use.

Detailed Instructions:

The main screen

```
F1▾        F2▾     F3   F4▾       F5▾   F6▾
Initial Pos Add LOP Fix Settings Tools Other
```

```
#LOPS=0
LAT=0.
LNG=0.
```

(F1) Initial Pos

```
F1▾        F2▾     F3   F4▾       F5▾   F6▾
Initial Pos Add LOP Fix Settings Tools Other
1:Known LAT & LNG
2:Noonshot
3:Known Alt & Azi
4:BVTD (Dead Reckng)
```

Sets the initial position for celestial navigation calculations. There are 4 possible sources of an IP:

1) **Known LAT & LNG**

   From a given latitude and longitude.

2) **Noonshot**

   From a Local Meridian passage (Noon shot).

3) **Known Alt & Azi**

   From a roughly measured altitude and azimuth

4) **BVTD (Dead Reckng)**

   From Bearing, Velocity, Time and Distance (BVTD) (i.e. Dead Reckoning).

(F2) Add LOP

Calculates a line of position (LOP) from the selected source. The following are the currently implemented sources.

1) **Sun**
2) **Moon**
3) **Stars**
     Only 2 currently implemented
4) **Mars**
5) **Jupiter**
6) **Saturn**
7) **Venus**
8) **DEC & GHA**
     From manually entered declination and Greenwich Hour angle (GHA).
9) **Azimuth and Altitude**
     From a measured altitude and azimuth.

(F3) Fix

Accurately calculates current position.

(F4) Settings

Configures the operation of the INAC program:

1) **Show LOPS**

   Show LOPS will show all current lines of positions

2) **Set HT. of eye**

   Set the height of the eye.

3) **Set PERM date**

   Set a GMT permanent date not prompt for a new date on every LOP.

4) **Use AMS time**

   Uses the AMS's time setting for all calculations, will not ask for time afterwards.

5) **Use AMS date**

   Uses the AMS's date setting for all calculations, will not ask for date afterwards.

6) **Manual time**

   Requires manual input of time for every calculation.

7) **Manual date**

   Requires manual input of date for every calculation.

8) **Delete last LOP**

   Deletes the last LOP calculated.

9) **Restore last**

   Restores last deleted LOP.

(F5) Tools

```
 F1↴    F2↴    F3   F4↴  F5↴  F6↴
Initial Pos Add LOP Fix Settings Tools Other

#LOPS=0     1:Great Circle
            2:Astronomy
LAT=0.      3:Tall object
LNG=0.      4:Clock
```

Contains all the programs not really needed for Celestial Navigation, but are useful.

1) **Great Circle**

Will input two locations by LAT and LON and will output the circular distance and heading to the second location. The formula takes in to count the curvature of the Earth so it is reasonably accurate.

2) **Astronomy**

Is a planetarium program that takes in location and date/time to calculate the positions of the planets and is capable of outputting a skymap.

3) **Tall object**

This is a derivative of coastal navigation it uses a tall object to determine distance away or the height of an object at known distance.

4) **Clock**

For AMS's that support clocks, it will display the current time and date on your calculator.

(F6) Other

```
 F1↴    F2↴    F3   F4↴  F5↴  F6↴
Initial Pos Add LOP Fix Settings Tools Other

#LOPS=0  1:Delete ALL DATA
         2:EXIT
LAT=0.   3:About
LNG=0.   4:Clear screen
```

Miscellaneous features including:

1) **Delete ALL DATA**
2) **EXIT**
3) **About**
4) **Clear screen**

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