example guyon 1909 pg 58

Zn= [redacted] **+192° 38.9'**

Analytic DR h= 60.1499 **+60° 9.0'**

ZD 29.850 **+29° 51.0'**

GHA	81	19.5	81.325	+81° 19.5'	
d Dec	8	54	8.900	+8° 54.'	0.1553 +North
L Lat DR	38	12	38.200	+38° 12.'	0.6667 +North
(calc fm GHA&Long) t DR			6.333	+6° 20.'	0.1105 +West
Long DR	-74	59.5	-74.992	-74° 59.5'	-1.3089 -West
Ho	59	55.3	59.922	+59° 55.3'	1.0458
	altair				

H	59.922	+59° 55.3'	H+D= 68.822 +68° 49.3'
D	8.900	+8° 54.0'	H-D= 51.022 +51° 1.3'
Pe	6.333	+6° 20.0'	D-H= -51.022 -51° 1.3'
L	38.200	+38° 12.0'	

t=tan(45+L/2) 2.059419

cot (H'+D')/2 =t*cot (H+D)/2 3.006486

tan (H'+D')/2 0.332614

(H'+D') 36.79572 2207.7 1103.9

one step 36.79572

cot (H'-D')/2 =1/t*cot (H-D)/2 1.017532

tan (H'-D')/2 0.98277

(H'-D') 89.00426 5340.3 2670.1

one step 89.00426

2 D'= -52.2085

D'= -26.1043 -26° 6.3' D' (minutes)= -1566.3

CHECK

1/tan(H'+D')/2	t*1/ tan(H+D)/2
3.00648558	3.006486

H' = (H'+D') - D' 62.89999

H' 62.89999

2 H'= 125.8

H'= 62.89999 +62° 54.0' H' (minutes)= 3774.0

tan Ze=cot D' sin Pe -0.22513 360+Ze 180-Ze

Ze -12.7 347.312337 [redacted] +192° 41.3'

sin He=cos D' cos Pe 0.892514

He 63.191 +63° 11.5'

H'-He= -0.291 -0° 17.5'

example guyon 1909 pg 58

Zn= [redacted] +192° 53.5'
Analytic DR h= 60.1282 +60° 7.7'
ZD 29.872 +29° 52.3'

-12.4 JUN 27 2011

GHA	81	19.5	81.325 +81° 19.5'		
d Dec	8	54	8.900 +8° 54.'	0.1553 +North	
L Lat DR	38	12	38.200 +38° 12.'	0.6667 +North	
(calc fm GHA&Long) t DR			6.458 +6° 27.5'	0.1127 +West	
Long DR	-74	52	-74.867 -74° 52.'	-1.3067 -West	
Ho	59	55.3	59.922 +59° 55.3'	1.0458	
	altair				

H	59.922 +59° 55.3'	H+D=	68.822 +68° 49.3'
D	8.900 +8° 54.0'	H-D=	51.022 +51° 1.3'
Pe	6.458 +6° 27.5'	D-H=	-51.022 -51° 1.3'
L	38.200 +38° 12.0'		

t=tan(45+L/2) 2.059419

cot (H'+D')/2 =t*cot (H+D)/2 3.006486
tan (H'+D')/2 0.332614
(H'+D') 36.79572 2207.7 1103.9
one step 36.79572

CHECK
1/tan(H'+D')/2 3.00648558
t*1/ tan(H+D)/2 3.006486

cot (H'-D')/2 =1/t*cot (H-D)/2 1.017532
tan (H'-D')/2 0.98277
(H'-D') 89.00426 5340.3 2670.1
one step 89.00426
2 D'= -52.2085
D'= -26.1043 -26° 6.3' D' (minutes)= -1566.3

H' = (H'+D') - D' 62.89999
H' 62.89999

2 H'= 125.8
H'= 62.89999 +62° 54.0' H' (minutes)= 3774.0

tan Ze=cot D' sin Pe -0.22956 360+Ze 180-Ze
Ze -12.9 347.071276 [redacted] +192° 55.7'

sin He=cos D' cos Pe 0.892296
He 63.163 +63° 9.8'

H'-He= -0.263 -0° 15.8'

Guyou First Method Worksheet

GHA	81	19.5	81.325 +81° 19.5'		
d Dec	8	54	8.900 +8° 54.'	0.1553 +North	
L Lat DR	38	12	38.200 +38° 12.'	0.6667 +North	
(calc fm GHA&Long) t DR			6.458 +6° 27.5'	0.1127 +West	
Long DR	-74	52	-74.867 -74° 52.'	-1.3067 -West	
Ho	59	55.3	59.922 +59° 55.3'	1.0458	
altair					
Dec + Ho			68.822 +68° 49.3'		Addition
Dec - Ho			-51.022 -51° 1.3'		Subtraction
MP (Lat)=			2483.5		MP table look up
MP [90 - (Dec + Ho)]=			1300.7		MP table look up
MP [90 - (Dec - Ho)]=			2543.3		MP table look up
MP (Lat) + MP [90 - (Dec + Ho)]=	A		3784.2		Addition
MP [90 - (Dec - Ho)] - MP (Lat)=	B		59.7		Subtraction
MP(x)=A; => x=			53.204 +53° 12.3'		MP table look up
MP(x)=B; => y=			0.996 +0° 59.7'		MP table look up
MP (90-x) =			2377.3		MP table look up
MP (90-y) =			16314.2		MP table look up
SUM	C		18691.5	C/2 9345.8	Addition
DIFFERENCE	D		-13936.9	D/2 -6968.5	Subtraction
MP(90-Z)=C/2; => 90-Z=			82.451 +82° 27.1'		MP table look up
MP(90-Pe)=D/2; => 90-Pe=			74.992 +74° 59.5'		MP table look up
Azimuth, Z=			7.549	7.549 +7° 32.9'	Subtraction
Local Hour Angle, LHA, Pe=			164.9919	15.008 +15° .5'	Subtraction
IF Dec > Hc, switch Z and Pe	Pe		7.548522 **+7° 32.9'**		
	Z		164.9919 **+164° 59.5'**		
As a check, use Dec, Lat, and LHA to calculate Alt and Zn					
	Zn=		195.0081 **+195° 0.5'**	ok	
	h=		59.9217 **+59° 55.3'**	ok	
(If star West, Zn=360-Z)					
GHA			0.000 +0° 0.'		
AP Long (=LHA-GHA)	7.549		+7° 32.9'	-West	
AP Lat	38	12	38.200 +38° 12.'	+North	

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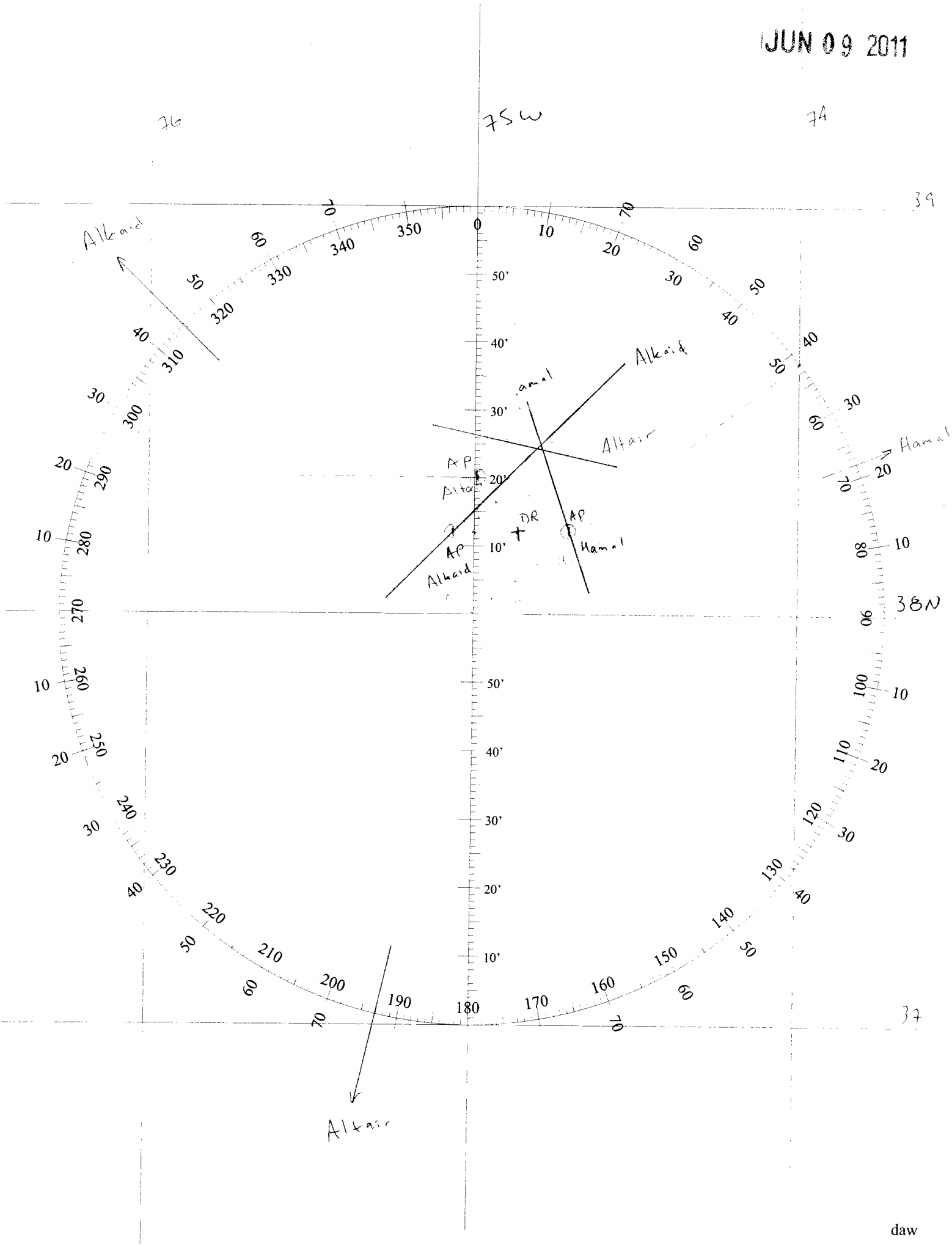
Guyou First Method Worksheet

GHA	172	9.7	172.162 +172° 9.7'			
d Dec	49	15.5	49.258 +49° 15.5'	0.8597 +North		
L Lat DR	38	12	38.200 +38° 12.'	0.6667 +North		
(calc fm GHA&Long) t DR			97.295 +97° 17.7'	1.6981 +West		
Long DR	-74	52	-74.867 -74° 52.'	-1.3067 -West		
Ho	23	53.8	23.897 +23° 53.8'	0.4171		
	alkaid					
Dec + Ho			73.155 +73° 9.3'			Addition
Dec - Ho			25.362 +25° 21.7'			Subtraction
MP (Lat)=			2483.5			MP table look up
MP [90 - (Dec + Ho)]=			1025.6			MP table look up
MP [90 - (Dec - Ho)]=			5127.8			MP table look up
MP (Lat) + MP [90 - (Dec + Ho)]=	A		3509.1			Addition
MP [90 - (Dec - Ho)] - MP (Lat)=	B		2644.3			Subtraction
MP(x)=A; => x=			50.369 +50° 22.2'			MP table look up
MP(x)=B; => y=			40.275 +40° 16.5'			MP table look up
MP (90-x) =			2593.8			MP table look up
MP (90-y) =			3448.8			MP table look up
SUM	C		6042.7	C/2 3021.3		Addition
DIFFERENCE	D		-855.0	D/2 -427.5		Subtraction
MP(90-Z)=C/2; => 90-Z=			44.899 +44° 53.9'			MP table look up
MP(90-Pe)=D/2; => 90-Pe=			7.107 +7° 6.4'			MP table look up
Azimuth, Z=			45.101		45.101 +45° 6.1'	Subtraction
Local Hour Angle, LHA, Pe=			97.10687		82.893 +82° 53.6'	Subtraction
IF Dec > Hc, switch Z and Pe		Pe	97.10687 **+97° 6.4'**			
		Z	45.10143 **+45° 6.1'**			
As a check, use Dec, Lat, and LHA to calculate Alt and Zn						
		Zn=	314.8986 **+314° 53.9'**	ok		
		h=	23.8967 **+23° 53.8'**	ok		
(If star West, Zn=360-Z)						
GHA			0.000 +0° 0.'			
AP Long (=LHA-GHA)	97.107		+97° 6.4'	-West		
AP Lat	38	12	38.200 +38° 12.'	+North		

Guyou First Method Worksheet

GHA	347	12.7	347.212 +347° 12.7'		
d Dec	23	30.9	23.515 +23° 30.9'	0.4104 +North	
L Lat DR	38	12	38.200 +38° 12.'	0.6667 +North	
(calc fm GHA&Long) t DR			-87.655 -87° 39.3'	-1.5299 +West	
Long DR	-74	52	-74.867 -74° 52.'	-1.3067 -West	
Ho	16	8.7	16.145 +16° 8.7'	0.2818	
hamal					
Dec + Ho			39.660 +39° 39.6'		Addition
Dec - Ho			7.370 +7° 22.2'		Subtraction
MP (Lat)=			2483.5		MP table look up
MP [90 - (Dec + Ho)]=			3506.3		MP table look up
MP [90 - (Dec - Ho)]=			9428.3		MP table look up
MP (Lat) + MP [90 - (Dec + Ho)]=	A		5989.8		Addition
MP [90 - (Dec - Ho)] - MP (Lat)=	B		6944.8		Subtraction
MP(x)=A; => x=			70.136 +70° 8.2'		MP table look up
MP(x)=B; => y=			74.889 +74° 53.4'		MP table look up
MP (90-x) =			1216.5		MP table look up
MP (90-y) =			917.3		MP table look up
SUM	C		2133.8	C/2 1066.9	Addition
DIFFERENCE	D		299.1	D/2 149.6	Subtraction
MP(90-Z)=C/2; => 90-Z=			17.503 +17° 30.2'		MP table look up
MP(90-Pe)=D/2; => 90-Pe=			2.492 +2° 29.5'		MP table look up
Azimuth, Z=			72.497	72.497 +72° 29.8'	Subtraction
Local Hour Angle, LHA, Pe=			87.50804	87.508 +87° 30.5'	Subtraction
IF Dec > Hc, switch Z and Pe		Pe	87.50804 **+87° 30.5'**		
		Z	72.49706 **+72° 29.8'**		
As a check, use Dec, Lat, and LHA to calculate Alt and Zn					
		Zn=	72.4971 **+72° 29.8'**	ok	
		h=	16.1450 **+16° 8.7'**	ok	
(If star West, Zn=360-Z)					
GHA			0.000 +0° 0.'		
AP Long (=LHA-GHA)	87.508		+87° 30.5'	-West	
AP Lat	38	12	38.200 +38° 12.'	+North	



daw

ICE.OUT

Celestial Navigation Data for 2011 Jun 7 at 8 15 07 UT (GMT)
Delta T = 73.7 seconds
For Assumed Location: Longitude W 74 48.0
Latitude N 38 24.0

DR 74 52 W
39 12 N

Object	Almanac Data GHA	Dec	Hc	Zn	Altitude Corrections Refr	SD	PA	Sum
	ø '	ø '	ø '	ø	'	'	'	'
MARS	331 27.5	n17 24.6	+ 0 45.7	68.2	-23.3	.0	.1	-23.2
JUPITER	350 19.0	n10 36.7	+10 51.7	85.0	-5.0	.3	.0	-4.6
ALIOTH	185 31.7	n55 54.0	+21 01.7	325.8	-2.6	.0	.0	-2.6
ALKAID	172 09.7	n49 15.5	+23 53.8	314.9	-2.2	.0	.0	-2.2
AL NA'IR	46 55.4	s46 54.0	+ 1 08.1	161.4	-21.0	.0	.0	-21.0
ALPHECCA	145 21.9	n26 40.6	+30 47.3	281.2	-1.7	.0	.0	-1.7
ALPHERAT	16 55.2	n29 09.1	+41 47.8	82.8	-1.1	.0	.0	-1.1
ALTAIR	81 19.5	n 8 54.0	+59 55.3	192.9	-.6	.0	.0	-.6
ANTARES	131 37.7	s26 27.5	+ 6 09.0	228.9	-8.2	.0	.0	-8.2
ARCTURUS	165 06.8	n19 07.4	+11 30.2	285.4	-4.7	.0	.0	-4.7
CAPELLA	299 47.2	n46 00.5	+ 3 32.9	29.5	-12.3	.0	.0	-12.3
DENEB	68 42.3	n45 19.2	+81 43.8	31.3	-.1	.0	.0	-.1
DIPHDA	8 07.5	s17 55.3	+ 5 58.6	118.5	-8.4	.0	.0	-8.4
DUBHE	213 03.4	n61 41.5	+15 38.3	340.9	-3.5	.0	.0	-3.5
ELTANIN	109 56.4	n51 29.2	+62 15.8	309.6	-.5	.0	.0	-.5
ENIF	52 58.5	n 9 55.7	+55 27.5	139.8	-.7	.0	.0	-.7
FOMALHAU	34 35.6	s29 33.4	+12 22.2	144.9	-4.4	.0	.0	-4.4
HAMAL	347 12.7	n23 30.9	+16 08.7	72.5	-3.4	.0	.0	-3.4
KAUS AUS	102 55.4	s34 22.6	+12 41.6	203.5	-4.3	.0	.0	-4.3
KOCHAB	156 28.9	n74 06.6	+38 56.2	339.6	-1.2	.0	.0	-1.2
MARKAB	32 49.8	n15 16.0	+46 31.5	110.3	-.9	.0	.0	-.9
MIRFAK	327 53.0	n49 54.0	+19 09.7	40.7	-2.8	.0	.0	-2.8
NUNKI	95 09.8	s26 16.8	+22 34.0	199.7	-2.4	.0	.0	-2.4
RASALHAG	115 17.5	n12 33.1	+45 47.2	245.4	-1.0	.0	.0	-1.0
SABIK	121 23.9	s15 44.3	+20 28.5	228.3	-2.6	.0	.0	-2.6
SCHEDAR	8 52.6	n56 35.8	+43 59.5	44.3	-1.0	.0	.0	-1.0
SHAULA	115 33.5	s37 06.7	+ 5 39.6	211.5	-8.7	.0	.0	-8.7
VEGA	99 49.6	n38 47.6	+70 29.8	279.0	-.4	.0	.0	-.4
ARIES	19 10.1							