

NOON

WHY

- Traditionally the NOON Sight is Very Important to Navigators as his Day Starts at NOON
- The NOON Sight gave the Navigator the Distance Run in the Past 24 Hours
- You will be learning how to obtain your Latitude from a NOON Sight Observation

WHAT

- How to determine when it is “Noon”?
- How to Find Latitude by Observing the SUN at “Noon”

HOW

- You FIRST determine WHEN NOON occurs for You
- Do a series of Sights at Your NOON
- Reduce your Sight to your Ho
- Find the SUN's Declination at the Time of NOON Sight
- Calculate the ZENITH DISTANCE
- Combine Declination and Zenith Distance to obtain Your Latitude

New Terms

- Meridian Passage
- Zenith
- Zenith Distance

Meridian Passage

- The moment in Time that the Subject Body is located on a Specific Meridian (Yours)
- All bodies have a Time of being on a given Meridian
- Celestially known as Noon with the Sun
- Usually referenced to the Sun being on the Observer's Meridian
- This is known as Local Apparent Noon

Zenith

- Indicates a Point Directly Overhead
- If an Observer is at a Body's GP, the Body is in the Observer's Zenith (directly overhead)

Zenith Distance

- Mathematically, the complement of the Observed Altitude
- Zenith Distance = $90^\circ - Ho$
- Zenith Distance is the side of the Navigation Triangle that is between the Observer and the GP of the Body

When is it NOON?

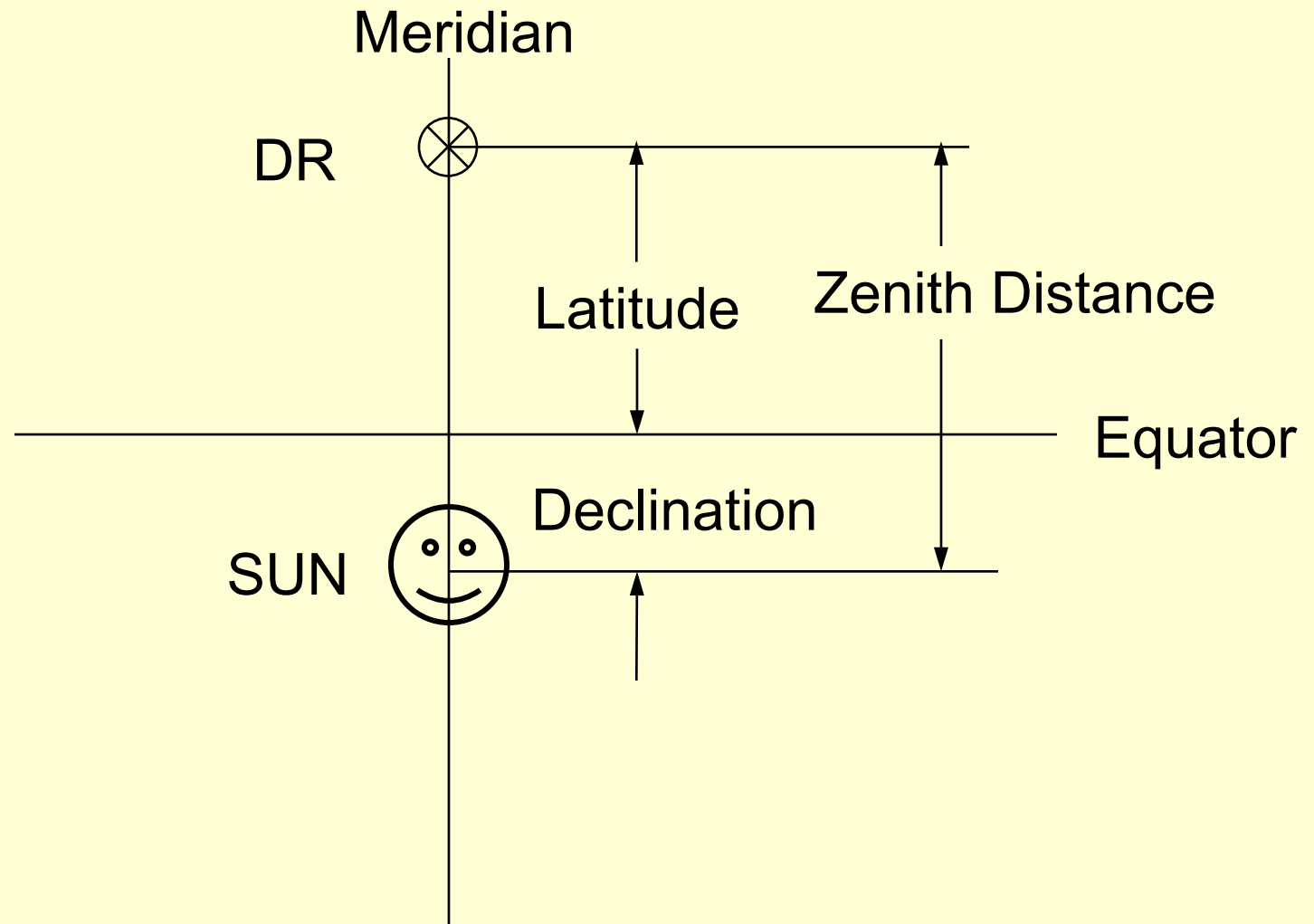
NO – it is NOT when you get hungry

NO – it is NOT 12:00:00 though it could be

NOON is the Time that the SUN *crosses* your Meridian

- Your Longitude and the GHA of the SUN are the same value

The Noon Diagram



How is the Time of Noon Determined?

- The Time of Meridian Passage is noted in the Nautical Almanac for each day.
- This Time is the Local Time at the CENTER of each Time Zone
- The Navigator MUST determine how far from the Center of his Time Zone he is located
- This angular difference is converted (Table in Almanac) to Time, which is then Added (if West of the Center) or Subtracted (if East of the Center) from/to the Meridian Passage Time as found in the Almanac
- The Time thus found is the Local Time of NOON

Example

- 11 March 2011 You are located at a DR position of 21 - 25' N 068 - 50' W
- What Time is LAN?
- Go To the Bottom of the Right Daily Page of Nautical Almanac for 11 March 2011 (in handouts)

2011 MARCH 11, 12, 13 (FRI., SAT., SUN.)

| UT | SUN | | MOON | | | | Lat. | Twilight | | Sunrise | Moonrise | | | | | |
|-------|----------|----------|----------|----------|----------|----------|------|----------|-------|---------|----------|--------------------------|--------------------------|--------------------------|--------------------------|-----|
| | GHA | Dec | GHA | <i>v</i> | Dec | <i>d</i> | | HP | Naut. | | Civil | 11 | 12 | 13 | 14 | |
| d h | ° / | ° / | ° / | ' | ° / | ' | ' | ° | h m | h m | h m | h m | h m | h m | h m | h m |
| 11 00 | 177 26.6 | S 3 56.1 | 114 04.0 | 10.8 | N22 05.3 | 4.8 | 55.2 | N 72 | 04 13 | 05 35 | 06 41 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 01 | 192 26.8 | 55.1 | 128 33.8 | 10.7 | 22 10.1 | 4.7 | 55.2 | N 70 | 04 25 | 05 38 | 06 38 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 02 | 207 26.9 | 54.1 | 143 03.5 | 10.6 | 22 14.8 | 4.6 | 55.2 | 68 | 04 34 | 05 40 | 06 35 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 03 | 222 27.1 | 53.1 | 157 33.1 | 10.6 | 22 19.4 | 4.6 | 55.2 | 66 | 04 42 | 05 42 | 06 33 | 06 04 | 06 12 | 07 11 | 08 59 | |
| 04 | 237 27.3 | 52.2 | 172 02.7 | 10.6 | 22 24.0 | 4.4 | 55.3 | 64 | 04 48 | 05 43 | 06 31 | 06 45 | 07 14 | 08 12 | 09 38 | |
| 05 | 252 27.4 | 51.2 | 186 32.3 | 10.4 | 22 28.4 | 4.3 | 55.3 | 62 | 04 53 | 05 45 | 06 29 | 07 13 | 07 49 | 08 46 | 10 05 | |
| 06 | 267 27.6 | S 3 50.2 | 201 01.7 | 10.5 | N22 32.7 | 4.1 | 55.3 | 60 | 04 57 | 05 46 | 06 27 | 07 35 | 08 14 | 09 11 | 10 26 | |
| 07 | 282 27.7 | 49.2 | 215 31.2 | 10.3 | 22 36.8 | 4.1 | 55.3 | N 58 | 05 01 | 05 47 | 06 26 | 07 53 | 08 34 | 09 30 | 10 43 | |
| 08 | 297 27.9 | 48.2 | 230 00.5 | 10.3 | 22 40.9 | 4.0 | 55.4 | 56 | 05 04 | 05 47 | 06 24 | 08 08 | 08 50 | 09 47 | 10 57 | |
| F 09 | 312 28.1 | 47.2 | 244 29.8 | 10.2 | 22 44.9 | 3.8 | 55.4 | 54 | 05 07 | 05 48 | 06 23 | 08 21 | 09 04 | 10 01 | 11 10 | |
| R 10 | 327 28.2 | 46.3 | 258 59.0 | 10.2 | 22 48.7 | 3.8 | 55.4 | 52 | 05 09 | 05 49 | 06 22 | 08 32 | 09 17 | 10 13 | 11 21 | |
| I 11 | 342 28.4 | 45.3 | 273 28.2 | 10.1 | 22 52.5 | 3.6 | 55.4 | 50 | 05 12 | 05 49 | 06 21 | 08 42 | 09 28 | 10 24 | 11 30 | |
| D 12 | 357 28.6 | S 3 44.3 | 287 57.3 | 10.0 | N22 56.1 | 3.5 | 55.5 | 45 | 05 16 | 05 50 | 06 19 | 09 04 | 09 50 | 10 46 | 11 51 | |
| A 13 | 12 28.7 | 43.3 | 302 26.3 | 10.0 | 22 59.6 | 3.4 | 55.5 | N 40 | 05 19 | 05 50 | 06 17 | 09 21 | 10 09 | 11 04 | 12 07 | |
| V 14 | 27 28.9 | 42.3 | 316 55.3 | 9.9 | 23 03.0 | 3.3 | 55.5 | 35 | 05 21 | 05 50 | 06 15 | 09 35 | 10 24 | 11 19 | 12 21 | |
| | | | | | | | | 30 | 05 22 | 05 50 | 06 14 | 09 48 | 10 37 | 11 33 | 12 33 | |

| | | | | | | | | | | | | | | | | |
|------|----------|--------------|----------|------|----------|------|------|------|-------|--------------|-------|------------|-------|-------|-------|--|
| A 13 | 12 28.7 | 43.3 | 276 42.1 | 7.9 | 23 23.0 | 2.7 | 57.0 | 52 | 18 32 | 19 08 | 19 47 | 20 31 | 21 14 | 22 02 | 22 50 | |
| Y 14 | 27 36.9 | 55.1 | 291 09.0 | 7.9 | 23 20.3 | 2.9 | 57.1 | 54 | 18 33 | 19 09 | 19 52 | 20 39 | 21 29 | 22 31 | 23 46 | |
| 15 | 42 37.1 | 54.1 | 305 35.9 | 7.9 | 23 17.4 | 3.0 | 57.1 | 56 | 18 35 | 19 13 | 19 58 | 20 25 | 21 14 | 22 18 | 23 34 | |
| 16 | 57 37.2 | 53.2 | 320 02.8 | 7.9 | 23 14.4 | 3.2 | 57.2 | 58 | 18 37 | 19 17 | 20 05 | 20 09 | 20 57 | 22 02 | 23 21 | |
| 17 | 72 37.4 | 52.2 | 334 29.7 | 7.8 | 23 11.2 | 3.3 | 57.2 | S 60 | 18 39 | 19 21 | 20 13 | 19 50 | 20 36 | 21 43 | 23 05 | |
| 18 | 87 37.6 | S 2 51.2 | 348 56.5 | 7.8 | N23 07.9 | 3.4 | 57.2 | | SUN | | | MOON | | | | |
| 19 | 102 37.7 | 50.2 | 3 23.3 | 7.8 | 23 04.5 | 3.6 | 57.3 | | Day | Eqn. of Time | Mer. | Mer. Pass. | | Age | Phase | |
| 20 | 117 37.9 | 49.2 | 17 50.1 | 7.8 | 23 00.9 | 3.7 | 57.3 | | | | Pass. | Upper | Lower | | | |
| 21 | 132 38.1 | 48.2 | 32 16.9 | 7.8 | 22 57.2 | 3.8 | 57.3 | | d | m s | m s | h m | h m | h m | d % | |
| 22 | 147 38.2 | 47.2 | 46 43.7 | 7.8 | 22 53.4 | 4.0 | 57.4 | | 11 | 10 14 | 10 06 | 12 10 | 16 58 | 04 33 | 07 35 | |
| 23 | 162 38.4 | 46.3 | 61 10.5 | 7.7 | N22 49.4 | 4.1 | 57.4 | | 12 | 09 38 | 09 30 | 12 10 | 17 51 | 05 25 | 08 45 | |
| | SD 16.1 | <i>d</i> 1.0 | SD | 15.1 | 15.3 | 15.5 | | | 13 | 09 42 | 09 34 | 12 10 | 18 46 | 06 18 | 09 55 | |

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LAN Calculation

- Meridian Passage from the nautical Almanac is 12:10 on 11 March 2011
- Your DR Longitude is 68 deg - 50 min West of Greenwich
- Now go to the Conversion of Arc to Time table in the Nautical Almanac

CONVERSION OF ARC TO TIME

| 0°-59° | | | 60°-119° | | | 120°-179° | | | 180°-239° | | | 240°-299° | | | 300°-359° | | | | 0'00 | 0'25 | 0'50 | 0'75 | | | | |
|--------|---|----|----------|---|----|-----------|----|----|-----------|----|----|-----------|----|----|-----------|----|----|----|------|------|------|------|---|----|---|----|
| ° | h | m | ° | h | m | ° | h | m | ° | h | m | ° | h | m | ° | h | m | ' | m | s | m | s | m | s | m | s |
| 0 | 0 | 00 | 60 | 4 | 00 | 120 | 8 | 00 | 180 | 12 | 00 | 240 | 16 | 00 | 300 | 20 | 00 | 0 | 0 | 00 | 0 | 01 | 0 | 02 | 0 | 03 |
| 1 | 0 | 04 | 61 | 4 | 04 | 121 | 8 | 04 | 181 | 12 | 04 | 241 | 16 | 04 | 301 | 20 | 04 | 1 | 0 | 04 | 0 | 05 | 0 | 06 | 0 | 07 |
| 2 | 0 | 08 | 62 | 4 | 08 | 122 | 8 | 08 | 182 | 12 | 08 | 242 | 16 | 08 | 302 | 20 | 08 | 2 | 0 | 08 | 0 | 09 | 0 | 10 | 0 | 11 |
| 3 | 0 | 12 | 63 | 4 | 12 | 123 | 8 | 12 | 183 | 12 | 12 | 243 | 16 | 12 | 303 | 20 | 12 | 3 | 0 | 12 | 0 | 13 | 0 | 14 | 0 | 15 |
| 4 | 0 | 16 | 64 | 4 | 16 | 124 | 8 | 16 | 184 | 12 | 16 | 244 | 16 | 16 | 304 | 20 | 16 | 4 | 0 | 16 | 0 | 17 | 0 | 18 | 0 | 19 |
| 5 | 0 | 20 | 65 | 4 | 20 | 125 | 8 | 20 | 185 | 12 | 20 | 245 | 16 | 20 | 305 | 20 | 20 | 5 | 0 | 20 | 0 | 21 | 0 | 22 | 0 | 23 |
| 6 | 0 | 24 | 66 | 4 | 24 | 126 | 8 | 24 | 186 | 12 | 24 | 246 | 16 | 24 | 306 | 20 | 24 | 6 | 0 | 24 | 0 | 25 | 0 | 26 | 0 | 27 |
| 7 | 0 | 28 | 67 | 4 | 28 | 127 | 8 | 28 | 187 | 12 | 28 | 247 | 16 | 28 | 307 | 20 | 28 | 7 | 0 | 28 | 0 | 29 | 0 | 30 | 0 | 31 |
| 8 | 0 | 32 | 68 | 4 | 32 | 128 | 8 | 32 | 188 | 12 | 32 | 248 | 16 | 32 | 308 | 20 | 32 | 8 | 0 | 32 | 0 | 33 | 0 | 34 | 0 | 35 |
| 9 | 0 | 36 | 69 | 4 | 36 | 129 | 8 | 36 | 189 | 12 | 36 | 249 | 16 | 36 | 309 | 20 | 36 | 9 | 0 | 36 | 0 | 37 | 0 | 38 | 0 | 39 |
| 48 | 3 | 12 | 108 | 7 | 12 | 168 | 11 | 12 | 228 | 15 | 12 | 288 | 19 | 12 | 348 | 23 | 12 | 48 | 3 | 12 | 3 | 13 | 3 | 14 | 3 | 15 |
| 49 | 3 | 16 | 109 | 7 | 16 | 169 | 11 | 16 | 229 | 15 | 16 | 289 | 19 | 16 | 349 | 23 | 16 | 49 | 3 | 16 | 3 | 17 | 3 | 18 | 3 | 19 |
| 50 | 3 | 20 | 110 | 7 | 20 | 170 | 11 | 20 | 230 | 15 | 20 | 290 | 19 | 20 | 350 | 23 | 20 | 50 | 3 | 20 | 3 | 21 | 3 | 22 | 3 | 23 |
| 51 | 3 | 24 | 111 | 7 | 24 | 171 | 11 | 24 | 231 | 15 | 24 | 291 | 19 | 24 | 351 | 23 | 24 | 51 | 3 | 24 | 3 | 25 | 3 | 26 | 3 | 27 |
| 52 | 3 | 28 | 112 | 7 | 28 | 172 | 11 | 28 | 232 | 15 | 28 | 292 | 19 | 28 | 352 | 23 | 28 | 52 | 3 | 28 | 3 | 29 | 3 | 30 | 3 | 31 |
| 53 | 3 | 32 | 113 | 7 | 32 | 173 | 11 | 32 | 233 | 15 | 32 | 293 | 19 | 32 | 353 | 23 | 32 | 53 | 3 | 32 | 3 | 33 | 3 | 34 | 3 | 35 |
| 54 | 3 | 36 | 114 | 7 | 36 | 174 | 11 | 36 | 234 | 15 | 36 | 294 | 19 | 36 | 354 | 23 | 36 | 54 | 3 | 36 | 3 | 37 | 3 | 38 | 3 | 39 |
| 55 | 3 | 40 | 115 | 7 | 40 | 175 | 11 | 40 | 235 | 15 | 40 | 295 | 19 | 40 | 355 | 23 | 40 | 55 | 3 | 40 | 3 | 41 | 3 | 42 | 3 | 43 |
| 56 | 3 | 44 | 116 | 7 | 44 | 176 | 11 | 44 | 236 | 15 | 44 | 296 | 19 | 44 | 356 | 23 | 44 | 56 | 3 | 44 | 3 | 45 | 3 | 46 | 3 | 47 |
| 57 | 3 | 48 | 117 | 7 | 48 | 177 | 11 | 48 | 237 | 15 | 48 | 297 | 19 | 48 | 357 | 23 | 48 | 57 | 3 | 48 | 3 | 49 | 3 | 50 | 3 | 51 |
| 58 | 3 | 52 | 118 | 7 | 52 | 178 | 11 | 52 | 238 | 15 | 52 | 298 | 19 | 52 | 358 | 23 | 52 | 58 | 3 | 52 | 3 | 53 | 3 | 54 | 3 | 55 |
| 59 | 3 | 56 | 119 | 7 | 56 | 179 | 11 | 56 | 239 | 15 | 56 | 299 | 19 | 56 | 359 | 23 | 56 | 59 | 3 | 56 | 3 | 57 | 3 | 58 | 3 | 59 |

The above table is for converting expressions in arc to their equivalent in time; its main use in this Almanac is for the conversion of longitude for application to LMT (*added if west, subtracted if east*) to give UT or vice versa, particularly in the case of sunrise, sunset, etc.

LAN Calculation

| | |
|------------------|-----------------------------|
| 12:10:00 | Meridian Passage |
| + 4:32:00 | 68° Longitude (West) |
| <u>+ 03:20</u> | 50' Longitude (West) |
| 16:45:20 | GMT of LAN at your location |
| <u>- 5:00:00</u> | Zone Description |
| 11:45:20 | LMT of LAN at your location |

(we should be shooting the Sun
at least 15-20 minutes earlier)

**Note: that our Longitude estimate is very critical for
determining the time of LAN & when we start
'shooting'**

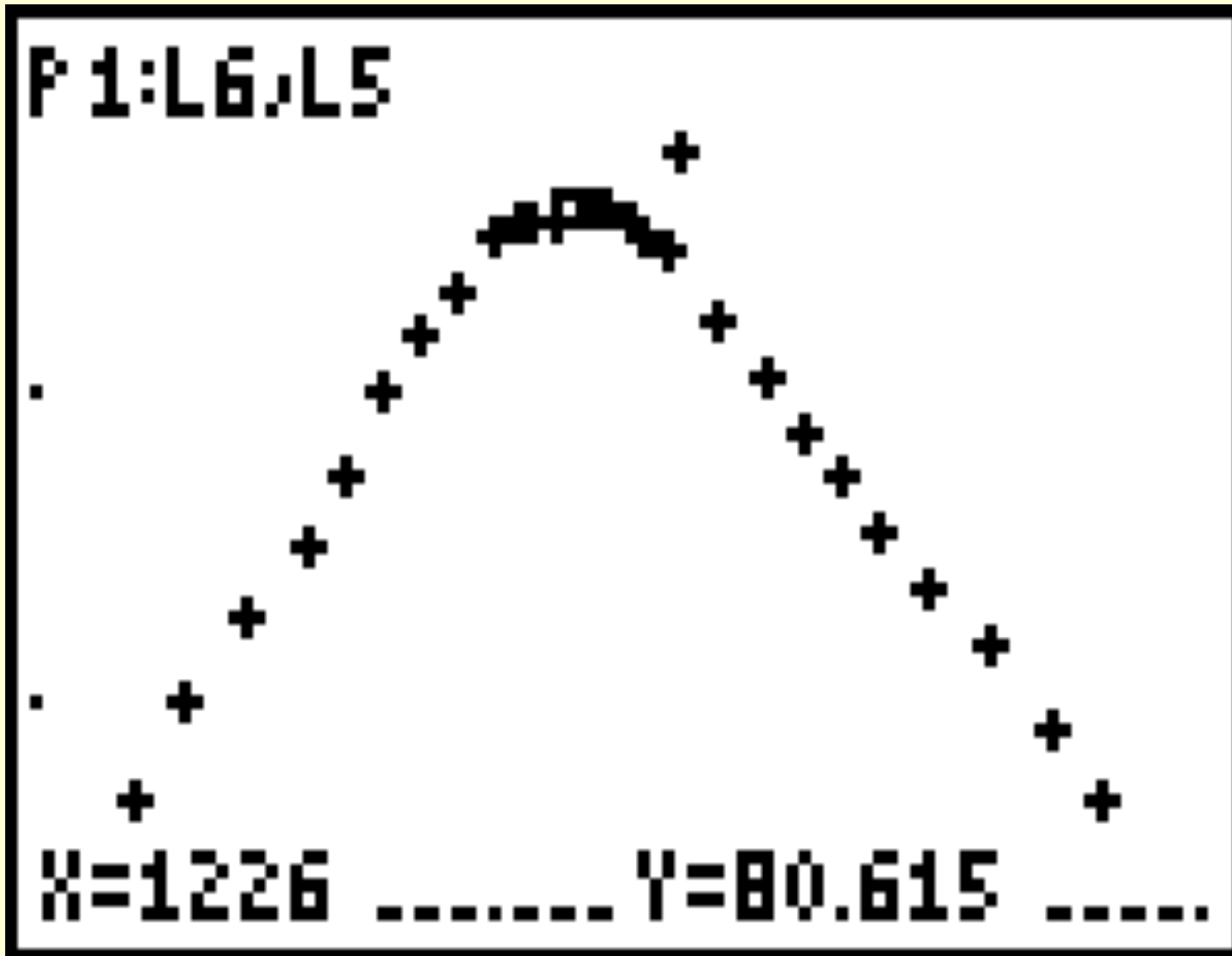
The NOON Sight – 1 Before and During

- The Navigator prepares to start shooting the SUN approximately 15 - 20 minutes before LAN (approx. 1125-1130 in our Example)
- Sights are taken as every minute until 3 minutes before LAN (1142), then taken at as quickly as possible until 2 minutes before LAN

The NOON Sight – 2 During and After

- During that 4 minutes when the Navigator is shooting the SUN the Navigator should notice that the SUN has stopped rising, then hangs in place, then starts to fall.
- Sights are then taken for about 5 minutes or more after LAN to ensure that the Sun is indeed falling

Graphing Multiple Sights Before and After Noon



Determination of Latitude

- Correct the Sextant Altitude (H_s) to your Observed Altitude (H_o) in the usual manner
- Subtract the H_o from 90° – this is your Zenith Distance
- Find the Declination of the SUN for the Time of your Sight (in GMT) in the Nautical Almanac

EXAMPLE DATA

- 11 March 2011 You are located at
21° 25' N 068° 50' W
- We obtained an altitude of 64° 55.4' for the Sun's Lower Limb at 11:45:20 LMT. Our height of eye is 115' above sea level. Our Sextant IC is 0'.
- Go To Table A2 of the Nautical Almanac for the necessary Correction values (in handouts)

A2 ALTITUDE CORRECTION TABLES 10°-90°—SUN, STARS, PLANETS

| OCT.—MAR. SUN | | | APR.—SEPT. | | | STARS AND PLANETS | | | | DIP | | | | |
|---------------|------------|------------|------------|------------|------------|-------------------|-------------------|----------------|------------------------------|------------|-------------------|------------|------------|-------------------|
| App. Alt. | Lower Limb | Upper Limb | App. Alt. | Lower Limb | Upper Limb | App. Alt. | Corr ⁿ | App. Alt. | Additional Corr ⁿ | Ht. of Eye | Corr ⁿ | Ht. of Eye | Ht. of Eye | Corr ⁿ |
| 9 33 | | | 9 39 | | | 9 55 | | | 2011 | m | | ft. | m | |
| 9 45 | +10.8 | -21.5 | 9 50 | +10.6 | -21.2 | 10 07 | -5.3 | | VENUS | 2.4 | -2.8 | 8.0 | 1.0 | -1.8 |
| 9 56 | +10.9 | -21.4 | 10 02 | +10.7 | -21.1 | 10 07 | -5.2 | Jan. 1-Feb. 18 | | 2.6 | -2.9 | 8.6 | 1.5 | -2.2 |
| 10 08 | +11.0 | -21.3 | 10 14 | +10.8 | -21.0 | 10 20 | -5.1 | | | 2.8 | -3.0 | 9.2 | 2.0 | -2.5 |
| 10 20 | +11.1 | -21.2 | 10 27 | +10.9 | -20.9 | 10 32 | -5.0 | | | 3.0 | -3.1 | 9.8 | 2.5 | -2.8 |
| 10 33 | +11.2 | -21.1 | 10 40 | +11.0 | -20.8 | 10 46 | -4.9 | 0 +0.2 | | 3.2 | -3.2 | 10.5 | 3.0 | -3.0 |
| 10 46 | +11.3 | -21.0 | 10 53 | +11.1 | -20.7 | 10 59 | -4.8 | 41 +0.1 | | 3.4 | -3.3 | 11.2 | | |
| 11 00 | +11.4 | -20.9 | 11 07 | +11.2 | -20.6 | 11 14 | -4.7 | 76 | Feb. 19-Dec. 31 | 3.6 | -3.4 | 11.9 | See table | |
| 11 15 | +11.5 | -20.8 | 11 22 | +11.3 | -20.5 | 11 29 | -4.6 | | | 3.8 | -3.4 | 12.6 | ← | |
| 11 30 | +11.6 | -20.7 | 11 37 | +11.4 | -20.4 | 12 00 | -4.5 | 0 +0.1 | | 4.0 | -3.5 | 13.3 | m | |
| 11 45 | +11.8 | -20.5 | 12 10 | +11.5 | -20.3 | 12 00 | -4.4 | 60 | MARS | 4.3 | -3.6 | 14.1 | 20 | -7.9 |
| 12 01 | +11.9 | -20.4 | 12 17 | +11.6 | -20.2 | 12 17 | -4.3 | | Jan. 1-Dec. 31 | 4.5 | -3.8 | 14.9 | 22 | -8.3 |
| 12 18 | +12.0 | -20.3 | 12 27 | +11.7 | -20.1 | 12 35 | -4.2 | | | 4.7 | -3.8 | 15.7 | 24 | -8.6 |
| 12 36 | +12.1 | -20.2 | 12 45 | +11.9 | -19.9 | 13 12 | -4.0 | 0 +0.1 | | 5.0 | -3.9 | 16.5 | 26 | -9.0 |
| 13 14 | +12.2 | -20.1 | 13 04 | +12.0 | -19.8 | 13 32 | -3.9 | 60 | | 5.2 | -4.1 | 17.4 | 28 | -9.3 |
| 13 34 | +12.3 | -20.0 | 13 24 | +12.1 | -19.7 | 13 53 | -3.8 | | | 5.5 | -4.1 | 18.3 | 30 | -9.6 |
| 13 55 | +12.4 | -19.9 | 13 44 | +12.2 | -19.6 | 14 16 | -3.7 | | | 5.8 | -4.2 | 19.1 | 32 | -10.0 |
| 14 17 | +12.5 | -19.8 | 14 06 | +12.3 | -19.5 | 14 39 | -3.6 | | | 6.1 | -4.4 | 20.1 | 34 | -10.3 |
| 14 41 | +12.6 | -19.7 | 14 29 | +12.3 | -19.5 | 15 03 | -3.5 | | | 6.3 | -4.4 | 21.0 | 36 | -10.6 |
| 15 05 | +12.7 | -19.6 | 14 53 | +12.5 | -19.3 | 15 29 | -3.5 | | | 6.6 | -4.5 | 22.0 | 38 | -10.8 |
| 15 31 | +12.9 | -19.5 | 15 18 | +12.6 | -19.2 | 15 56 | -3.4 | | | 6.9 | -4.6 | 22.9 | | |
| 15 59 | +13.0 | -19.3 | 15 45 | +12.7 | -19.1 | 16 25 | -3.3 | | | 7.2 | -4.7 | 23.9 | 40 | -11.1 |
| 16 27 | +13.1 | -19.2 | 16 13 | +12.8 | -19.0 | 16 55 | -3.2 | | | 7.5 | -4.8 | 24.9 | 42 | -11.4 |
| 16 58 | +13.2 | -19.1 | 16 43 | +12.9 | -18.9 | 17 27 | -3.1 | | | 7.9 | -4.9 | 26.0 | 44 | -11.7 |
| 17 30 | +13.3 | -19.0 | 17 14 | +13.0 | -18.8 | 18 01 | -2.9 | | | 8.2 | -5.0 | 27.1 | 46 | -11.9 |
| 18 05 | +13.4 | -18.9 | 17 47 | +13.1 | -18.7 | 18 37 | -2.8 | | | 8.5 | -5.2 | 28.1 | 48 | -12.2 |
| 18 41 | +13.5 | -18.8 | 18 23 | +13.2 | -18.6 | 19 16 | -2.7 | | | 8.8 | -5.2 | 29.2 | | |
| 19 20 | +13.6 | -18.7 | 19 00 | +13.3 | -18.5 | 19 56 | -2.6 | | | 9.2 | -5.3 | 30.4 | ft. | |
| 20 02 | +13.7 | -18.6 | 19 41 | +13.4 | -18.4 | 20 40 | -2.5 | | | 9.5 | -5.4 | 31.5 | 2 | -1.4 |
| 20 46 | +13.8 | -18.5 | 20 24 | +13.5 | -18.3 | 21 27 | -2.4 | | | 9.9 | -5.5 | 32.7 | 4 | -1.9 |
| 21 34 | +13.9 | -18.4 | 21 10 | +13.6 | -18.2 | 22 17 | -2.3 | | | 10.3 | -5.6 | 33.9 | 6 | -2.4 |
| 22 25 | +14.0 | -18.3 | 21 59 | +13.7 | -18.1 | 23 11 | -2.2 | | | 10.6 | -5.7 | 35.1 | 8 | -2.7 |
| 23 20 | +14.1 | -18.2 | 22 52 | +13.8 | -18.0 | 24 09 | -2.1 | | | 11.0 | -5.8 | 36.3 | 10 | -3.1 |
| 24 20 | +14.2 | -18.1 | 23 49 | +13.9 | -17.9 | 25 12 | -2.0 | | | 11.4 | -5.9 | 37.6 | See table | |
| 25 24 | +14.3 | -18.0 | 24 51 | +14.0 | -17.8 | 26 20 | -1.9 | | | 11.8 | -6.0 | 38.9 | ← | |
| 26 34 | +14.4 | -17.9 | 25 58 | +14.1 | -17.7 | 27 34 | -1.8 | | | 12.2 | -6.1 | 40.1 | ft. | |
| 27 50 | +14.5 | -17.8 | 27 11 | +14.2 | -17.6 | 28 54 | -1.7 | | | 12.6 | -6.2 | 41.5 | 70 | -8.1 |
| 29 13 | +14.6 | -17.7 | 28 31 | +14.3 | -17.5 | 30 22 | -1.6 | | | 13.0 | -6.3 | 42.8 | 75 | -8.4 |
| 30 44 | +14.7 | -17.6 | 29 58 | +14.4 | -17.4 | 31 58 | -1.5 | | | 13.4 | -6.4 | 44.2 | 80 | -8.7 |
| 32 24 | +14.8 | -17.5 | 31 33 | +14.5 | -17.3 | 33 43 | -1.4 | | | 13.8 | -6.5 | 45.5 | 85 | -8.9 |
| 34 15 | +14.9 | -17.4 | 33 18 | +14.6 | -17.2 | 35 38 | -1.3 | | | 14.2 | -6.6 | 46.9 | 90 | -9.2 |
| 36 17 | +15.0 | -17.3 | 35 15 | +14.7 | -17.1 | 37 45 | -1.2 | | | 14.7 | -6.7 | 48.4 | 95 | -9.5 |
| 38 34 | +15.1 | -17.2 | 37 24 | +14.8 | -17.0 | 40 06 | -1.1 | | | 15.1 | -6.9 | 49.8 | | |
| 41 06 | +15.2 | -17.1 | 39 48 | +14.9 | -16.9 | 42 42 | -1.0 | | | 15.5 | -7.0 | 51.3 | 100 | -9.7 |
| 43 56 | +15.3 | -17.0 | 42 28 | +15.0 | -16.8 | 45 34 | -0.9 | | | 16.0 | -7.0 | 52.8 | 105 | -9.9 |
| 47 07 | +15.4 | -16.9 | 45 29 | +15.1 | -16.7 | 48 45 | -0.8 | | | 16.5 | -7.1 | 54.3 | 110 | -10.2 |
| 50 43 | +15.5 | -16.8 | 48 52 | +15.2 | -16.6 | 52 16 | -0.7 | | | 16.9 | -7.2 | 55.8 | 120 | -10.8 |
| 54 46 | +15.6 | -16.7 | 52 41 | +15.3 | -16.5 | 56 09 | -0.6 | | | 17.4 | -7.3 | 57.4 | 125 | -10.8 |
| 59 21 | +15.7 | -16.6 | 56 59 | +15.4 | -16.4 | 60 26 | -0.5 | | | 17.9 | -7.4 | 58.9 | 130 | -11.1 |
| 64 28 | +15.8 | -16.5 | 61 50 | +15.5 | -16.3 | 65 06 | -0.4 | | | 18.4 | -7.5 | 60.5 | 135 | -11.3 |
| 70 10 | +15.9 | -16.4 | 67 15 | +15.6 | -16.2 | 70 09 | -0.3 | | | 18.8 | -7.7 | 62.1 | 140 | -11.5 |
| 76 24 | +16.0 | -16.3 | 73 14 | +15.7 | -16.1 | 75 32 | -0.2 | | | 19.3 | -7.8 | 63.8 | 145 | -11.7 |
| 83 05 | +16.1 | -16.2 | 79 42 | +15.8 | -16.0 | 81 12 | -0.1 | | | 19.8 | -7.9 | 65.4 | 150 | -11.9 |
| 90 00 | | | 86 31 | +15.9 | -15.9 | 87 03 | 0.0 | | | 20.4 | -8.0 | 67.1 | 155 | -12.1 |
| | | | 90 00 | | | 90 00 | 0.0 | | | 20.9 | -8.1 | 68.8 | | |
| | | | | | | | | | | 21.4 | -8.1 | 70.5 | | |

App. Alt. = Apparent altitude = Sextant altitude corrected for index error and dip.

Table A2 Information Page

| | | | | |
|------|------|------|------------|--------------|
| 12.2 | -6.1 | 40.1 | ft. | |
| 12.6 | -6.2 | 41.5 | 70 | -8.1 |
| 13.0 | -6.3 | 42.8 | 75 | -8.4 |
| 13.4 | -6.4 | 44.2 | 80 | -8.7 |
| 13.8 | -6.5 | 45.5 | 85 | -8.9 |
| 14.2 | -6.6 | 46.9 | 90 | -9.2 |
| 14.7 | -6.7 | 48.4 | 95 | -9.5 |
| 15.1 | -6.8 | 49.8 | | |
| 15.5 | -6.9 | 51.3 | 100 | -9.7 |
| 16.0 | -7.0 | 52.8 | 105 | -9.9 |
| 16.5 | -7.1 | 54.3 | 110 | -10.2 |
| 16.9 | -7.2 | 55.8 | 115 | -10.4 |
| 17.4 | -7.3 | 57.4 | 120 | -10.8 |
| 17.9 | -7.4 | 58.9 | 125 | -10.8 |
| 18.4 | -7.5 | 60.5 | | |
| 18.8 | -7.6 | 62.1 | 130 | -11.1 |
| 19.3 | -7.7 | 63.8 | 135 | -11.3 |
| 19.8 | -7.8 | 65.4 | 140 | -11.5 |
| 20.4 | -7.9 | 67.1 | 145 | -11.7 |
| 20.9 | -8.0 | 68.8 | 150 | -11.9 |
| 21.4 | -8.1 | 70.5 | 155 | -12.1 |

for index error and dip.

**Insert the Height of Eye correction and Compute Ha
Then go back to Table A2 with the Ha to get the Alt Corr.**

| Step 1 Correct Hs to get Ho | | | | |
|-----------------------------|--|----------------|-----------|----------------------|
| 1-1 | Record Maximum Sextant Height (Hs = peak height of the Sun at Noon), and mark limb | Lower Upper | Hs | 64 ^o 55.4 |
| 1-2 | Record Index Correction (mark sign + if off, - if on) | | IC | Off + 0 On - |
| 1-3 | Record eye height (HE) and look up Dip Correction on the right-hand side of Table A2, front of Almanac (T-8 in notes) | | Dip | - 10.4 |
| | HE (ft) | | | 115 |
| | | | | Subtract |
| 1-4 | Record Maximum Sextant Height (Hs = peak height of the Sun at Noon), and mark limb | | Ha | 64 ^o 45 |
| 1-5 | Look up the altitude correction on the left-hand side of Table A2, front of the Almanac (T-8 in notes) (correction depends on Ha, Limb, and month) | | Alt corr. | - |

Starpath Form 107
for
Local Apparent Noon Sights

Now go back to Table A2 with the Ha to get the Alt Corr.

A2 ALTITUDE CORRECTION TABLES 10°-90°—SUN, STARS, PLANETS

| OCT.—MAR. SUN | | | APR.—SEPT. | | | STARS AND PLANETS | | | | DIP | | | | |
|---------------|------------|------------|------------|------------|------------|-------------------|-------------------|-----------------|------------------------------|------------|-------------------|------------|------------|-------------------|
| App. Alt. | Lower Limb | Upper Limb | App. Alt. | Lower Limb | Upper Limb | App. Alt. | Corr ⁿ | App. Alt. | Additional Corr ⁿ | Ht. of Eye | Corr ⁿ | Ht. of Eye | Ht. of Eye | Corr ⁿ |
| 9 33 | | | 9 39 | | | 9 55 | | 2011 | | m | | ft. | m | |
| 9 45 | +10.8 | -21.5 | 9 50 | +10.6 | -21.2 | 10 07 | -5.3 | VENUS | | 2.4 | -2.8 | 8.0 | 1.0 | -1.8 |
| 9 56 | +10.9 | -21.4 | 10 02 | +10.7 | -21.1 | 10 07 | -5.2 | Jan. 1–Feb. 18 | | 2.6 | -2.9 | 8.6 | 1.5 | -2.2 |
| 10 08 | +11.0 | -21.3 | 10 14 | +10.8 | -21.0 | 10 20 | -5.1 | | | 2.8 | -3.0 | 9.2 | 2.0 | -2.5 |
| 10 20 | +11.1 | -21.2 | 10 27 | +10.9 | -20.9 | 10 32 | -5.0 | | | 3.0 | -3.0 | 9.8 | 2.5 | -2.8 |
| 10 33 | +11.2 | -21.1 | 10 40 | +11.0 | -20.8 | 10 46 | -4.9 | | | 3.2 | -3.1 | 10.5 | 3.0 | -3.0 |
| 10 46 | +11.3 | -21.0 | 10 53 | +11.1 | -20.7 | 10 59 | -4.8 | | | 3.4 | -3.3 | 11.2 | | |
| 11 00 | +11.4 | -20.9 | 11 07 | +11.2 | -20.6 | 11 14 | -4.7 | Feb. 19–Dec. 31 | | 3.6 | -3.4 | 11.9 | See table | |
| 11 15 | +11.5 | -20.8 | 11 22 | +11.3 | -20.5 | 11 29 | -4.6 | | | 3.8 | -3.4 | 12.6 | ← | |
| 11 30 | +11.6 | -20.7 | 11 37 | +11.4 | -20.4 | 12 00 | -4.5 | | | 4.0 | -3.5 | 13.3 | m | |
| 11 45 | +11.7 | -20.6 | 12 10 | +11.5 | -20.3 | 12 00 | -4.4 | | | 4.3 | -3.7 | 14.1 | 20 | -7.9 |
| 12 01 | +11.8 | -20.5 | 12 17 | +11.6 | -20.2 | 12 17 | -4.3 | MARS | | 4.5 | -3.8 | 14.9 | 24 | -8.6 |
| 12 18 | +11.9 | -20.4 | 12 27 | +11.7 | -20.1 | 12 35 | -4.2 | Jan. 1–Dec. 31 | | 4.7 | -3.8 | 15.7 | 26 | -9.0 |
| 12 36 | +12.0 | -20.3 | 12 45 | +11.8 | -20.0 | 12 53 | -4.1 | | | 5.0 | -3.9 | 16.5 | 28 | -9.3 |
| 12 54 | +12.1 | -20.2 | 13 04 | +11.9 | -19.9 | 13 12 | -4.0 | | | 5.2 | -4.1 | 17.4 | | |
| 13 14 | +12.2 | -20.1 | 13 24 | +12.0 | -19.8 | 13 32 | -3.9 | | | 5.5 | -4.1 | 18.3 | 30 | -9.6 |
| 13 34 | +12.3 | -20.0 | 13 44 | +12.1 | -19.7 | 13 53 | -3.8 | | | 5.8 | -4.2 | 19.1 | 32 | -10.0 |
| 13 55 | +12.4 | -19.9 | 14 06 | +12.2 | -19.6 | 14 16 | -3.7 | | | 6.1 | -4.4 | 20.1 | 34 | -10.3 |
| 14 17 | +12.5 | -19.8 | 14 29 | +12.3 | -19.5 | 14 39 | -3.6 | | | 6.3 | -4.4 | 21.0 | 36 | -10.6 |
| 14 41 | +12.6 | -19.7 | 14 53 | +12.4 | -19.4 | 15 03 | -3.5 | | | 6.6 | -4.5 | 22.0 | 38 | -10.8 |
| 15 05 | +12.7 | -19.6 | 15 18 | +12.5 | -19.3 | 15 29 | -3.5 | | | 6.9 | -4.6 | 22.9 | | |
| 15 31 | +12.8 | -19.5 | 15 45 | +12.6 | -19.2 | 15 56 | -3.3 | | | 7.2 | -4.7 | 23.9 | 40 | -11.1 |
| 15 59 | +12.9 | -19.4 | 16 13 | +12.7 | -19.1 | 16 25 | -3.2 | | | 7.5 | -4.8 | 24.9 | 42 | -11.4 |
| 16 27 | +13.0 | -19.3 | 16 43 | +12.8 | -19.0 | 16 55 | -3.2 | | | 7.9 | -4.9 | 26.0 | 44 | -11.7 |
| 16 58 | +13.1 | -19.2 | 17 14 | +12.9 | -18.9 | 17 27 | -3.1 | | | 8.2 | -5.0 | 27.1 | 46 | -11.9 |
| 17 30 | +13.2 | -19.1 | 17 47 | +13.0 | -18.8 | 18 01 | -2.9 | | | 8.5 | -5.2 | 28.1 | 48 | -12.2 |
| 18 05 | +13.3 | -19.0 | 18 23 | +13.1 | -18.7 | 18 37 | -2.8 | | | 8.8 | -5.2 | 29.2 | | |
| 18 41 | +13.4 | -18.9 | 18 50 | +13.2 | -18.6 | 19 16 | -2.7 | | | 9.2 | -5.3 | 30.4 | ft. | |
| 19 20 | +13.5 | -18.8 | 19 00 | +13.3 | -18.5 | 19 56 | -2.6 | | | 9.5 | -5.4 | 31.5 | 2 | -1.4 |
| 20 02 | +13.6 | -18.7 | 19 41 | +13.3 | -18.5 | 20 40 | -2.5 | | | 9.9 | -5.5 | 32.7 | 4 | -1.9 |
| 20 46 | +13.7 | -18.6 | 20 24 | +13.4 | -18.4 | 21 27 | -2.5 | | | 10.3 | -5.6 | 33.9 | 6 | -2.4 |
| 21 34 | +13.8 | -18.5 | 21 10 | +13.5 | -18.3 | 22 17 | -2.4 | | | 10.6 | -5.7 | 35.1 | 8 | -2.7 |
| 22 25 | +13.9 | -18.4 | 21 59 | +13.6 | -18.2 | 23 11 | -2.3 | | | 11.0 | -5.8 | 36.3 | 10 | -3.1 |
| 23 20 | +14.0 | -18.3 | 22 52 | +13.7 | -18.1 | 24 09 | -2.2 | | | 11.4 | -5.9 | 37.6 | See table | |
| 24 20 | +14.1 | -18.2 | 23 49 | +13.8 | -18.0 | 25 12 | -2.1 | | | 11.8 | -6.0 | 38.9 | ← | |
| 25 24 | +14.2 | -18.1 | 24 51 | +13.9 | -17.9 | 26 20 | -2.0 | | | 12.2 | -6.2 | 40.1 | ft. | |
| 26 34 | +14.3 | -18.0 | 25 58 | +14.0 | -17.8 | 27 34 | -1.9 | | | 12.6 | -6.3 | 41.5 | 70 | -8.1 |
| 27 50 | +14.4 | -17.9 | 27 11 | +14.1 | -17.7 | 28 54 | -1.8 | | | 13.0 | -6.4 | 42.8 | 75 | -8.4 |
| 29 13 | +14.5 | -17.8 | 28 31 | +14.2 | -17.6 | 30 22 | -1.7 | | | 13.4 | -6.4 | 44.2 | 80 | -8.7 |
| 30 44 | +14.6 | -17.7 | 29 58 | +14.3 | -17.5 | 31 58 | -1.6 | | | 13.8 | -6.5 | 45.5 | 85 | -8.9 |
| 32 24 | +14.7 | -17.6 | 31 33 | +14.4 | -17.4 | 33 43 | -1.5 | | | 14.2 | -6.6 | 46.9 | 90 | -9.2 |
| 34 15 | +14.8 | -17.5 | 33 18 | +14.5 | -17.3 | 35 38 | -1.4 | | | 14.7 | -6.7 | 48.4 | 95 | -9.5 |
| 36 17 | +14.9 | -17.4 | 35 15 | +14.6 | -17.2 | 37 45 | -1.3 | | | 15.1 | -6.8 | 49.8 | | |
| 38 34 | +15.0 | -17.3 | 37 24 | +14.7 | -17.1 | 40 06 | -1.2 | | | 15.5 | -6.9 | 51.3 | 100 | -9.7 |
| 41 06 | +15.1 | -17.2 | 39 48 | +14.8 | -17.0 | 42 42 | -1.1 | | | 16.0 | -7.0 | 52.8 | 105 | -9.9 |
| 43 56 | +15.2 | -17.1 | 42 28 | +14.9 | -16.9 | 45 34 | -1.0 | | | 16.5 | -7.1 | 54.3 | 110 | -10.2 |
| 47 07 | +15.3 | -17.0 | 45 29 | +15.0 | -16.8 | 48 45 | -0.9 | | | 16.9 | -7.2 | 55.8 | 115 | -10.4 |
| 50 43 | +15.4 | -16.9 | 48 52 | +15.1 | -16.7 | 52 16 | -0.8 | | | 17.4 | -7.4 | 57.4 | 120 | -10.6 |
| 54 15 | +15.5 | -16.8 | 52 41 | +15.2 | -16.6 | 56 09 | -0.7 | | | 17.9 | -7.4 | 58.9 | 125 | -10.8 |
| 58 00 | +15.6 | -16.7 | 56 59 | +15.3 | -16.5 | 60 26 | -0.6 | | | 18.4 | -7.5 | 60.5 | | |
| 62 00 | +15.7 | -16.6 | 61 50 | +15.4 | -16.4 | 65 06 | -0.5 | | | 18.8 | -7.6 | 62.1 | 130 | -11.1 |
| 66 15 | +15.8 | -16.5 | 67 15 | +15.5 | -16.3 | 70 09 | -0.4 | | | 19.3 | -7.7 | 63.8 | 135 | -11.3 |
| 70 45 | +15.9 | -16.4 | 73 14 | +15.6 | -16.2 | 75 32 | -0.3 | | | 19.8 | -7.8 | 65.4 | 140 | -11.5 |
| 75 00 | +16.0 | -16.3 | 79 42 | +15.7 | -16.1 | 81 12 | -0.2 | | | 20.4 | -7.9 | 67.1 | 145 | -11.7 |
| 80 00 | +16.1 | -16.2 | 86 31 | +15.8 | -16.0 | 87 03 | -0.1 | | | 20.9 | -8.0 | 68.8 | 150 | -11.9 |
| 85 00 | +16.2 | -16.1 | 90 00 | +15.9 | -15.9 | 90 00 | 0.0 | | | 21.4 | -8.1 | 70.5 | 155 | -12.1 |

App. Alt. = Apparent altitude = Sextant altitude corrected for index error and dip.

For the SUN's Lower Limb in March with an Ha of **64° 45'**, we find that the Alt Corr. is **+15.8'**

| | | | | | |
|-------|-------|-------|-------|-------|---|
| 43 56 | +15.2 | -17.1 | 45 29 | +15.0 | - |
| 47 07 | +15.3 | -17.0 | 48 52 | +15.1 | - |
| 50 43 | +15.4 | -16.9 | 52 41 | +15.2 | - |
| 54 46 | +15.5 | -16.8 | 56 59 | +15.3 | - |
| 59 21 | +15.6 | -16.7 | 61 50 | +15.4 | - |
| 64 28 | +15.7 | -16.6 | 67 15 | +15.5 | - |
| 70 10 | +15.8 | -16.5 | 73 14 | +15.6 | - |
| 76 24 | +15.9 | -16.4 | 79 42 | +15.7 | - |

| Step 1 Correct Hs to get Ho | | | | |
|-----------------------------|--|----------------|-----------|-----------------|
| 1-1 | Record Maximum Sextant Height (Hs = peak height of the Sun at Noon), and mark limb | Lower Upper | Hs | 64 ° 55.4 |
| 1-2 | Record Index Correction (mark sign + if off, - if on) | | IC | Off + 0 On - |
| 1-3 | Record eye height (HE) and look up Dip Correction on the right-hand side of Table A2, front of Almanac (T-8 in notes) | | Dip | - 10.4 |
| | | HE (ft) | 115 | |
| 1-4 | Record Maximum Sextant Height (Hs = peak height of the Sun at Noon), and mark limb | | Ha | 64 ° 45 |
| 1-5 | Look up the altitude correction on the left-hand side of Table A2, front of the Almanac (T-8 in notes) (correction depends on Ha, Limb, and month) (mark sign + for lower limb, - for upper limb) | | Alt corr. | + 15.8 - |
| 1-6 | Sum the above two numbers to get Observed Height | | Ho | 65 ° 0.8 |

Starpath Form 107
for
Local Apparent Noon Sights

| Step 1 Determine the Zenith Distance | | | | |
|--------------------------------------|--|--|----|-----------------------|
| 2-1 | Record Ho from Step 1, above, and then subtract it from 90° to get the zenith distance. | | Ho | 89 ° 60.0 65 ° 0.8 |
| 2-2 | Zenith Distance | | Z | 24 ° 59.2 |

Subtract
RESULT


Find Declination for your Sight Time

2011 MARCH 11, 12, 13 (FRI., SAT., SUN.)

57

| UT | SUN | | MOON | | | | | Lat. | Twilight | | Sunrise | Moonrise | | | | |
|----------------------------|-------------------|---------------------------------|---------------------------------|----------|-----------|----------|------|-------|----------|-------|---------|----------|-------|-------|-------|-----|
| | GHA | Dec | GHA | <i>v</i> | Dec | <i>d</i> | HP | | Naut. | Civil | | 11 | 12 | 13 | 14 | |
| d h | ° / ' / " | ° / ' / " | ° / ' / " | ' | ° / ' / " | ' | ' | ° | h m | h m | h m | h m | h m | h m | h m | h m |
| F R I D A Y | 11 00 | 177 26.6 S 3 56.1 | 114 04.0 10.8 N22 05.3 4.8 55.2 | | | | | N 72 | 04 13 | 05 35 | 06 41 | | | | | |
| | 01 | 192 26.8 55.1 | 128 33.8 10.7 22 10.1 4.7 55.2 | | | | | N 70 | 04 25 | 05 38 | 06 38 | | | | | |
| | 02 | 207 26.9 54.1 | 143 03.5 10.6 22 14.8 4.6 55.2 | | | | | 68 | 04 34 | 05 40 | 06 35 | | | | | |
| | 03 | 222 27.1 . . 53.1 | 157 33.1 10.6 22 19.4 4.6 55.2 | | | | | 66 | 04 42 | 05 42 | 06 33 | 06 04 | 06 12 | 07 11 | 08 59 | |
| | 04 | 237 27.3 52.2 | 172 02.7 10.6 22 24.0 4.4 55.3 | | | | | 64 | 04 48 | 05 43 | 06 31 | 06 45 | 07 14 | 08 12 | 09 38 | |
| | 05 | 252 27.4 51.2 | 186 32.3 10.4 22 28.4 4.3 55.3 | | | | | 62 | 04 53 | 05 45 | 06 29 | 07 13 | 07 49 | 08 46 | 10 05 | |
| | 06 | 267 27.6 S 3 50.2 | 201 01.7 10.5 N22 32.7 4.1 55.3 | | | | | 60 | 04 57 | 05 46 | 06 27 | 07 35 | 08 14 | 09 11 | 10 26 | |
| | 07 | 282 27.7 49.2 | 215 31.2 10.3 22 36.8 4.1 55.3 | | | | | N 58 | 05 01 | 05 47 | 06 26 | 07 53 | 08 34 | 09 30 | 10 43 | |
| | 08 | 297 27.9 48.2 | 230 00.5 10.3 22 40.9 4.0 55.4 | | | | | 56 | 05 04 | 05 47 | 06 24 | 08 08 | 08 50 | 09 47 | 10 57 | |
| | 09 | 312 28.1 . . 47.2 | 244 29.8 10.2 22 44.9 3.8 55.4 | | | | | 54 | 05 07 | 05 48 | 06 23 | 08 21 | 09 04 | 10 01 | 11 10 | |
| 10 | 327 28.2 46.3 | 258 59.0 10.2 22 48.7 3.8 55.4 | | | | | 52 | 05 09 | 05 49 | 06 22 | 08 32 | 09 17 | 10 13 | 11 21 | | |
| 11 | 342 28.4 45.3 | 273 28.2 10.1 22 52.5 3.6 55.4 | | | | | 50 | 05 12 | 05 49 | 06 21 | 08 42 | 09 28 | 10 24 | 11 30 | | |
| 12 | 357 28.6 S 3 44.3 | 287 57.3 10.0 N22 56.1 3.5 55.5 | | | | | 45 | 05 16 | 05 50 | 06 19 | 09 04 | 09 50 | 10 46 | 11 51 | | |
| 13 | 12 28.7 43.3 | 302 26.3 10.0 22 59.6 3.4 55.5 | | | | | N 40 | 05 19 | 05 50 | 06 17 | 09 21 | 10 09 | 11 04 | 12 07 | | |
| 14 | 27 28.9 42.3 | 316 55.3 9.9 23 03.0 3.3 55.5 | | | | | 35 | 05 21 | 05 50 | 06 15 | 09 35 | 10 24 | 11 19 | 12 21 | | |
| 15 | 42 29.0 41.3 | 331 24.2 9.9 23 06.3 3.2 55.5 | | | | | 30 | 05 22 | 05 50 | 06 14 | 09 48 | 10 37 | 11 33 | 12 33 | | |
| 16 | 57 29.2 40.4 | 345 53.1 9.8 23 09.5 3.0 55.6 | | | | | 20 | 05 24 | 05 49 | 06 11 | 10 10 | 11 00 | 11 55 | 12 54 | | |
| 17 | 72 29.4 39.4 | 0 21.9 9.8 23 12.5 3.0 55.6 | | | | | N 10 | 05 24 | 05 48 | 06 09 | 10 28 | 11 20 | 12 15 | 13 11 | | |
| 18 | 87 29.5 S 3 38.4 | 14 50.7 9.7 N23 15.5 2.8 55.6 | | | | | 0 | 05 22 | 05 46 | 06 07 | 10 46 | 11 38 | 12 33 | 13 28 | | |
| 19 | 102 29.7 37.4 | 29 19.4 9.6 23 18.3 2.7 55.7 | | | | | S 10 | 05 19 | 05 43 | 06 04 | 11 04 | 11 57 | 12 51 | 13 45 | | |
| 20 | 117 29.9 36.4 | 43 48.0 9.6 23 21.0 2.6 55.7 | | | | | 20 | 05 14 | 05 39 | 06 01 | 11 23 | 12 17 | 13 10 | 14 02 | | |
| 21 | 132 30.0 . . 35.5 | 58 16.6 9.5 23 23.6 2.4 55.7 | | | | | 30 | 05 06 | 05 34 | 05 58 | 11 45 | 12 40 | 13 33 | 14 23 | | |
| 22 | 147 30.2 34.5 | 72 45.1 9.5 23 26.0 2.4 55.7 | | | | | 35 | 05 01 | 05 31 | 05 56 | 11 58 | 12 53 | 13 46 | 14 35 | | |
| 23 | 162 30.4 33.5 | 87 13.6 9.4 23 28.4 2.2 55.8 | | | | | 40 | 04 55 | 05 27 | 05 54 | 12 12 | 13 09 | 14 01 | 14 48 | | |
| 24 | 177 30.5 S 3 32.5 | 101 42.0 9.4 N23 30.6 2.1 55.8 | | | | | 45 | 04 47 | 05 22 | 05 51 | 12 30 | 13 27 | 14 19 | 15 04 | | |
| 25 | 192 30.6 31.5 | 115 10.7 9.3 23 33.2 2.0 55.8 | | | | | S 50 | 04 37 | 05 16 | 05 48 | 12 52 | 13 51 | 14 41 | 15 24 | | |

Find 'd' factor

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-----|------|------|--------------|------|------|------|------|------|------|------|------|------|-----|-----------------|-----------------|-------|------------|-------|-----|-------|----|----|----|----|---|----|----|----|
| U N D A Y | 10 | 327 | 36.2 | 2 | 59.1 | 233 | 21.2 | 8.0 | 23 | 30.4 | 2.3 | 56.9 | 40 | 18 | 25 | 18 | 52 | 19 | 24 | 21 | 42 | 22 | 34 | 23 | 33 | 24 | 39 | | |
| | 11 | 342 | 36.4 | | 58.1 | 247 | 48.2 | 7.9 | 23 | 28.1 | 2.5 | 57.0 | 45 | 18 | 27 | 18 | 57 | 19 | 32 | 21 | 24 | 22 | 15 | 23 | 16 | 24 | 24 | | |
| | 12 | 357 | 36.5 | S | 2 | 57.1 | 262 | 15.1 | 8.0 | N23 | 25.6 | 2.6 | 57.0 | S | 50 | 18 | 30 | 19 | 03 | 19 | 42 | 21 | 02 | 21 | 52 | 22 | 54 | 24 | 05 |
| | 13 | 12 | 36.7 | | 56.1 | 276 | 42.1 | 7.9 | 23 | 23.0 | 2.7 | 57.0 | 52 | 18 | 32 | 19 | 06 | 19 | 47 | 20 | 51 | 21 | 41 | 22 | 43 | 23 | 56 | | |
| | 14 | 27 | 36.9 | | 55.1 | 291 | 09.0 | 7.9 | 23 | 20.3 | 2.9 | 57.1 | 54 | 18 | 33 | 19 | 09 | 19 | 52 | 20 | 39 | 21 | 29 | 22 | 31 | 23 | 46 | | |
| | 15 | 42 | 37.1 | . | 54.1 | 305 | 35.9 | 7.9 | 23 | 17.4 | 3.0 | 57.1 | 56 | 18 | 35 | 19 | 13 | 19 | 58 | 20 | 25 | 21 | 14 | 22 | 18 | 23 | 34 | | |
| | 16 | 57 | 37.2 | | 53.2 | 320 | 02.8 | 7.9 | 23 | 14.4 | 3.2 | 57.2 | 58 | 18 | 37 | 19 | 17 | 20 | 05 | 20 | 09 | 20 | 57 | 22 | 02 | 23 | 21 | | |
| | 17 | 72 | 37.4 | | 52.2 | 334 | 29.7 | 7.8 | 23 | 11.2 | 3.3 | 57.2 | S | 60 | 18 | 39 | 19 | 21 | 20 | 13 | 19 | 50 | 20 | 36 | 21 | 43 | 23 | 05 | |
| | 18 | 87 | 37.6 | S | 2 | 51.2 | 348 | 56.5 | 7.8 | N23 | 07.9 | 3.4 | 57.2 | | SUN | | | MOON | | | | | | | | | | | |
| | 19 | 102 | 37.7 | | 50.2 | 3 | 23.3 | 7.8 | 23 | 04.5 | 3.6 | 57.3 | | Day | Eqn. of Time | | Mer. | Mer. Pass. | | Age | Phase | | | | | | | | |
| | 20 | 117 | 37.9 | | 49.2 | 17 | 50.1 | 7.8 | 23 | 00.9 | 3.7 | 57.3 | | | 00 ^h | 12 ^h | Pass. | Upper | Lower | | | | | | | | | | |
| | 21 | 132 | 38.1 | . | 48.2 | 32 | 16.9 | 7.8 | 22 | 57.2 | 3.8 | 57.3 | | d | m | s | m | s | h | m | h | m | h | m | d | % | | | |
| | 22 | 147 | 38.2 | | 47.2 | 46 | 43.7 | 7.8 | 22 | 53.4 | 4.0 | 57.4 | | 11 | 10 | 14 | 10 | 06 | 12 | 10 | 16 | 58 | 04 | 33 | 07 | 35 | | | |
| 23 | 162 | 38.4 | | 46.3 | 61 | 10.5 | 7.7 | N22 | 49.4 | 4.1 | 57.4 | | 12 | 09 | 58 | 09 | 50 | 12 | 10 | 17 | 51 | 05 | 25 | 08 | 45 | | | | |
| | SD | 16.1 | | d 1.0 | SD | 15.1 | | 15.3 | 15.5 | | | | 13 | 09 | 42 | 09 | 34 | 12 | 10 | 18 | 46 | 06 | 18 | 09 | 55 |  | | | |

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The 'd' Factor is the amount of change in Declination in an hour – in our example it is 1.0' per hour

INCREMENTS AND CORRECTIONS

45^m

| Corr ⁿ | E or Corr ⁿ | | E or Corr ⁿ | | 45 ^m | SUN PLANETS | | ARIES | | MOON | | E or Corr ⁿ | | E or Corr ⁿ | | E or Corr ⁿ | |
|-------------------|------------------------|-----|------------------------|-----|-----------------|-------------|---------|---------|-----|------|-----|------------------------|------|------------------------|---|------------------------|---|
| | ' | " | ' | " | | ' | " | ' | " | ' | " | ' | " | ' | " | ' | " |
| 0-0 | 6-0 | 4-5 | 12-0 | 8-9 | 00 | 11 15-0 | 11 16-8 | 10 44-3 | 0-0 | 0-0 | 6-0 | 4-6 | 12-0 | 9-1 | | | |
| 0-1 | 6-1 | 4-5 | 12-1 | 9-0 | 01 | 11 15-3 | 11 17-1 | 10 44-5 | 0-1 | 0-1 | 6-1 | 4-6 | 12-1 | 9-2 | | | |
| 0-1 | 6-2 | 4-6 | 12-2 | 9-0 | 02 | 11 15-5 | 11 17-3 | 10 44-7 | 0-2 | 0-2 | 6-2 | 4-7 | 12-2 | 9-3 | | | |
| 0-2 | 6-3 | 4-7 | 12-3 | 9-1 | 03 | 11 15-8 | 11 17-6 | 10 45-0 | 0-3 | 0-2 | 6-3 | 4-8 | 12-3 | 9-3 | | | |
| 0-3 | 6-4 | 4-7 | 12-4 | 9-2 | 04 | 11 16-0 | 11 17-9 | 10 45-2 | 0-4 | 0-3 | 6-4 | 4-9 | 12-4 | 9-4 | | | |
| 0-4 | 6-5 | 4-8 | 12-5 | 9-3 | 05 | 11 16-3 | 11 18-1 | 10 45-4 | 0-5 | 0-4 | 6-5 | 4-9 | 12-5 | 9-5 | | | |
| 0-4 | 6-6 | 4-9 | 12-6 | 9-3 | 06 | 11 16-5 | 11 18-4 | 10 45-7 | 0-6 | 0-5 | 6-6 | 5-0 | 12-6 | 9-6 | | | |
| 0-5 | 6-7 | 5-0 | 12-7 | 9-4 | 07 | 11 16-8 | 11 18-6 | 10 45-9 | 0-7 | 0-5 | 6-7 | 5-1 | 12-7 | 9-6 | | | |
| 0-6 | 6-8 | 5-0 | 12-8 | 9-5 | 08 | 11 17-0 | 11 18-9 | 10 46-2 | 0-8 | 0-6 | 6-8 | 5-2 | 12-8 | 9-7 | | | |
| 0-7 | 6-9 | 5-1 | 12-9 | 9-6 | 09 | 11 17-3 | 11 19-1 | 10 46-4 | 0-9 | 0-7 | 6-9 | 5-2 | 12-9 | 9-8 | | | |
| 0-7 | 7-0 | 5-2 | 13-0 | 9-6 | 10 | 11 17-5 | 11 19-4 | 10 46-6 | 1-0 | 0-8 | 7-0 | 5-3 | 13-0 | 9-9 | | | |
| 0-8 | 7-1 | 5-3 | 13-1 | 9-7 | 11 | 11 17-8 | 11 19-6 | 10 46-9 | 1-1 | 0-8 | 7-1 | 5-4 | 13-1 | 9-9 | | | |
| 0-9 | 7-2 | 5-3 | 13-2 | 9-8 | 12 | 11 18-0 | 11 19-9 | 10 47-1 | 1-2 | 0-9 | 7-2 | 5-5 | 13-2 | 10-0 | | | |
| 1-0 | 7-3 | 5-4 | 13-3 | 9-9 | 13 | 11 18-3 | 11 20-1 | 10 47-4 | 1-3 | 1-0 | 7-3 | 5-5 | 13-3 | 10-1 | | | |

Find the 'd' Correction in the Increments and Corrections pages for the minutes of GMT for your sight in this case for a 'd' of 1.0' the **Correction is 0.8'** for 45 minutes of GMT

| Step 3 Use the Almanac to Find Sun's Declination | | GMT date = 11-Mar-11 | | | | |
|---|---|--|--|---------------|--|--|
| 3-1 | Record the date and GMT of the sight (the time the Sun reached its peak height) | GMT (hr) = 16 | GMT (min)= 45 | | | |
| 3-2 | Turn to the daily page of the Almanac for the date of the sight, and find the Sun's declination (dec) for the hour of the sight (line 3-1) and record it here | Dec (hr) | N ^o S 3 40.4 S | | | |
| 3-3 | Record the d-value from the botom of the dec column in the Almanac. Mark the signs of the d-value and the d-corr + if the dec for the next hour is larger, or - if it is smaller. | d-value + - 1.0 - | d-corr = + 0.8 - | | | |
| 3-4 | Turn to the Increments and Corrections pages at the back of the Almanac (T-9 to 12, in the notes) and find the minutes table for thr GMT minutes (line 3-1). On the right-hand side of the double line in the table, find the d-corr corresponding to the d-value of line 3-3 | <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2">Declination =</td> <td>N ^o S 3 39.6 S</td> </tr> </table> | | Declination = | | N ^o S 3 39.6 S |
| Declination = | | N ^o S 3 39.6 S | | | | |
| | | above | | | | |

Place the values of the Zenith Distance and Declination in the appropriate boxes at the bottom of the Form to Calculate your Latitude at the time of the Sight.

We were looking South at the SUN

| | | | | | |
|--------------------------------|----|----|------|------|---|
| Declination or Zenith Distance | 24 | ° | 59.2 | ' | |
| Zenith Distance or Declination | 3 | ° | 39.6 | ' | |
| Latitude = | N | 21 | ° | 19.6 | ' |

→ So we



SUBTRACT

RESULT

We are 5.4 nm South of our DR

COMPLETED Noon Sight Form for this example

| Step 1 Correct Hs to get Ho | | | | |
|-----------------------------|---|----------------|-----------|-------------------------|
| 1-1 | Record Maximum Sextant Height (Hs = peak height of the Sun at Noon), and mark limb | Lower Upper | Hs | 64 ⁰ 55.4 |
| 1-2 | Record Index Correction (mark sign + if off, - if on) | IC | Off On | + - 0 |
| 1-3 | Record eye height (HE) and look up Dip Correction on the right-hand side of Table A2, front of Almanac (T-8 in notes) | Dip | HE (ft) | 115 - 10.4 |
| 1-4 | Record Maximum Sextant Height (Hs = peak height of the Sun at Noon), and mark limb | Ha | | 64 ⁰ 45 |
| 1-5 | Look up the altitude correction on the left-hand side of Table A2, front of the Almanac (T-8 in notes) (correction depends on Ha, Limb, and month) (mark sign + for lower limb, - for upper limb) | Alt corr. | | + - 15.8 |
| 1-6 | Sum the above two numbers to get Observed Height | Ho | | 65 ⁰ 0.8 |

Starpath Form 107
for
Local Apparent Noon Sights

| Step 1 Determine the Zenith Distance | | | 89 ⁰ | 60.0 |
|--------------------------------------|---|----|-----------------|------|
| 2-1 | Record Ho from Step 1, above, and then subtract it from 90° to get the zenith distance. | Ho | 65 ⁰ | 0.8 |
| 2-2 | Zenith Distance | Z | 24 ⁰ | 59.2 |

| Step 3 Use the Almanac to Find Sun's Declination | | GMT date = 11-Mar-11 | |
|--|---|------------------------|-------------------------------|
| 3-1 | Record the date and GMT of the sight (the time the Sun reached its peak height) | GMT (hr) = 16 | GMT (min) = 45 |
| 3-2 | Turn to the daily page of the Almanac for the date of the sight, and find the Sun's declination (dec) for the hour of the sight (line 3-1) and record it here | Dec (hr) | N S 3 ⁰ 40.4 |
| 3-3 | Record the d-value from the bottom of the dec column in the Almanac. Mark the signs of the d-value and the d-corr + if the dec for the next hour is larger, or - if it is smaller. | d-value + - -1.0 | d-corr = + - 0.8 |
| 3-4 | Turn to the Increments and Corrections pages at the back of the Almanac (T-9 to 12, in the notes) and find the minutes table for the GMT minutes (line 3-1). On the right-hand side of the double line in the table, find the d-corr corresponding to the d-value of line 3-3 | Declination = | N S 3 ⁰ 39.6 |
| 3-5 | Apply the d-corr to the dec (hr) and record it above | | |

Step 4 Find Latitude from Zenith Distance and Declination

Record DR Latitude to use as a guide, and then take the sum or difference of zenith distance and declination to find your true Latitude at LAN

DR Lat = 21° 25' N

| | | |
|--------------------------------|-------------------|------|
| Declination or Zenith Distance | 24 ⁰ | 59.2 |
| Zenith Distance or Declination | S 3 ⁰ | 39.6 |
| Latitude = | N 21 ⁰ | 19.6 |

Summary

- You have Learned How to Determine the time of LAN
- You have Seen How to Determine your Latitude from your NOON Sight