

| TRUE<br>Zn | CORRECTION FOR 1 MINUTE OF TIME |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      | TRUE<br>Zn |      |     |
|------------|---------------------------------|------|------|------|------|------|-------|-------|-------|-------|------|------|------|------|------|------|------------|------|-----|
|            | LATITUDE IN DEGREES             |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |            |      |     |
|            | 0                               | 5    | 10   | 15   | 20   | 25   | 30    | 35    | 40    | 45    | 50   | 55   | 60   | 65   | 70   | 75   |            | 80   | 85  |
| 090        | -5.0                            | -4.9 | -4.8 | -4.5 | +4.1 | -3.6 | +13.0 | +12.3 | -11.5 | +10.6 | -9.6 | +8.6 | -7.5 | -6.3 | +5.1 | -3.9 | -2.6       | -1.3 | 090 |
| 092        | 5.0                             | 4.9  | 4.8  | 4.5  | 4.1  | 3.6  | 13.0  | 12.3  | 11.5  | 10.6  | 9.6  | 8.6  | 7.5  | 6.3  | 5.1  | 3.9  | 2.6        | 1.3  | 088 |
| 094        | 15.0                            | 14.9 | 14.7 | 14.5 | 14.1 | 13.6 | 13.0  | 12.3  | 11.5  | 10.6  | 9.6  | 8.6  | 7.5  | 6.3  | 5.1  | 3.9  | 2.6        | 1.3  | 086 |
| 096        | 14.9                            | 14.9 | 14.7 | 14.4 | 14.0 | 13.5 | 12.9  | 12.2  | 11.4  | 10.5  | 9.6  | 8.6  | 7.5  | 6.3  | 5.1  | 3.9  | 2.6        | 1.3  | 084 |
| 098        | 14.9                            | 14.8 | 14.6 | 14.3 | 14.0 | 13.5 | 12.9  | 12.2  | 11.4  | 10.5  | 9.5  | 8.5  | 7.4  | 6.3  | 5.1  | 3.8  | 2.6        | 1.3  | 082 |
| 100        | 14.8                            | 14.7 | 14.5 | 14.3 | 13.9 | 13.4 | 12.8  | 12.1  | 11.3  | 10.4  | 9.5  | 8.5  | 7.4  | 6.2  | 5.1  | 3.8  | 2.6        | 1.3  | 080 |
| 102        | 14.7                            | 14.6 | 14.4 | 14.2 | 13.8 | 13.3 | 12.7  | 12.0  | 11.2  | 10.4  | 9.4  | 8.4  | 7.3  | 6.2  | 5.0  | 3.8  | 2.5        | 1.3  | 078 |
| 104        | 14.6                            | 14.5 | 14.3 | 14.1 | 13.7 | 13.2 | 12.6  | 11.9  | 11.1  | 10.3  | 9.4  | 8.3  | 7.3  | 6.2  | 5.0  | 3.8  | 2.5        | 1.3  | 076 |
| 106        | 14.4                            | 14.4 | 14.2 | 13.9 | 13.5 | 13.1 | 12.5  | 11.8  | 11.0  | 10.2  | 9.3  | 8.3  | 7.2  | 6.1  | 4.9  | 3.7  | 2.5        | 1.3  | 074 |
| 108        | 14.3                            | 14.2 | 14.0 | 13.8 | 13.4 | 12.9 | 12.4  | 11.7  | 10.9  | 10.1  | 9.2  | 8.2  | 7.1  | 6.0  | 4.9  | 3.7  | 2.5        | 1.2  | 072 |
| 110        | 14.1                            | 14.0 | 13.9 | 13.6 | 13.2 | 12.8 | 12.2  | 11.5  | 10.8  | +10.0 | -9.1 | -8.1 | -7.0 | -6.0 | +4.8 | -3.6 | -2.4       | -1.2 | 070 |
| 112        | 13.9                            | 13.9 | 13.7 | 13.4 | 13.1 | 12.6 | 12.0  | 11.4  | 10.7  | 9.8   | 8.9  | 8.0  | 7.0  | 5.9  | 4.8  | 3.6  | 2.4        | 1.2  | 068 |
| 114        | 13.7                            | 13.7 | 13.5 | 13.2 | 12.9 | 12.4 | 11.9  | 11.2  | 10.5  | 9.7   | 8.8  | 7.9  | 6.9  | 5.8  | 4.7  | 3.5  | 2.4        | 1.2  | 066 |
| 116        | 13.5                            | 13.4 | 13.3 | 13.0 | 12.7 | 12.2 | 11.7  | 11.0  | 10.3  | 9.5   | 8.7  | 7.7  | 6.7  | 5.7  | 4.6  | 3.5  | 2.3        | 1.2  | 064 |
| 118        | 13.2                            | 13.2 | 13.0 | 12.8 | 12.4 | 12.0 | 11.5  | 10.8  | 10.1  | 9.4   | 8.5  | 7.6  | 6.6  | 5.6  | 4.5  | 3.4  | 2.3        | 1.2  | 062 |
| 120        | 13.0                            | 12.9 | 12.8 | 12.5 | 12.2 | 11.8 | 11.3  | 10.6  | 10.0  | +9.2  | -8.4 | -7.5 | -6.5 | -5.5 | -4.4 | -3.4 | -2.3       | -1.1 | 060 |
| 122        | 12.7                            | 12.7 | 12.5 | 12.3 | 12.0 | 11.5 | 11.0  | 10.4  | 9.7   | 9.0   | 8.2  | 7.3  | 6.4  | 5.4  | 4.4  | 3.3  | 2.2        | 1.1  | 058 |
| 124        | 12.4                            | 12.4 | 12.2 | 12.0 | 11.7 | 11.3 | 10.8  | 10.2  | 9.5   | 8.8   | 8.0  | 7.1  | 6.2  | 5.3  | 4.3  | 3.2  | 2.2        | 1.1  | 056 |
| 126        | 12.1                            | 12.1 | 12.0 | 11.7 | 11.4 | 11.0 | 10.5  | 9.9   | 9.3   | 8.6   | 7.8  | 7.0  | 6.1  | 5.1  | 4.2  | 3.1  | 2.1        | 1.1  | 054 |
| 128        | 11.8                            | 11.8 | 11.6 | 11.4 | 11.1 | 10.7 | 10.2  | 9.7   | 9.1   | 8.4   | 7.6  | 6.8  | 5.9  | 5.0  | 4.0  | 3.1  | 2.1        | 1.0  | 052 |
| 130        | 11.5                            | 11.4 | 11.3 | 11.1 | 10.8 | 10.4 | +10.0 | -9.4  | -8.8  | +8.1  | -7.4 | -6.6 | -5.7 | -4.9 | +3.9 | -3.0 | -2.0       | -1.0 | 050 |
| 132        | 11.1                            | 11.1 | 11.0 | 10.8 | 10.5 | 10.1 | 9.7   | 9.1   | 8.5   | 7.9   | 7.2  | 6.4  | 5.6  | 4.7  | 3.8  | 2.9  | 1.9        | 1.0  | 048 |
| 134        | 10.8                            | 10.8 | 10.6 | 10.4 | 10.1 | 9.8  | 9.3   | 8.8   | 8.3   | 7.6   | 6.9  | 6.2  | 5.4  | 4.6  | 3.7  | 2.8  | 1.9        | 0.9  | 046 |
| 136        | 10.4                            | 10.4 | 10.3 | 10.1 | 9.8  | 9.4  | 9.0   | 8.5   | 8.0   | 7.4   | 6.7  | 6.0  | 5.2  | 4.4  | 3.6  | 2.7  | 1.8        | 0.9  | 044 |
| 138        | 10.0                            | 10.0 | 9.9  | 9.7  | 9.4  | 9.1  | 8.7   | 8.2   | 7.7   | 7.1   | 6.5  | 5.8  | 5.0  | 4.2  | 3.4  | 2.6  | 1.7        | 0.9  | 042 |
| 140        | 9.6                             | 9.6  | 9.5  | 9.3  | 9.1  | 8.7  | -8.4  | -7.9  | -7.4  | +6.8  | -6.2 | -5.5 | +4.8 | -4.1 | +3.3 | +2.5 | -1.7       | -0.8 | 040 |
| 142        | 9.2                             | 9.2  | 9.1  | 8.9  | 8.7  | 8.4  | 8.0   | 7.6   | 7.1   | 6.5   | 5.9  | 5.3  | 4.6  | 3.9  | 3.2  | 2.4  | 1.6        | 0.8  | 038 |
| 144        | 8.8                             | 8.8  | 8.7  | 8.5  | 8.3  | 8.0  | 7.6   | 7.2   | 6.8   | 6.2   | 5.7  | 5.1  | 4.4  | 3.7  | 3.0  | 2.3  | 1.5        | 0.8  | 036 |
| 146        | 8.4                             | 8.4  | 8.3  | 8.1  | 7.9  | 7.6  | 7.3   | 6.9   | 6.4   | 5.9   | 5.4  | 4.8  | 4.2  | 3.5  | 2.9  | 2.2  | 1.5        | 0.7  | 034 |
| 148        | 7.9                             | 7.9  | 7.8  | 7.7  | 7.5  | 7.2  | 6.9   | 6.5   | 6.1   | 5.6   | 5.1  | 4.6  | 4.0  | 3.4  | 2.7  | 2.1  | 1.4        | 0.7  | 032 |
| 150        | 7.5                             | 7.5  | 7.4  | 7.2  | 7.0  | 6.8  | -6.5  | -6.1  | -5.7  | +5.3  | -4.8 | +4.3 | -3.8 | -3.2 | -2.6 | -1.9 | +1.3       | -0.7 | 030 |
| 152        | 7.0                             | 7.0  | 6.9  | 6.8  | 6.6  | 6.4  | 6.1   | 5.8   | 5.4   | 5.0   | 4.5  | 4.0  | 3.5  | 3.0  | 2.4  | 1.8  | 1.2        | 0.6  | 028 |
| 154        | 6.6                             | 6.6  | 6.5  | 6.4  | 6.2  | 6.0  | 5.7   | 5.4   | 5.0   | 4.6   | 4.2  | 3.8  | 3.3  | 2.8  | 2.2  | 1.7  | 1.1        | 0.6  | 026 |
| 156        | 6.1                             | 6.1  | 6.0  | 5.9  | 5.7  | 5.5  | 5.3   | 5.0   | 4.7   | 4.3   | 3.9  | 3.5  | 3.1  | 2.6  | 2.1  | 1.6  | 1.1        | 0.5  | 024 |
| 158        | 5.6                             | 5.6  | 5.5  | 5.4  | 5.3  | 5.1  | 4.9   | 4.6   | 4.3   | 4.0   | 3.6  | 3.2  | 2.8  | 2.4  | 1.9  | 1.5  | 1.0        | 0.5  | 022 |
| 160        | 5.1                             | 5.1  | 5.1  | 5.0  | 4.8  | 4.6  | -4.4  | -4.2  | -3.9  | +3.6  | -3.3 | +2.9 | -2.6 | -2.2 | -1.8 | -1.3 | -0.9       | -0.4 | 020 |
| 162        | 4.6                             | 4.6  | 4.6  | 4.5  | 4.4  | 4.2  | 4.0   | 3.8   | 3.6   | 3.3   | 3.0  | 2.7  | 2.3  | 2.0  | 1.6  | 1.2  | 0.8        | 0.4  | 018 |
| 164        | 4.1                             | 4.1  | 4.1  | 4.0  | 3.9  | 3.7  | 3.6   | 3.4   | 3.2   | 2.9   | 2.7  | 2.4  | 2.1  | 1.7  | 1.4  | 1.1  | 0.7        | 0.4  | 016 |
| 166        | 3.6                             | 3.6  | 3.6  | 3.5  | 3.4  | 3.3  | 3.1   | 3.0   | 2.8   | 2.6   | 2.3  | 2.1  | 1.8  | 1.5  | 1.2  | 0.9  | 0.6        | 0.3  | 014 |
| 168        | 3.1                             | 3.1  | 3.1  | 3.0  | 2.9  | 2.8  | 2.7   | 2.6   | 2.4   | 2.2   | 2.0  | 1.8  | 1.6  | 1.3  | 1.1  | 0.8  | 0.5        | 0.3  | 012 |
| 170        | 2.6                             | 2.6  | 2.6  | 2.5  | 2.4  | 2.4  | -2.3  | -2.1  | -2.0  | +1.8  | -1.7 | +1.5 | -1.3 | -1.1 | +0.9 | +0.7 | -0.5       | +0.2 | 010 |
| 172        | 2.1                             | 2.1  | 2.1  | 2.0  | 2.0  | 1.9  | 1.8   | 1.7   | 1.6   | 1.5   | 1.3  | 1.2  | 1.0  | 0.9  | 0.7  | 0.5  | 0.4        | 0.2  | 008 |
| 174        | 1.6                             | 1.6  | 1.5  | 1.5  | 1.5  | 1.4  | 1.4   | 1.3   | 1.2   | 1.1   | 1.0  | 0.9  | 0.8  | 0.7  | 0.5  | 0.4  | 0.3        | 0.1  | 006 |
| 176        | 1.0                             | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 0.9   | 0.9   | 0.8   | 0.7   | 0.7  | 0.6  | 0.5  | 0.4  | 0.4  | 0.3  | 0.2        | 0.1  | 004 |
| 178        | 0.5                             | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5   | 0.4   | 0.4   | 0.4   | 0.3  | 0.3  | 0.3  | 0.2  | 0.2  | 0.1  | 0.1        | 0.0  | 002 |
| 180        | 0.0                             | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0        | 0.0  | 000 |
| 182        | 0.5                             | 0.5  | 0.5  | 0.5  | 0.5  | -0.5 | -0.5  | 0.5   | 0.4   | -0.4  | -0.3 | -0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1       | -0.0 | 358 |
| 184        | 1.0                             | 1.0  | 1.0  | 1.0  | 1.0  | 1.0  | 0.9   | 0.9   | 0.8   | 0.7   | 0.7  | 0.6  | 0.5  | 0.4  | 0.4  | 0.3  | 0.2        | 0.1  | 356 |
| 186        | 1.6                             | 1.6  | 1.5  | 1.5  | 1.5  | 1.4  | 1.4   | 1.3   | 1.2   | 1.1   | 1.0  | 0.9  | 0.8  | 0.7  | 0.5  | 0.4  | 0.3        | 0.1  | 354 |
| 188        | 2.1                             | 2.1  | 2.1  | 2.0  | 2.0  | 1.9  | 1.8   | 1.7   | 1.6   | 1.5   | 1.3  | 1.2  | 1.0  | 0.9  | 0.7  | 0.5  | 0.4        | 0.2  | 352 |
| 190        | 2.6                             | 2.6  | 2.6  | 2.5  | 2.4  | 2.4  | 2.3   | 2.1   | 2.0   | 1.8   | 1.7  | 1.5  | 1.3  | 1.1  | 0.9  | 0.7  | 0.5        | 0.2  | 350 |
| 192        | 3.1                             | 3.1  | 3.1  | 3.0  | 2.9  | 2.8  | 2.7   | 2.6   | 2.4   | 2.2   | -2.0 | -1.8 | -1.6 | -1.3 | -1.1 | -0.8 | -0.5       | -0.3 | 348 |
| 194        | 3.6                             | 3.6  | 3.6  | 3.5  | 3.4  | 3.3  | 3.1   | 3.0   | 2.8   | 2.6   | 2.3  | 2.1  | 1.8  | 1.5  | 1.2  | 0.9  | 0.6        | 0.3  | 346 |
| 196        | 4.1                             | 4.1  | 4.1  | 4.0  | 3.9  | 3.7  | 3.6   | 3.4   | 3.2   | 2.9   | 2.7  | 2.4  | 2.1  | 1.7  | 1.4  | 1.1  | 0.7        | 0.4  | 344 |
| 198        | 4.6                             | 4.6  | 4.6  | 4.5  | 4.4  | 4.2  | 4.0   | 3.8   | 3.6   | 3.3   | 3.0  | 2.7  | 2.3  | 2.0  | 1.6  | 1.2  | 0.8        | 0.4  | 342 |
| 200        | 5.1                             | 5.1  | 5.1  | 5.0  | 4.8  | 4.6  | 4.4   | 4.2   | 3.9   | 3.6   | 3.3  | 2.9  | 2.6  | 2.2  | 1.8  | 1.3  | 0.9        | 0.4  | 340 |
| 202        | 5.6                             | 5.6  | 5.5  | 5.4  | 5.3  | 5.1  | -4.9  | 4.6   | -4.3  | -4.0  | -3.6 | -3.2 | -2.8 | -2.4 | -1.9 | -1.5 | -1.0       | -0.5 | 338 |
| 204        | 6.1                             | 6.1  | 6.0  | 5.9  | 5.7  | 5.5  | 5.3   | 5.0   | 4.7   | 4.3   | 3.9  | 3.5  | 3.1  | 2.6  | 2.1  | 1.6  | 1.1        | 0.5  | 336 |
| 206        | 6.6                             | 6.6  | 6.5  | 6.4  | 6.2  | 6.0  | 5.7   | 5.4   | 5.0   | 4.6   | 4.2  | 3.8  | 3.3  | 2.8  | 2.2  | 1.7  | 1.1        | 0.6  | 334 |
| 208        | 7.0                             | 7.0  | 6.9  | 6.8  | 6.6  | 6.4  | 6.1   | 5.8   | 5.4   | 5.0   | 4.5  | 4.0  | 3.5  | 3.0  | 2.4  | 1.8  | 1.2        | 0.6  | 332 |
| 210        | 7.5                             | 7.5  | 7.4  | 7.2  | 7.0  | 6.8  | 6.5   | 6.1   | 5.7   | 5.3   | 4.8  | 4.3  | 3.8  | 3.2  | 2.6  | 1.9  | 1.3        | 0.7  | 330 |
| 212        | 7.9                             | 7.9  | 7.8  | 7.7  | 7.5  | 7.2  | -6.9  | -6.5  | -6.1  | -5.6  | -5.1 | -4.6 | -4.0 | -3.4 | -2.7 | -2.1 | -1.4       | -0.7 | 328 |
| 214        | 8.4                             | 8.4  | 8.3  | 8.1  | 7.9  | 7.6  | 7.3   | 6.9   | 6.4   | 5.9   | 5.4  | 4.8  | 4.2  | 3.5  | 2.9  | 2.2  | 1.5        | 0.7  | 326 |
| 216        | 8.8                             | 8.8  | 8.7  | 8.5  | 8.3  | 8.0  | 7.6   | 7.2   | 6.8   | 6.2   | 5.7  | 5.1  | 4.4  | 3.7  | 3.0  | 2.3  | 1.5        | 0.8  | 324 |
| 218        | 9.2                             | 9.2  | 9.1  | 8.9  | 8.7  | 8.4  | 8.0   | 7.6   | 7.1   | 6.5   | 5.9  | 5.3  | 4.6  | 3.9  | 3.2  | 2.4  | 1.6        | 0.8  | 322 |
| 220        | 9.6                             | 9.6  | 9.5  | 9.3  | 9.1  | 8.7  | 8.4   | 7.9   | 7.4   | 6.8   | 6.2  | 5.5  | 4.8  | 4.1  | 3.3  | 2.5  | 1.7        | 0.8  | 320 |
| 222        | 10.0                            | 10.0 | 9.9  | 9.7  | 9.4  | 9.1  | 8.7   | 8.2   | 7.7   | 7.1   | -6.5 | 5.8  | -5.0 | 4.2  | 3.4  | -2.6 | -1.7       | -0.9 | 318 |
| 224        | 10.4                            | 10.4 | 10.3 | 10.1 | 9.8  | 9.4  | 9.0   | 8.5   | 8.0   | 7.4   | 6.7  | 6.0  | 5.2  | 4.4  | 3.6  | 2.7  | 1.8        | 0.9  | 316 |
| 226        | 10.8                            | 10.8 | 10.6 | 10.4 | 10.1 | 9.8  | 9.3   | 8.8   | 8.3   | 7.6   | 6.9  | 6.2  | 5.4  | 4.6  | 3.7  | 2.8  | 1.9        | 0.9  | 314 |
| 228        | 11.1                            | 11.1 | 11.0 | 10.8 | 10.5 | 10.1 | 9.7   | 9.1   | 8.5   | 7.9   | 7.2  | 6.4  | 5.6  | 4.7  | 3.8  | 2.9  | 1.9        | 1.0  | 312 |
| 230        | 11.5                            | 11.4 | 11.3 | 11.1 | 10.8 | 10.4 | 10.0  | 9.4   | 8.8   | 8.1   | 7.4  | 6.6  | 5.7  | 4.9  | 3.9  | 3.0  | 2.0        | 1.0  | 310 |
| 232        | 11.8                            | 11.8 | 11.6 | 11.4 | 11.1 | 10.7 | 10.2  | -9.7  | -9.1  | -8.4  | -7   |      |      |      |      |      |            |      |     |