

HP-41C Altitude-Azimuth Positioning by Paul Burke
PPC Calculator Journal V9 No 1 Pg 24 Jan-Feb 1982

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01 LBL "DOB HP"      ;Altitude-Azimuth Positioning
02 "GMST:1981="      ;Greenwich Mean Sidereal Time
03 ">"06:38:17.9"
04 AVIEW              ;Display Year & GMST message
05 6.63832206
06 STO 02
07 "PLANETS "
08 ARCL 25
09 AVIEW              ;Display PLANETS YYYY.MMDD date
10 "LOCATIONS:"
11 AVIEW              ;Display LOCATIONS: message
12 PSE
13 "BUTTES=B"
14 AVIEW              ;Display BUTTES=B message
15 PSE
16 "TEHAC =C"
17 AVIEW              ;Display TEHAC =C message
18 PSE
19 "PINOS =D"
20 AVIEW              ;Display PINOS =D message
21 PSE
22 " PMD  =E"
23 AVIEW              ;Display PMD  =E message
24 PSE
25 "REMOTE=F"
26 AVIEW              ;Display REMOTE=F message
27 PSE
28 "LOCATION?"
29 PROMPT              ;Display LOCATION prompt
30 LBL B              ;Location B=Buttes
31 -7.8555
32 STO 01
33 34.43
34 STO 00
35 GTO a
36 LBL C              ;Location C=Tehachapi, CA
37 -7.8655556
38 STO 01
39 35.0300417
40 STO 00
41 GTO a
42 LBL D              ;Location D=Mt. Pinos, CA
43 -7.9411106
44 STO 01
45 34.49
46 STO 00
47 GTO a
48 LBL E              ;Location E=Palmdale, CA
49 -7.872
50 STO 01
51 34.33
52 STO 00
53 GTO a
54 LBL F              ;Location F=Entered by user
55 "LONG=?"
56 PROMPT              ;Enter Longitude
57 HR
58 -15
59 /
60 STO 01
61 "LAT=?"
62 PROMPT              ;Enter Latitude
63 HR
64 STO 00
65 LBL a              ;Enter Month and Day
66 "MM.DD=?"
67 PROMPT              ;Enter Month.Day
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68 STO 04
69 INT
70 275
71 *
72 9
73 /
74 INT
75 RCL 04
76 INT
77 9
78 +
79 12
80 /
81 INT
82 ST+ X           ;Delete this line for leap year
83 -
84 RCL 04
85 FRC
86 100
87 *
88 +
89 30
90 -
91 INT
92 STO 04
93 "D.O.Y.="
94 ARCL X
95 AVIEW           ;Display Day of Year (1-366)
96 LBL A           ;Enter Local Civil Time
97 "PST=?"        ;Change for different time zone
98 PROMPT         ;Enter Pacific Standard Time
99 HR
100 8              ;Change for different time zone
101 +
102 STO 03
103 RCL 04
104 24
105 *
106 RCL 03
107 +
108 .0027379093
109 *
110 RCL 03
111 +
112 RCL 02
113 +
114 RCL 01
115 +
116 24
117 MOD
118 STO 09
119 HMS
120 FIX 7
121 STO 10
122 "LST="
123 TONE 9
124 ARCL X
125 AVIEW           ;Display Local Sidereal Time
126 RCL 09
127 15
128 *
129 STO 09
130 "PLANET DATA"
131 ">" ENTRY?"
132 PROMPT         ;0=Planet Data already in memory
133 X=0?           ;1=Read Planet Data from cards
134 GTO "START"    ;Find Location (Line 151)
135 16.025         ;Data registers 16 through 25
136 XROM 30,03     ;RDTAX (Card data to register)
137 GTO "START"    ;Find Location (Line 151)

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138 LBL "DECODE"      ;Decode stored value to Right
139 ENTER             ;Ascension and Declination
140 INT
141 100
142 /
143 ABS
144 STO 13
145 RDN
146 FRC
147 100
148 *
149 STO 06
150 GTO 02
151 LBL "START"        ;Find Location of Astral Object
152 AON
153 "NAME OR "
154 >"POSITION:"
155 PROMPT
156 ASTO 15
157 AOFF
158 GTO IND 15
159 LBL " "             ;Reverse Option (via Space Bar)
160 "REVERSE?"
161 PROMPT             ;0=Normal, 1=Reverse
162 X>0?
163 GTO "REVERSE"
164 "R.A.=?"
165 PROMPT             ;Enter Right Ascension
166 HR
167 15
168 *
169 STO 13
170 "DEC=?"
171 PROMPT             ;Enter Declination
172 HR
173 STO 06
174 GTO 02
175 LBL "REVERSE"      ;Given Azimuth and Altitude,
176 SF 03              ;Calculate Right Ascension & Declination
177 "AZ=?"
178 PROMPT             ;Enter Azimuth
179 STO 08
180 SIN
181 X>0?
182 SF 02
183 "ALT=?"           ;Enter Altitude
184 PROMPT
185 STO 06
186 GTO 03
187 LBL 02
188 RCL 09
189 RCL 13
190 -
191 STO 08
192 SIN
193 X<0?
194 GTO 03
195 SF 02
196 LASTX
197 360
198 X<>Y
199 -
200 STO 08
201 LBL 03
202 RCL 00
203 SIN
204 RCL 06
205 SIN
206 *
207 RCL 00

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208 COS
209 RCL 06
210 COS
211 *
212 RCL 08
213 COS
214 *
215 +
216 ASIN
217 STO 08
218 LBL 04
219 RCL 00
220 SIN
221 RCL 08
222 SIN
223 *
224 RCL 06
225 SIN
226 X<>Y
227 -
228 RCL 00
229 COS
230 RCL 08
231 COS
232 *
233 /
234 ACOS
235 FS?C 03
236 GTO 11
237 FC?C 02
238 GTO 05
239 360
240 X<>Y
241 -
242 LBL 05
243 TONE 8
244 FIX 2
245 " AZ= "
246 ARCL X
247 ">" DEG CW"
248 AVIEW           ;Display Azimuth
249 RCL 08
250 TONE 7
251 "ALT= "
252 X<0?
253 GTO 06
254 ARCL X
255 ">" DEG"
256 AVIEW           ;Display Altitude
257 STOP
258 GTO "START"     ;Find Location (Line 151)
259 LBL 06
260 TONE 1
261 BEEP
262 "INVISIBLE"
263 AVIEW           ;Astral Object cannot be seen
264 GTO "START"     ;Find Location (Line 151)
265 LBL 11
266 FC?C 02
267 GTO 08
268 360
269 X<>Y
270 -
271 LBL 08
272 FIX 6
273 15
274 /
275 HMS
276 " SHA= "
277 ARCL X           ;Display Hour Angle

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278 AVIEW
279 RCL 10
280 X<>Y
281 HMS-
282 X>0?
283 GTO 09
284 24
285 HMS+
286 LBL 09
287 " R.A.="
288 ARCL X
289 ">" HMS"
290 AVIEW ;Display Right Ascension
291 RCL 08
292 " DEC= "
293 ARCL X
294 ">" DEG"
295 AVIEW ;Display Declination
296 GTO "START" ;Find Location (Line 151)
297 LBL d ;Reset Erroneous Position
298 "RESET"
299 AVIEW ;Display RESET message
300 2
301 ST- 01
302 GTO IND Y
303 LBL "INTRPLT" ;Interpolation Routine
304 LBL b ;Alternate Label for Interpolation
305 16.02401
306 STO 00
307 LBL "AGAIN" ;Repeat for Next Planet
308 2.00501
309 STO 01
310 AON
311 "PLANET=?"
312 PROMPT ;Enter Name of Planet
313 AOFF
314 ADV
315 LBL 01
316 "1ST POS?"
317 PROMPT ;First Position of Planet
318 XEQ c
319 LBL 02
320 "2ND POS?"
321 PROMPT ;Second Position of Planet
322 XEQ c
323 LBL c ;Decode Entered Positions to
324 ENTER ;Right Ascension & Declination
325 INT
326 ABS
327 1000
328 /
329 HR
330 STO IND 01
331 ISG 01
332 RDN
333 FRC
334 100
335 *
336 HR
337 STO IND 01
338 ISG 01
339 RTN
340 "SPAN=?"
341 PROMPT ;Number of days between positions
342 "DAY OF SPAN?"
343 PROMPT ;Number of day within the interval
344 X<>Y
345 /
346 STO 06
347 04.00102

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348 STO 01
349 RCL IND 01
350 DSE 01
351 RCL IND 01
352 X<Y?
353 GTO 13
354 "RETROGRADE?"
355 PROMPT          ;Display RETROGRADE prompt
356 X=0?           ;Retrograde? 0=No, 1=Yes
357 GTO 12
358 RDN
359 X<>Y
360 GTO 13
361 LBL 12
362 RDN
363 LBL 13
364 STO T
365 -
366 X<0?
367 GTO 15
368 GTO 14
369 LBL 15
370 24
371 +
372 LBL 14
373 RCL 06
374 *
375 RCL T
376 +
377 24
378 X<>Y
379 X<=Y?
380 GTO 01
381 24
382 -
383 LBL 01
384 STO 09
385 HMS
386 "RA="
387 ARCL X
388 AVIEW          ;Display Right Ascension
389 05.00202
390 STO 01
391 RCL IND 01
392 DSE 01
393 RCL IND 01
394 STO T
395 -
396 RCL 06
397 *
398 RCL T
399 +
400 STO 10
401 HMS
402 "DEC="
403 ARCL X
404 AVIEW          ;Display Declination
405 ADV
406 ADV
407 XEQ e
408 GTO "AGAIN"    ;Repeat for Next Planet (Line 307)
409 LBL e          ;Convert RA and Dec to Stored Value
410 RCL 09
411 1500
412 *
413 INT
414 RCL 10
415 100
416 /
417 X>0?

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418 GTO 15
419 SF 01
420 CHS
421 LBL 15
422 +
423 FS?C 01
424 CHS
425 STO IND 00
426 ISG 00
427 RTN
428 "DATE=?"
429 PROMPT          ;Enter Date in YYYY.MMDD format
430 STO 25
431 16.025          ;Data registers 16 through 25
432 XROM 29,17      ;PRREGX - Print regs 16 to 25
433 "WRITE CARD"
434 AVIEW
435 XROM 30,08      ;WDTAX - Write R16-25 to card
436 RTN
437 LBL "EPHEM"     ;Beginning of Ephemeral Data
438 LBL "SUN"       ;Sun data in register 16
439 RCL 16
440 GTO 07
441 LBL "MER"       ;Mercury data in register 17
442 RCL 17
443 GTO 07
444 LBL "VEN"       ;Venus data in register 18
445 RCL 18
446 GTO 07
447 LBL "MARS"      ;Mars data in register 19
448 RCL 19
449 GTO 07
450 LBL "JUPE"      ;Jupiter data in register 20
451 RCL 20
452 GTO 07
453 LBL "SAT"       ;Saturn data in register 21
454 RCL 21
455 GTO 07
456 LBL "URAN"      ;Uranus data in register 22
457 RCL 22
458 GTO 07
459 LBL "NEP"       ;Neptune data in register 23
460 RCL 23
461 GTO 07
462 LBL "PLU"       ;Pluto data in register 24
463 RCL 24
464 GTO 07
465 LBL "M1"        ;Messier Object 1 data
466 8296.2159
467 GTO 07
468 LBL "M6"        ;Messier Object 6 data
469 -26433.3211
470 GTO 07
471 LBL "M8"        ;Messier Object 8 data
472 -27050.2421
473 GTO 07
474 LBL "M13"       ;Messier Object 13 data
475 25013.3631
476 GTO 07
477 LBL "M17"       ;Messier Object 17 data
478 -27450.1612
479 GTO 07
480 LBL "M27"       ;Messier Object 27 data
481 29958.2235
482 GTO 07
483 LBL "M31"       ;Messier Object 31 data
484 1000.4101
485 GTO 07
486 LBL "M33"       ;Messier Object 33 data
487 2288.3024

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488 GTO 07
489 LBL "M44"           ;Messier Object 44 data
490 12930.2011
491 GTO 07
492 LBL "M51"           ;Messier Object 51 data
493 20233.4727
494 GTO 07
495 LBL "M57"           ;Messier Object 57 data
496 28304.3258
497 GTO 07
498 LBL "M81"           ;Messier Object 81 data
499 14995.6918
500 GTO 07
501 LBL "M101"          ;Messier Object 101 data
502 20142.5458
503 GTO 07
504 LBL 07
505 GTO "DECODE"        ;Decode Value to RA & Dec (Line 138)
506 LBL "ALD"           ;Aldebaran Data
507 6826.1627
508 GTO 07
509 LBL "ALT"           ;Altair data
510 29709.0844
511 GTO 07
512 LBL "ANT"           ;Antares data
513 -24658.263
514 GTO 07
515 LBL "ARC"           ;Arcturus data
516 21334.1948
517 GTO 07
518 LBL "BET"           ;Betelgeuse data
519 8811.0748
520 GTO 07
521 LBL "CAP"           ;Capella data
522 7825.4933
523 GTO 07
524 LBL "DEN"           ;Deneb data
525 30993.4511
526 GTO 07
527 LBL "HEL"           ;Helios data
528 -33675.2111
529 GTO 07
530 LBL "POLL"          ;Pollux data
531 11556.2813
532 GTO 07
533 LBL "PRO"           ;Procyon data
534 11417.0516
535 GTO 07
536 LBL "REG"           ;Regulus data
537 13642.1221
538 GTO 07
539 LBL "SIR"           ;Sirius data
540 -10073.1663
541 GTO 07
542 LBL "VEGA"          ;Vega data
543 27881.3876
544 GTO 07
545 LBL "VEIL"          ;Veil data
546 31100.3051
547 GTO 07
548 STOP
549 END

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06CDC000F700444F42204850FA474D53543A313938313DFB7F
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1741 BYTES

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Program Registers Needed: 249

Row 1 (1 - 2)



Row 2 (2 - 3)



Row 3 (3 - 5)



Row 4 (5 - 7)



Row 5 (7 - 10)



Row 6 (10 - 13)



Row 7 (13 - 17)



Row 8 (18 - 22)



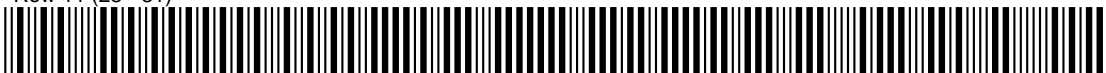
Row 9 (22 - 25)



Row 10 (25 - 28)



Row 11 (28 - 31)



Row 12 (31 - 36)



Row 13 (36 - 39)



Row 14 (39 - 41)



Row 15 (42 - 44)



Row 16 (45 - 49)



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Row 17 (49 - 53)



Row 18 (53 - 58)



Row 19 (58 - 64)



Row 20 (65 - 69)



Row 21 (70 - 79)



Row 22 (80 - 89)



Row 23 (89 - 94)



Row 24 (94 - 100)



Row 25 (101 - 108)



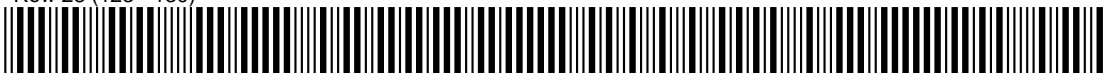
Row 26 (108 - 115)



Row 27 (116 - 122)



Row 28 (123 - 130)



Row 29 (130 - 131)



Row 30 (131 - 134)



Row 31 (134 - 137)



Row 32 (137 - 138)

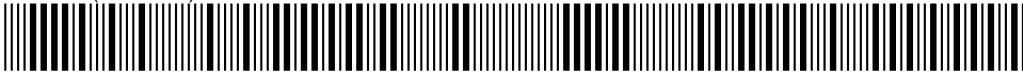


Row 33 (139 - 147)



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Row 34 (148 - 151)



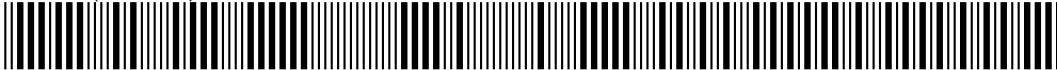
Row 35 (152 - 154)



Row 36 (154 - 158)



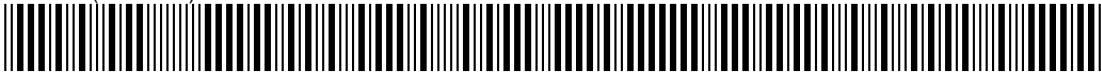
Row 37 (158 - 160)



Row 38 (160 - 163)



Row 39 (164 - 169)



Row 40 (170 - 175)



Row 41 (175 - 177)



Row 42 (177 - 183)



Row 43 (183 - 193)



Row 44 (194 - 202)



Row 45 (203 - 215)



Row 46 (216 - 228)



Row 47 (229 - 238)



Row 48 (238 - 245)



Row 49 (245 - 247)



Row 50 (247 - 252)



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Row 51 (253 - 258)



Row 52 (258 - 262)



Row 53 (262 - 264)



Row 54 (264 - 271)



Row 55 (272 - 276)



Row 56 (277 - 286)



Row 57 (287 - 289)



Row 58 (289 - 293)



Row 59 (294 - 296)



Row 60 (296 - 301)



Row 61 (302 - 303)



Row 62 (304 - 307)



Row 63 (307 - 308)



Row 64 (308 - 312)



Row 65 (313 - 317)



Row 66 (318 - 320)



Row 67 (321 - 327)



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Row 68 (328 - 336)



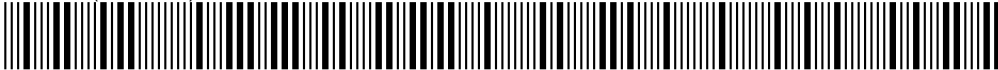
Row 69 (337 - 341)



Row 70 (342)



Row 71 (343 - 348)



Row 72 (349 - 354)



Row 73 (354 - 358)



Row 74 (359 - 367)



Row 75 (368 - 376)



Row 76 (377 - 386)



Row 77 (386 - 389)



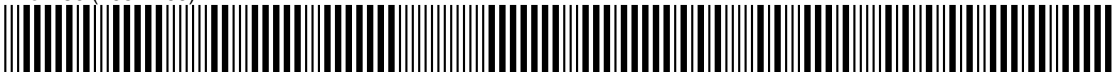
Row 78 (389 - 397)



Row 79 (398 - 404)



Row 80 (405 - 409)



Row 81 (409 - 416)



Row 82 (417 - 424)



Row 83 (425 - 429)



Row 84 (430 - 433)



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Row 85 (433 - 437)



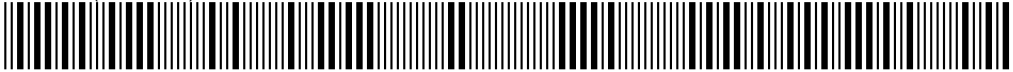
Row 86 (437 - 438)



Row 87 (438 - 441)



Row 88 (442 - 445)



Row 89 (446 - 449)



Row 90 (449 - 452)



Row 91 (453 - 456)



Row 92 (456 - 459)



Row 93 (459 - 462)



Row 94 (462 - 466)



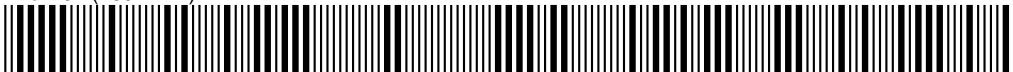
Row 95 (466 - 468)



Row 96 (468 - 469)



Row 97 (469 - 472)



Row 98 (472 - 474)



Row 99 (474 - 475)



Row 100 (476 - 478)



Row 101 (478 - 480)



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Row 102 (480 - 481)



Row 103 (482 - 484)



Row 104 (484 - 486)



Row 105 (486 - 489)



Row 106 (489 - 490)



Row 107 (490 - 493)



Row 108 (493 - 495)



Row 109 (495 - 496)



Row 110 (496 - 499)



Row 111 (499 - 501)



Row 112 (501 - 502)



Row 113 (502 - 505)



Row 114 (506 - 507)



Row 115 (507 - 510)



Row 116 (510 - 512)



Row 117 (512 - 513)



Row 118 (513 - 516)



HP-41C Altitude-Azimuth Pos. by Paul Burke PPC V9 N1 P24 Jan-Feb 1982

Row 119 (516 - 518)



Row 120 (518 - 519)



Row 121 (520 - 522)



Row 122 (522 - 524)



Row 123 (524 - 526)



Row 124 (527 - 528)



Row 125 (528 - 530)



Row 126 (530 - 532)



Row 127 (532 - 534)



Row 128 (534 - 536)



Row 129 (536 - 538)



Row 130 (539 - 540)



Row 131 (540 - 542)



Row 132 (542 - 544)



Row 133 (544 - 546)



Row 134 (546 - 549)

