North Texas NTMS Microwave Society

Pointing Antennas

By

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Pointing Antennas

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- Short Distance 6 Digit Grid Square Point
- Compass Correction
- GPS
- Dish Aiming
- Summary
- References

6 Digit Point Error

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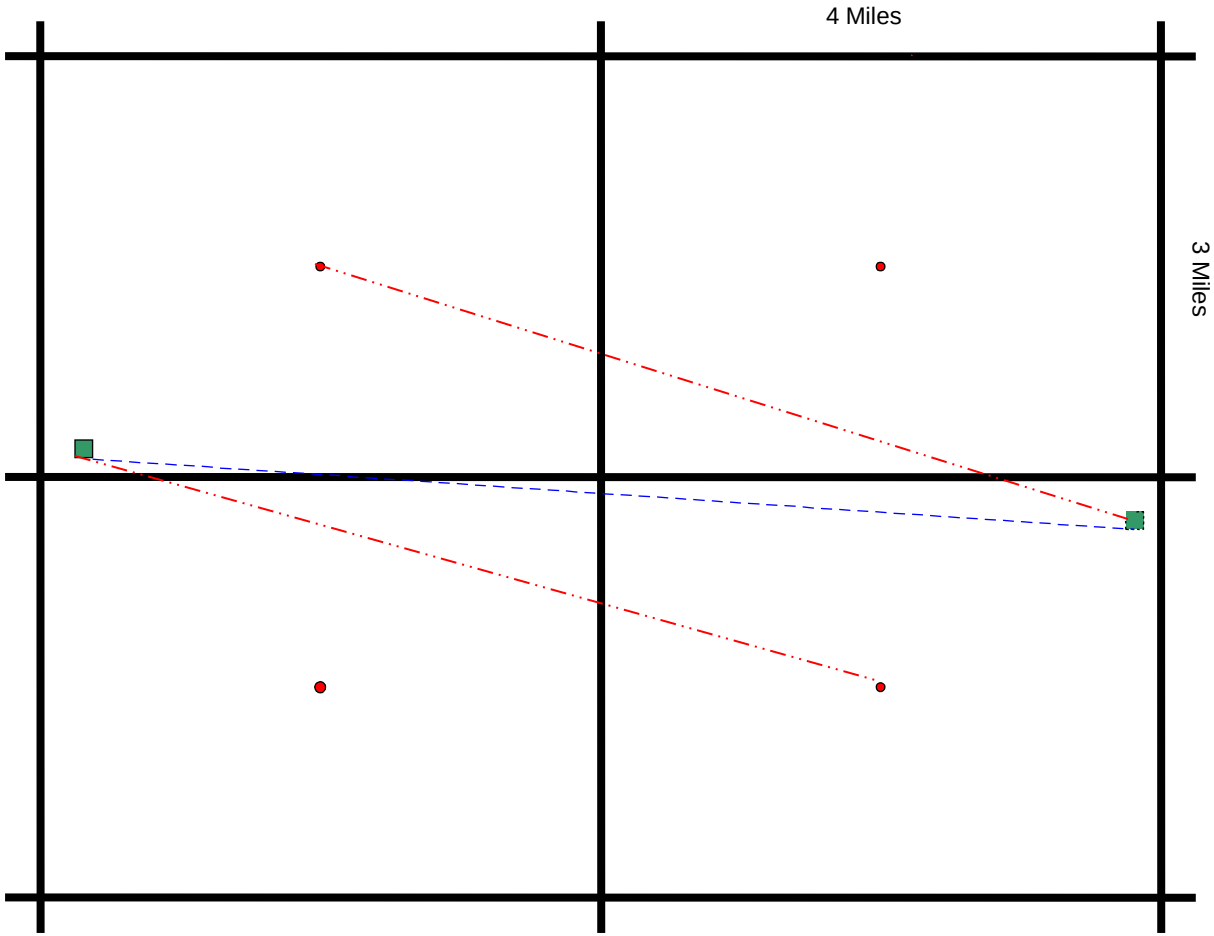
Blue is Reai direction

Red is 6 Digit Direction

Programs Assume Center of Gris or Sub-Grids for Calculations



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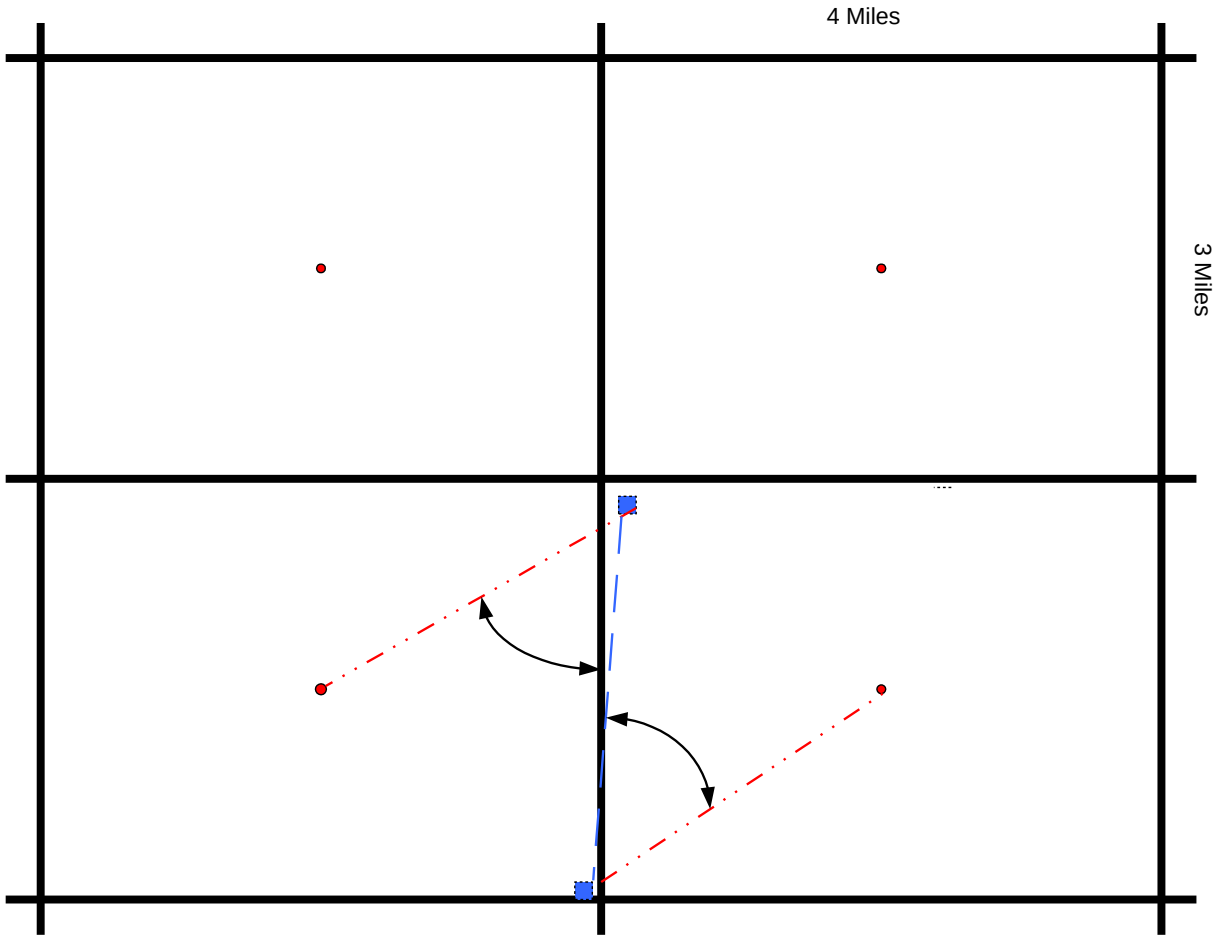
6 Digit Point Error

Example of Gross Bearing Errors

Blue is Real

Red is 6 Digit Grid Square Calculations



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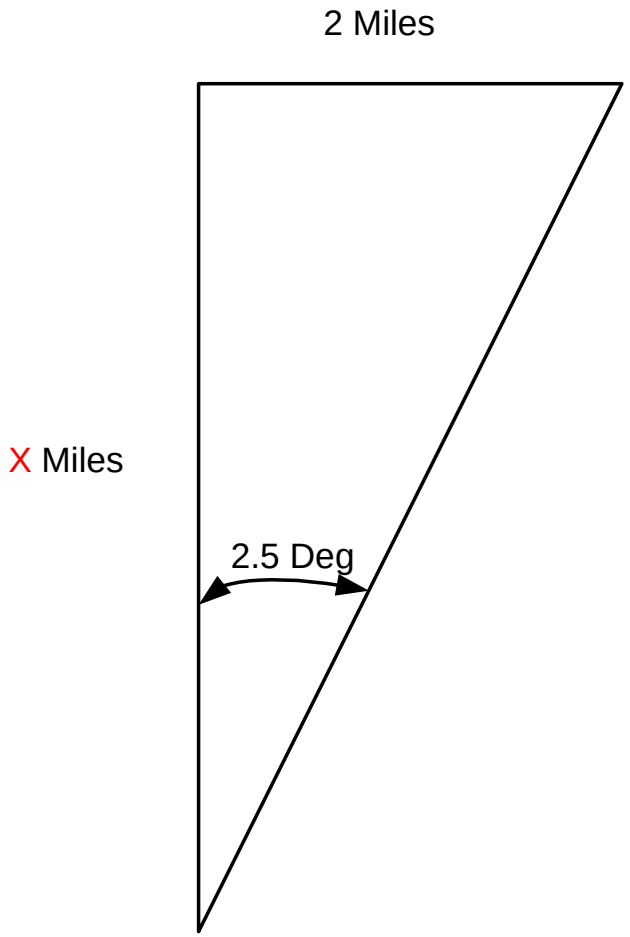
Assume 36 inch Dish:

Beam Width ~ 2.5 Degrees

X = 2 / Tan 2.5°

Minimum Distance Between Stations = 45.8 Miles



6 Digit Point Error

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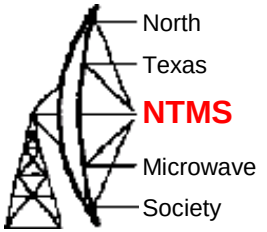
- Points to Ponder
  - Be Aware of Close in Error
  - Could Be Cause of Missed Close in Contacts
    - Both Stations Pointed Wrong Direction
  - Use Knowledge of Area
  - Use Lat/Long – Goggle Earth
  - Use 10 Digit Grid Square Location Error Dops Significantly

Using a Compass



- Compass Error
  - Magnetic Variation/Declination
    - Magnetic North and True North Not Same
    - Error Varies with Location on Earth with Respect to Magnetic North
    - Changes with Time
  - Magnetic Deviation
    - Varies with Surrounding Magnetic Fields
      - Ferrous Metals

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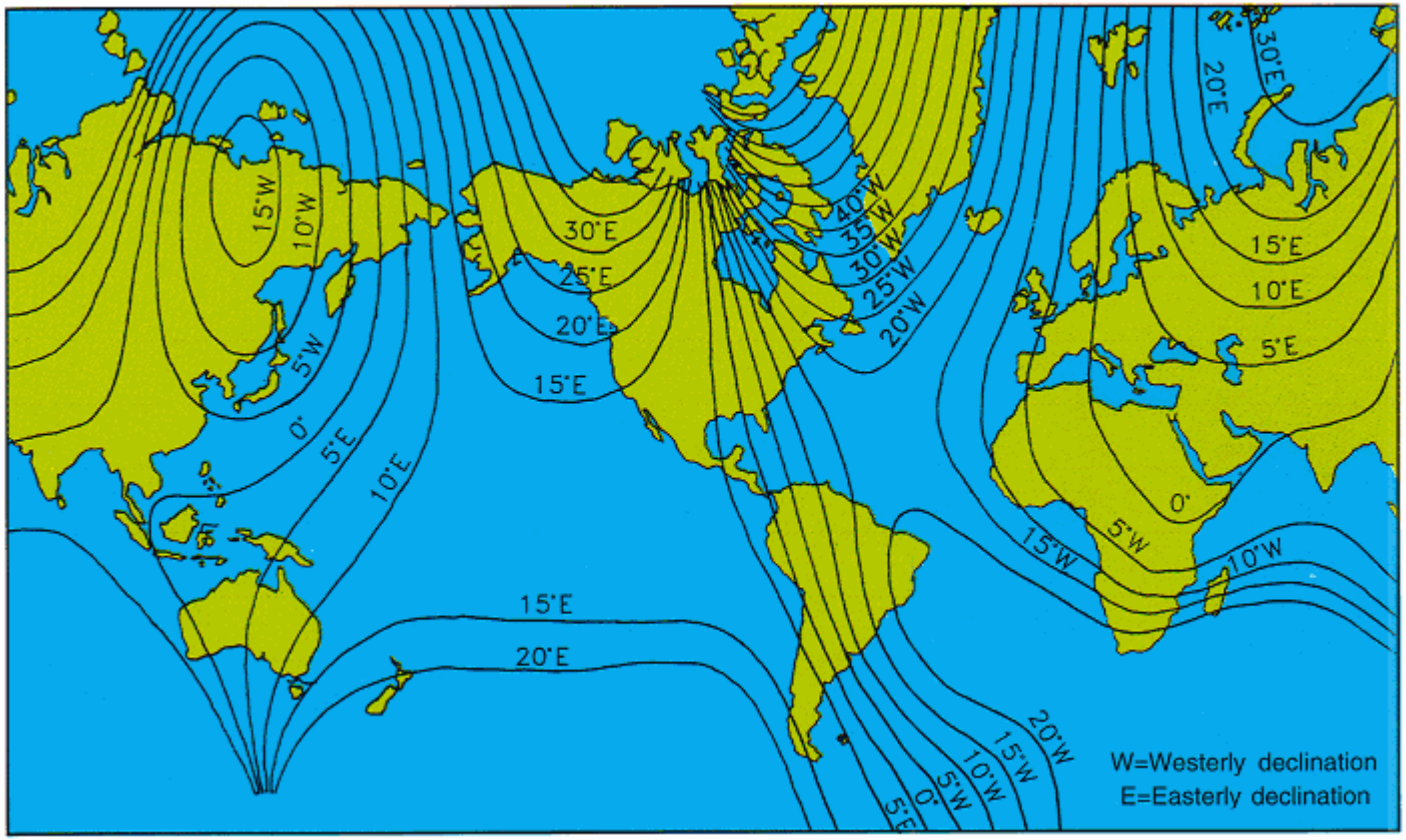
Compass Correction

- Magnetic Variation/Declination



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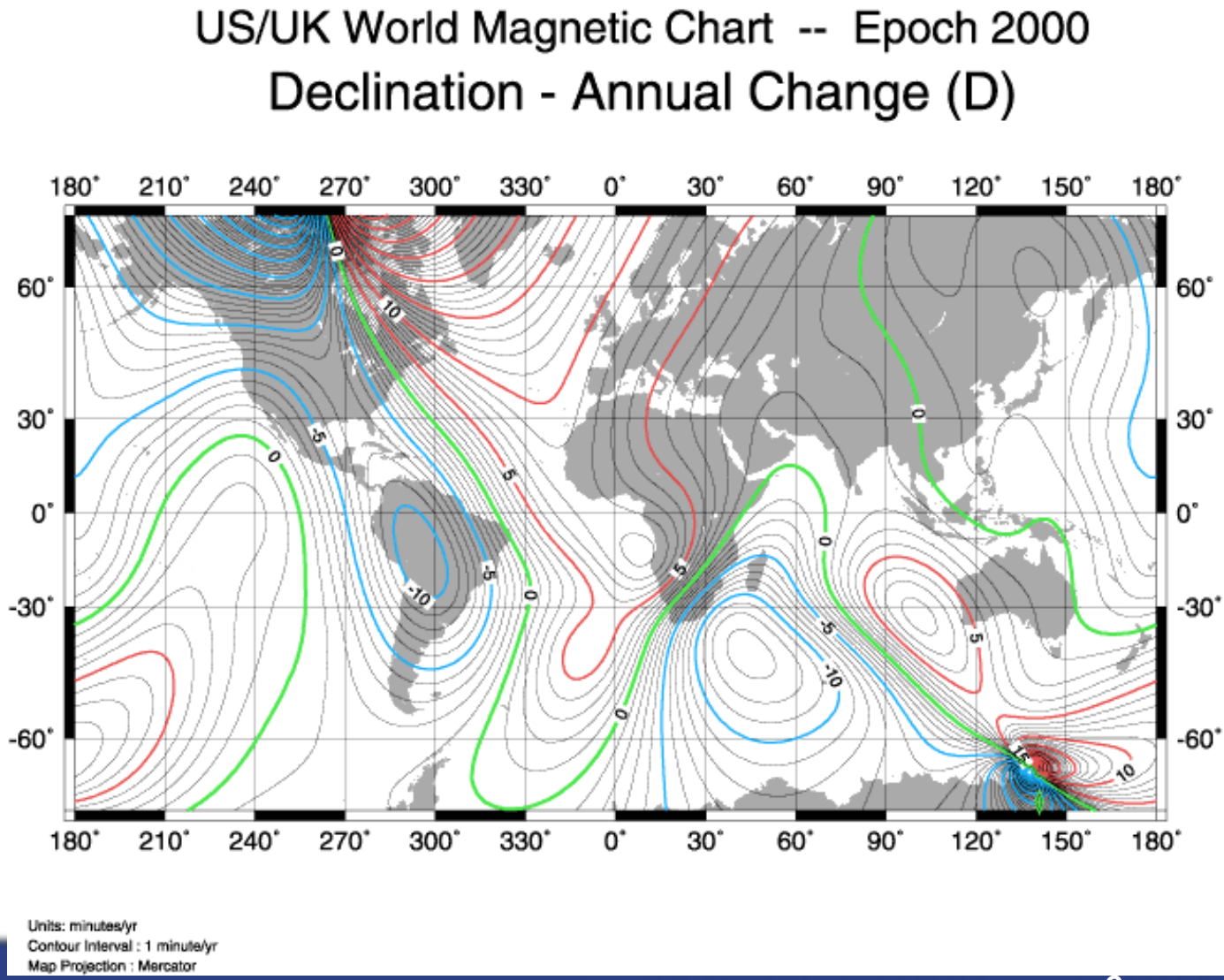
Compass

- Variation Changes with Time
  - Map Contour Minutes/ Year



Compass

- Can Dead Men Vote Twice At Elections
  - Compass
  - Deviation
  - Magnetic
  - Variation (Declination)
  - True
  - Add
  - Easterly – When Converting Compass to True

Compass

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- Compass
  - Uncorrected Heading Read Off the Compass
- Deviation
  - Affects of Unknown Magnetic Fields
    - Automobile
    - Power Lines
    - Iron Deposits
    - Any Ferrous Metals in Close Proximity
    - Ignore Correction Unless Your Have Measured

Compass

- Variation (Declination)
  - Affect of Magnetic North and True North Not in Same Location
  - Varies with Location on Earth
  - Correction is in Terms of East or West
  - Correction Changes with Time

Compass

- True
  - Heading with Deviation and Variation Correction Applied
  - Referenced to as True North
- Add
- Easterly Corrections From Compass To True
- CDMVT _ C To T Correction East Error Added

Compass

- Confusion Occurs
  - Start With True From Computer Program
  - Easterly Errors Must be Subtracted When Changing from True to Compass
  - Deviation is Unknown Use 0 Correction

GPS

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- GPS
  - Location
  - Calculated Direction
  - Displays Correct Direction Only IF Moving
  - Operates from Batteries
  - Unfamiliar with Functions

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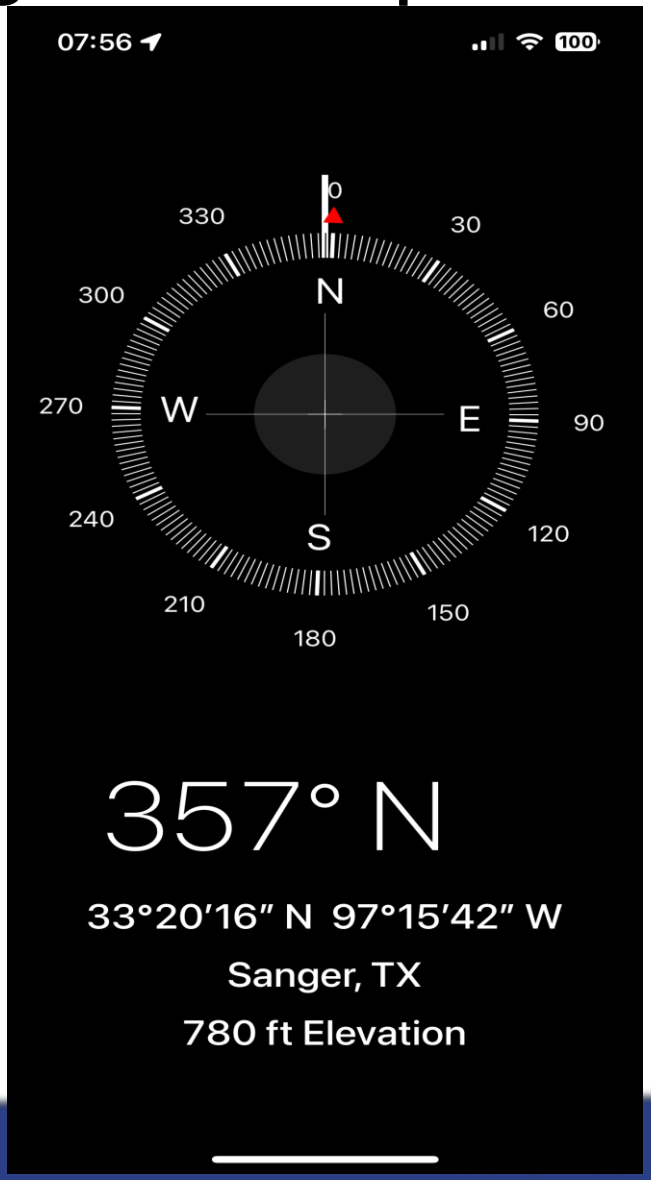
Magnet Compass

When pointed to North the Magnet reading is 3° to the West – This is an Uncorrected Compass Reading for a 3° East Variation



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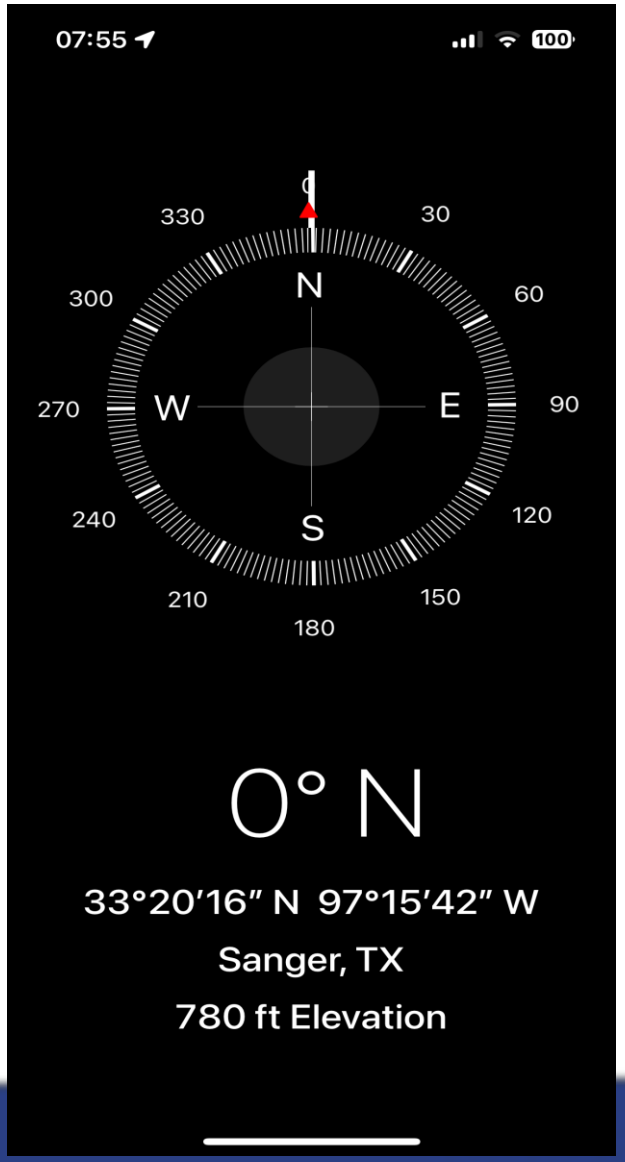
True North Compass

Compass pointed at True North – This is a Corrected Compass Reading for 3° East Variation



Dish Aiming Tools

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- Dish Aiming
  - Compass
  - Compass Rose
  - Beacons
  - Know Station
  - Landmarks
- Practice Aiming at Beacon If Possible

Dish Aiming Tools

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- Compass Rose
  - Circle Marked in Degrees
  - Adjustable Around Mast
  - Pointer on Mast
  - Set Compass Rose with Compass
  - Turn Antenna to Station to be Worked
  - Aim at to Beacon for Practice or Verification of Setting
  - Aim at Landmark to Adjust Setting Circle

Compass Rose

Dish Aiming Tools

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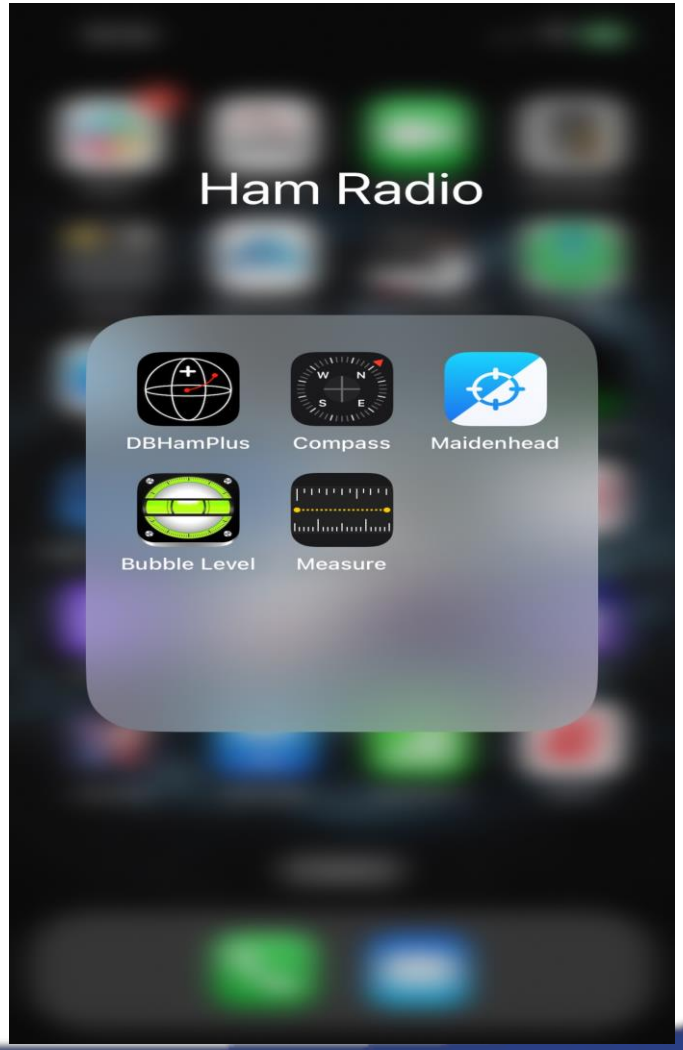
- Compass AP is set for True North
  - Correct for Magnetic Errors
    - Move Away from Automobile or Other Ferrous Material
  - Site Object on Horizon with Compass in Direction of Interest
  - Aim Dish at Objected Sited on Horizon

Dish Aiming Tools (cont.)

- iPhone Aps I Use
  - DBHamPlus
  - MaidenHead
  - Bubble Love
  - Compass



Dish Aiming Tools (cont.)

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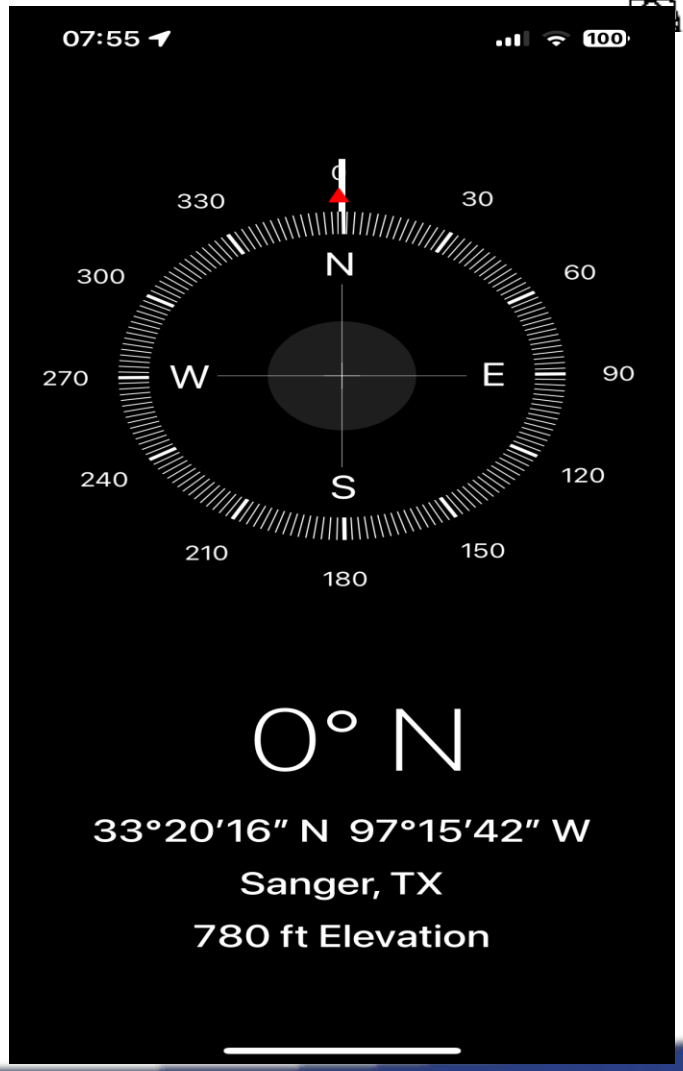
- Cell Phone AP
  - Iphone - COMPASS



DBHam Plus

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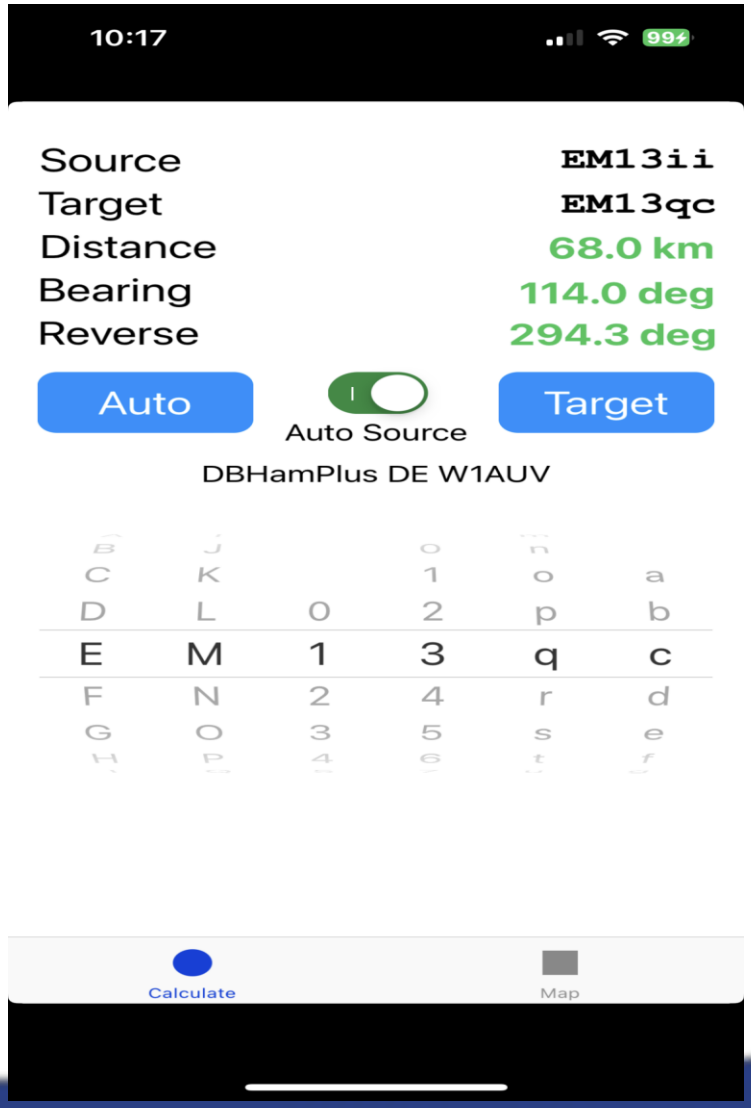
Choose Source For Your Location and Turn on Auto Source to get iPhone GPA Location

Dial in Target Stations Grid to Get Bearing to and From plus Distance



Maidenhead AP

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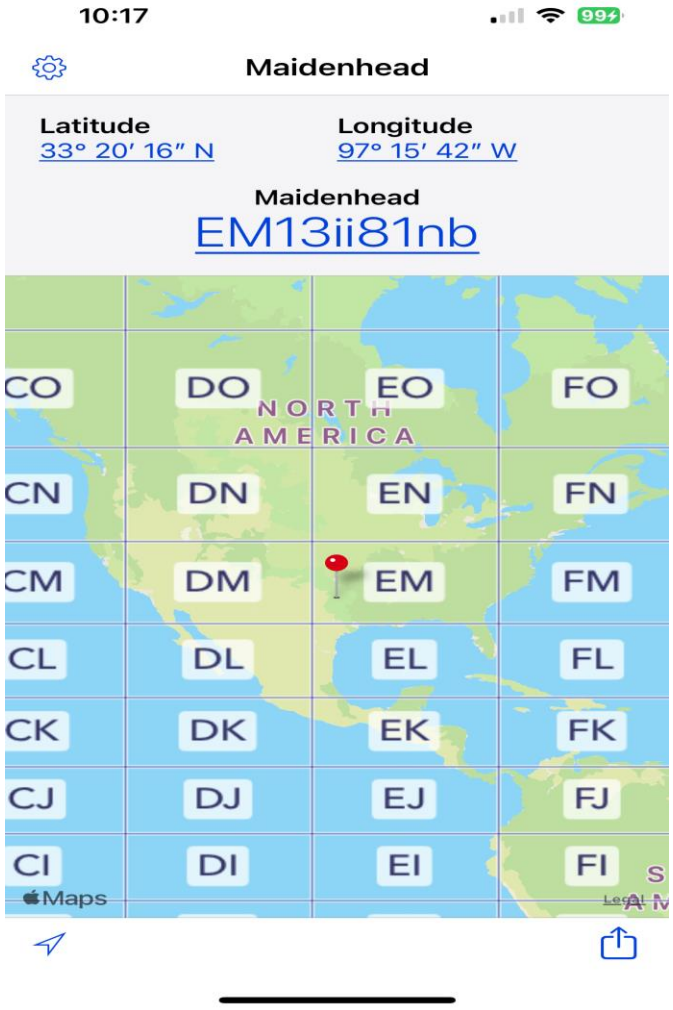
AP uses GPS location from iPhone – see settings



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Bubble Level

Good Tool for Setup of Antenna

Can be Used to Adjustment of Elevation

Adjusting Bearing Circle

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- Choose Know Location of Distant Object
- Find Objects Location and Bearing With Goggle Earth
- Example Below - Water Tower on Horizon
  - Goggle Earth

Goggle Earth

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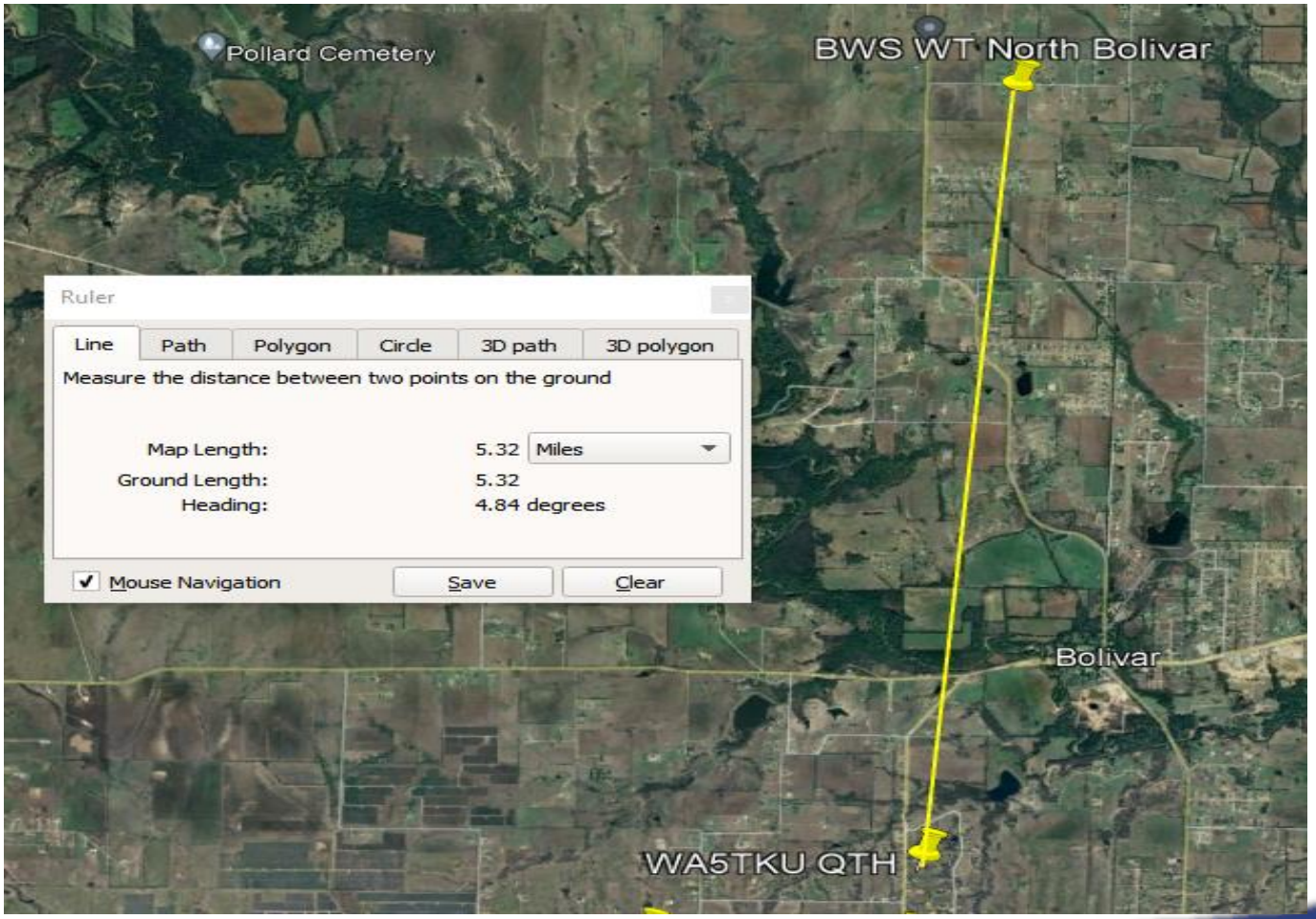
Use Ruler to Measure Bearing and Distance



Find a Know Reference Point

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I Use the Water Tower to Adjust My Home Station North Settings for Rotors

Note: Cell Tower is less that 2 years old

- Note: Water Tower on Left – It is 5° East of True North – Distance About 5 Miles

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- Arduino Aps
  - HamGPS
  - Digital compass by AXIOMATIC
  - Thanks Brad, WQ5S

Summary

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- Tools
  - Know How to Use
  - Practice Usage
  - Knowledge of Limitations
  - If Possible Visit Site and Choose an Aiming Object to Calculate Bearing for Future Use

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- References:
  - http://www.learn-orienteering.org/old/
  - http://www.thecompassstore.com/whatisdec.html
  - http://geomag.usgs.gov/faq.html
  - http://geology.isu.edu/geostac/Field_Exercise/topomaps/bearing.htm
  - http://www.tpub.com/content/administration/14220/css/14220_69.htm