DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

FE36

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

WIRE DRAG

Diagram No. 1234-2

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

(HYDROGRAPHIC)

Type of Survey Field Examination

Field No.

Office No. FE-36

LOCALITY

State North Carolina

General Locality Cape Lookout

Locality

1942

CHIEF OF PARTY
I.E. Rittenburg

LIBRARY & ARCHIVES

DATE 1942

☆ U.S. GOV. PRINTING OFFICE: 1976—669-441

FE36

WIRE DRAG

NOTE: A new system for registering Field Examinations (FE's) was established in 1980. All FE's are now consecutively numbered as shown hereon. The date shown in the new format is the actual date of survey. This material was previously registered as: FE No.6 1942

DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Form No. 718
(Ed. May 1935)

Sheet No. 1

of ..... Sheets

ABSTRACT OF BUOY TO BUOY AZIMUTHS

U. S. C. & G. S. Ship Cowie, H.C. Stutemeyer Commanding

Project Special Surveys, Locality Cape Lookout N.C. 19 42

DATE	FROM BUOY	TO BUOY	METHOD	AZIMUTH	REMARKS
June 30	Trawl	"A"ffirm	Inclined Sun angle	159° 01'	
	"A"ffirm	"B"aker	"	159° 48.3	
	"B"aker	"C"ast	"	162° 19.4	
	"C"ast	"D"og	"	155° 54.2	
	"D"og	"E"asy	"	156° 30.0	
	"Easy	"F"ox	"	156° 52.5	
	"Fox"	"G"eorge	"	160° 36.4	
	"G"eorge	"H"ypo	"	161° 54.2	
July 1	"H"ypo	"J"ig	"	161° 35.3	
	"Jig	"K"ing	"	159° 46.2	
	"K"ing	"L"ove	"	160° 27'	
	"L"ove	"M"ike	"	158° 37.6	

Compiled by H.C. Stutemeyer Checked by W. B. Page

U.S. GOVERNMENT PRINTING OFFICE 59042

DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Form No. 720
Ed. May 1935

Sheet No. 1 of 1 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Buoy 14 to ~~Buoy~~: Mast of Russian Wreck

U. S. C. & G. S. Ship M. V. Cowie, I. E. Ritenour Commanding.

Project ____, Locality off Cape Lookout, N.C., Date 6/19, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Celestial object observed ⊙ bearing 107.3° true.

Horizon object observed Stbd Mast Wreck bearing 34.5° true.

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object.

Inclined angle *i* by IER using Sextant No. 4322 I. C. = 00

Latitude 34° 18' 12"

Longitude 76° 24' 24"

Longitude h. 15 m. 05 s. - 37.6

R. A. ____ h. ____ m. ____ s. Decl. δ + 23° 25' 5"

H. I. ____

Chronometer No. 5220 Sid. M. T. Watch No. ____ Sid. M. T.

Vertical angle *h* by RHT using Sextant No. 5179 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	15 08 08	09 15	10 08	
Chron. cor'n	− 07	− 07	− 07	
G. C. T	15 08 01	15 09 08	15 10 49	
Eq. of time or *R.A. M.S.+12 hr.*	− 01 05.3	− 01 05.3	− 01 05.3	
Cor'n, Table III (N.A.)				
G. A. T. or *G. S. T.*	15 06 55.7	15 08 02.7	15 09 43.7	
Longitude	5 05 37.6	5 05 37.6	5 05 37.6	
L. A. T. or *L. S. T.*	10 01 18.1	10 02 25.1	10 04 06.1	
R. A.				
Hour angle, *t*				

	1	2	3	4
Observed *h*	61° 43' 50"	61° 58' 10"	62° 20' 40"	° ' "
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
h	61° 59.6	62° 14.0	62° 36.5	

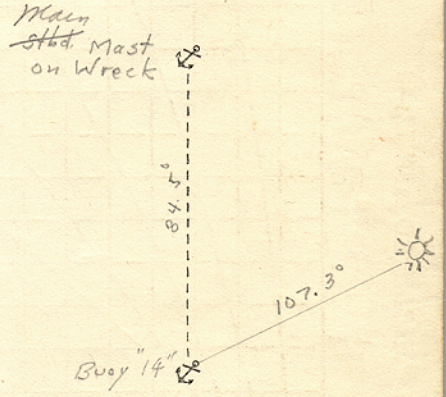
	1	2	3	4
Obs. incl. angle	82° 09'	82° 50'	82° 35' 18"	° '
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
i	82° 24.8	83° 05.8	82° 51.0	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.1206585	9.0798849	9.0950556	
Log cos *h*	9.6717043	9.6682665	9.6628245	
Log cos Δ_{approx}	9.4489542	9.4116184	9.4322311	
Δ_{approx}	73° 40' 14"	75° 02' 55"	74° 18' 13"	
Dip correction*	− 5' 26.4"	− 5' 26.4	− 5' 26.4	−
Δ_{true}	73° 34.8'	74° 57.5'	74° 12.8'	
Az. cel. object	104° 56'	105° 12'	105° 38'	
Az. horiz. object	31° 21'	30° 14'	31° 25'	0 1
			Mean	31-23

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34° .425			At latitude: 35°			Latitude of observation
	δ 23	δ 24	δ 23° 25.5	δ 23°	δ 24°	δ 23° 25.5	34° 18.2'
10 00'	104 49	103 50	104° 03'	106 36	104-51	105 51	
01.32			104° 23'	45		106 12	104° 56'
02.42			104 39			106 29	105° 12'
04.12			105 04			106 55	105° 38'
10 10'	107 20	105 26	106 32	109 14	107-24	108 27	
	1 54			47			
	48					2 36	
						1 56	

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comput. by WBQ. I.E.R.

11—11535

INSTRUCTIONS

105 95
104 41
1 49
109

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

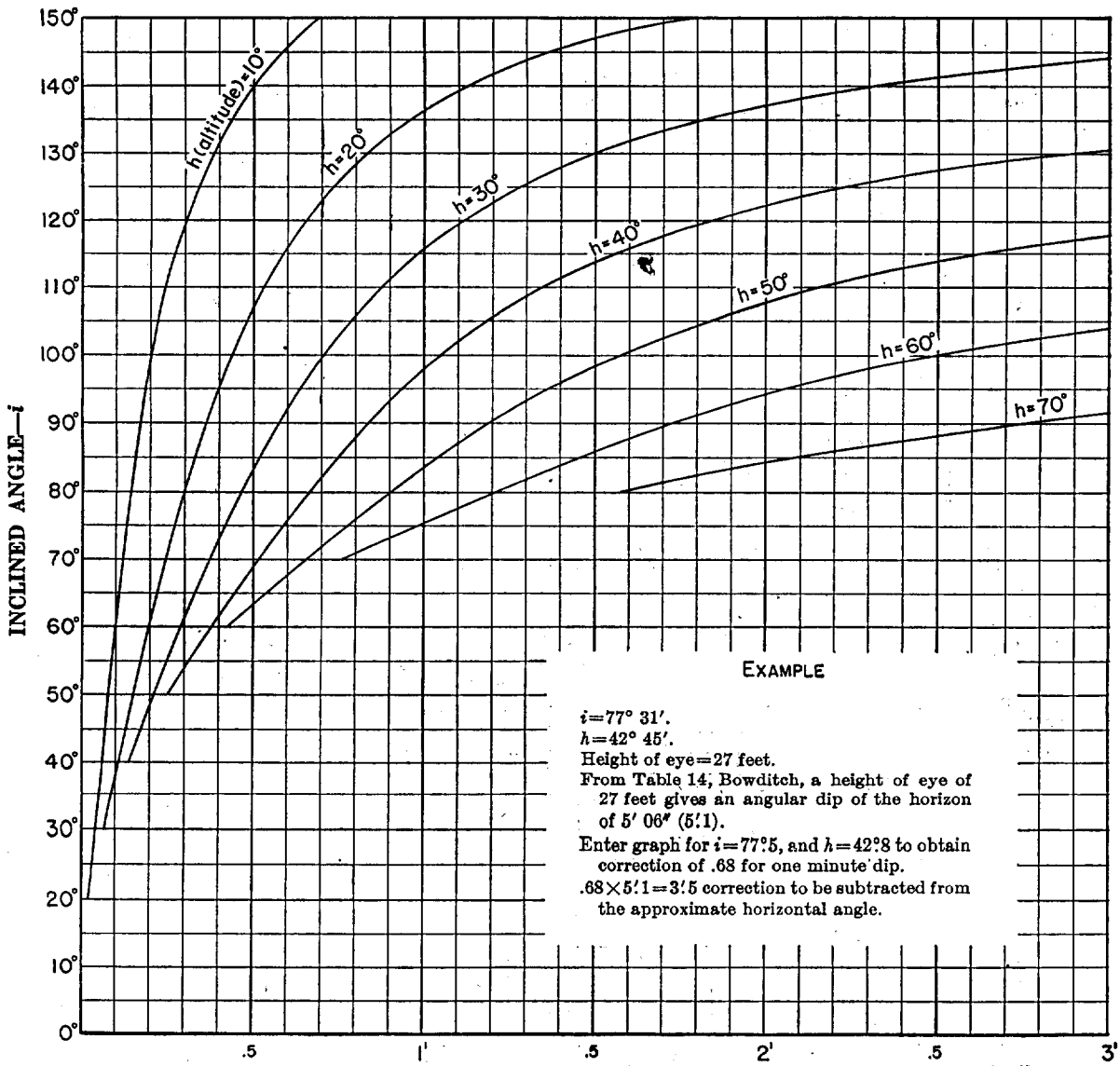
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{s}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

4 · 62° /
2 · 82 /
3° 58" = 3.97
1.37 × 3.97 = 5.44' = 5' 26.4" /

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 1 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Trawl to Buoy: Afirm

U. S. ~~C. & G. S.~~ N. Ship Advance, Lt. Stanwood Commanding.

Project Special Survey, Locality Cape Look out, Date June 30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Celestial object observed ⊙ bearing 80° true.

Horizon object observed Trawl bearing ____° true.

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object.

Inclined angle i by L.E.R. using Sextant No. 617 I. C.= .05 Vertical angle h by C.E. using Sextant No. 739 I. C.= .05

Latitude 34° 33.3'

Longitude 76° 36.3'

Longitude h. 5 m. 6 s. 26

R. A. h. m. s. Decl. δ + 23° 12' 00"

H. I. 19'

Chronometer No. 70291 M. T. Watch No. ____ Sid. M. T.

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch	3			
Chron. time	12 44 47	12 44 56		
Chron. cor'n	− 1 46	− 46		
G. C. T.	12 43 01	12 44 10		
Eq. of time or *R.A. M. S.+12 hr.*	− 03 23.4	− 03 23.4		
Cor'n, Table III (N.A.)	12 39 37.6	12 40 46.6		
G. A. T. or *G. S. T.*	05 06 26	05 06 26		
Longitude	07 33 12	07 34 21		
L. A. T. or *L. S. T.*	07 33 12	07 34 21		
R. A.				
Hour angle, t				

	1	2	3	4
	° '	° '	° '	° '
Observed h	31 23	31 30		
Index cor'n	00	00		
Semi-diam.	15.8	15.8		
h	31 38.8	31 45.8		
Obs. incl. angle	78 40	78 38.3		
Index cor'n	00	00		
Semi-diam.	15.8	15.8		
i	78 55.8	78 54.3		

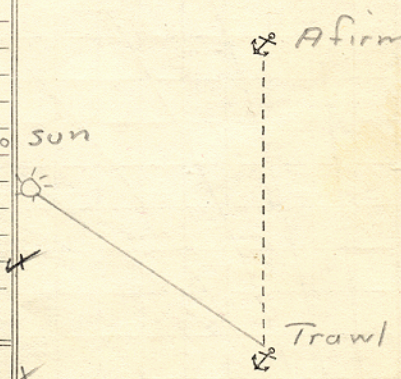
No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$ *

	1	2	3	4
Log cos i	9.28334	9.28429		
Log cos h	9.93009	9.92954		
Log cos Δ_{approx}	9.35325	9.35475		
Δ_{approx}	76 - 57.9	76 - 55.1		
Dip correction*	− 02.0	− 02.0	− 02.0	− 02.0
Δ_{true}	76 - 55.9	76 - 53.1		
Az. cel. object	82 - 02	82 - 11.0		
Az. horiz. object	158 - 57.9	159 - 04.1		
Mean				159 - 01

SKETCH

5



INTERPOLATION FROM AZIMUTH TABLES

Hour angle t	At latitude: 34° δ 23°	δ 24°	δ 23.2	At latitude: 35° δ 23°	δ 24°	δ 23.2	Latitude of observation 24.56
07-30	81 31	80 30	81 18.8	82 06	81 05	81 53.8	81 39
33.2			81 - 42			82 - 18	82 02
34.35			81 - 50			82 - 27	82 11
07-46	82 44	81 41	82 31.4	83 22	82 19	83 09.4	82 52

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	a	Log sin a	Log s (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp by WBP
Ck by RHT

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

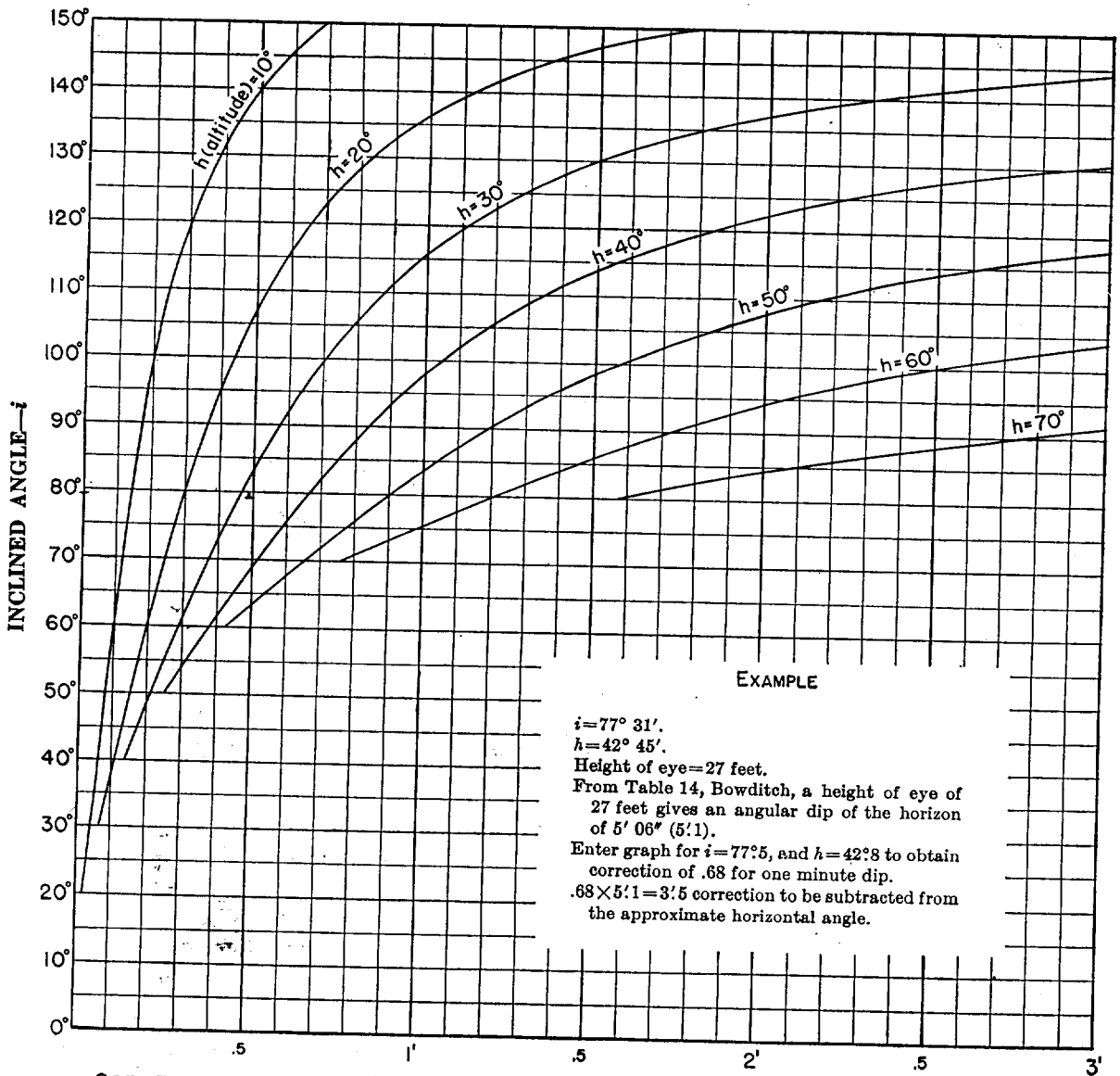
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



EXAMPLE

$i = 77° 31'$.
$h = 42° 45'$.
Height of eye = 27 feet.
From Table 14, Bowditch, a height of eye of 27 feet gives an angular dip of the horizon of 5′ 06″ (5′.1).
Enter graph for $i = 77°.5$, and $h = 42°.8$ to obtain correction of .68 for one minute dip.
$.68 \times 5'.1 = 3'.5$ correction to be subtracted from the approximate horizontal angle.

CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

4′09″ = 4.15′

4.15
47
2905
1660
2.0335′

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 2 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: "A"firm to Buoy: "Baker

U. S. ~~C. & G.~~ S. Ship Advance, Lt Stanwood Commanding.

Project Special Survey, Locality Cape Lookout, Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Latitude 34° 31.3'

Longitude 76° 35' 14"

Longitude 5h 06m 22s

Celestial object observed ☉ bearing 83° true. R. A. ____ Decl. δ +23° 11.9'

Horizon object observed A bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 170291 M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by IER using Sextant No. 617 I. C. = 00 Vertical angle *h* by C.E. using Sextant No. 739 I. C. = -0.5

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	13 01 27	13 02 35	13 04 31	
Chron. cor'n	— 01 48	48	48	
G. C. T.	13 00 39	13 01 47	13 03 43	
Eq. of time or *R.A. M.S.+12hr.*	— 03 23.5	03 23.5	03 23.5	
Cor'n, Table III (N.A.)	15.5			
G. A. T. or *G. S. T.*	12 57 ~~11.5~~	12 58 23.5	13 00 19.5	
Longitude	05 06 21.6	05 06 21.6	05 06 21.6	
L. A. T. or *L. S. T.*	07 50 47.5	07 52 01.5	07 53 57.9	
R. A.	7-50-53.9			
Hour angle, *t*				

	1	2	3	4
	° ′	° ′	° ′	° ′
Observed *h*	34 53	35 13.5	35 34	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
h	35 08.8	35 29.3	35 49.8	

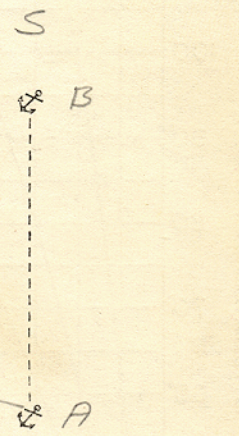
	1	2	3	4
	° ′	° ′	° ′	° ′
Obs. incl. angle	78 —	78 14	77 49	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
i	78 15.8	78 29.8	78 04.8	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.30838	9.29928	9.31508	
Log cos *h*	9.91258	9.91075	9.90889	
Log cos Δ_{approx}	9.39580	9.38903	9.40613	
Δ_{approx}	75 35.7	75 49.3	75 14.4	
Dip correction*	— 02.3	— 02.3	— 02.3	—
Δ_{true}	75 33.4	75 47.0	75 12.1	
Az. cel. object	84 ~~13.3~~ 14.1	84 21.7	84 ~~26.~~ 37.5	
Az. horiz. object	159 ~~46.8~~ 47.1	160 08.7	159 ~~48.8~~ 49.6	Mean 159 48.3

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34° δ 23°	δ 24	δ 23.2	At latitude: 35° δ 23	δ 24	δ 23.2	Latitude of observation 34.5
07 50	83 58	82 53	83 45.8	84 40	83 36	84 27.2	84 07.2
50.8							84 17.1
52.02							84 21.8
53.96							84 37.5
07 60	85 13	84 06	84 59.5	85 59	84 53	85 45.8	85 23.7
			24.2				

23.7 96.5

AZIMUTH

	° ′
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction ″
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp by WBO ×
by RHT

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

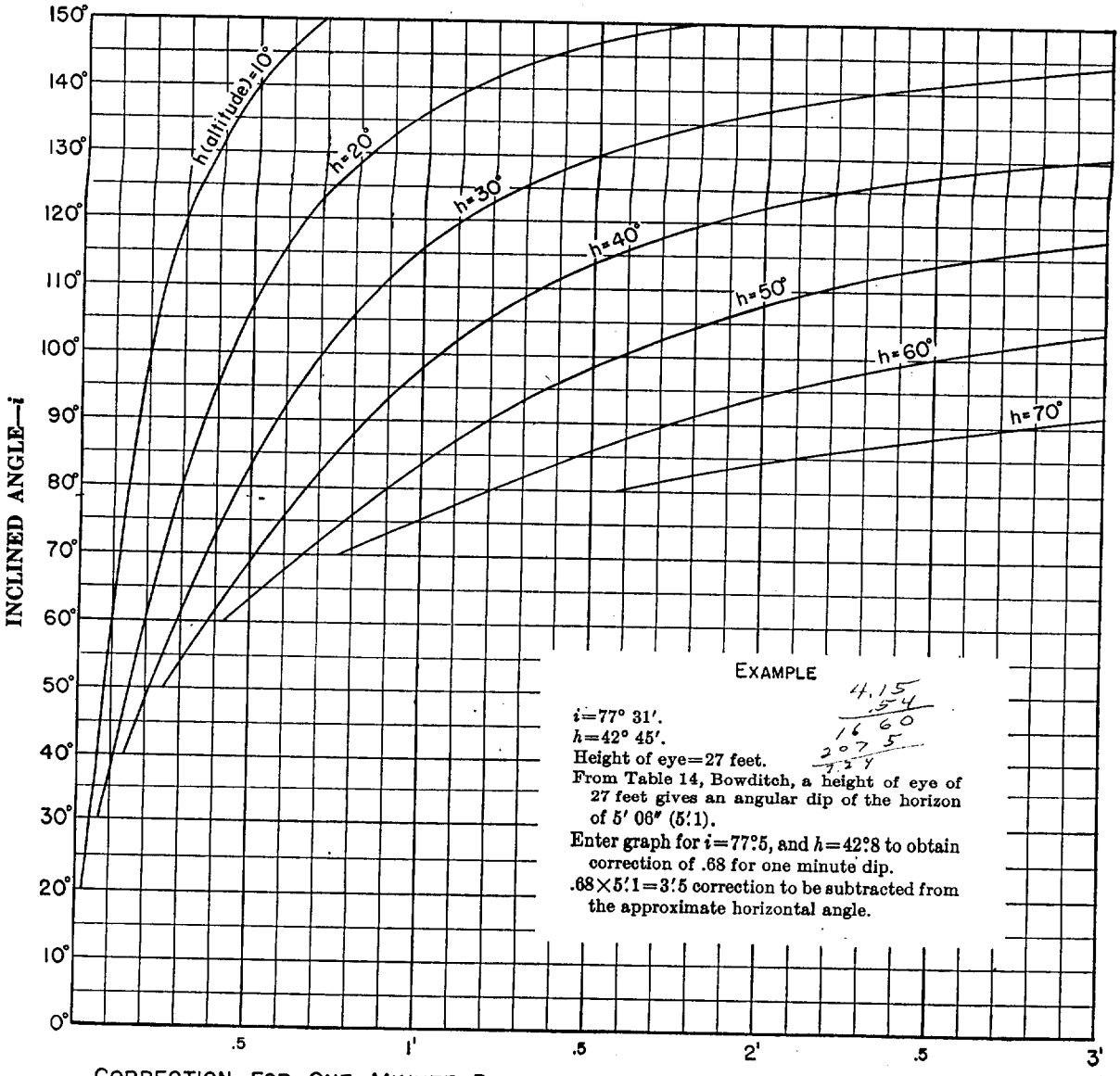
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 3 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Baker to Buoy: East

U. S. ~~C. & G. S.~~ N Ship Advance, Lt. Stanwood Commanding.

Latitude 34° 28' 30"

Longitude 26 33 00

Project Special Survey, Locality Off Cape Lookout N.C., Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude h. 05 m. 06 s. 1.6

Celestial object observed ☉ bearing 86° true. 1764276 = 446

R. A. ____ h. ____ m. ____ s. Decl. δ ° + 23 ' 11.8 "

Horizon object observed B bearing ____° true.

H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 17029 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C. = 00 Vertical angle *h* by CEL using Sextant No. 239 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	13 21 35	13 22 50		
Chron. cor'n	0 13 49	49		
G. C. T	13 20 46	13 22 01		
Eq. of time or *R.A. M.S.+12 hr.*	- 03 23.7	- 03 23.7		
Cor'n, Table III (N.A.)				
G. A. T. or *G. S. T.*	13 17 22.3	13 18 37.3		
Longitude	5 06 16	5 06 16		
L. A. T. or *L. S. T.*	08 11 10.3	08 12 25.3		
R. A.	6.3	21.3		
Hour angle, *t*				

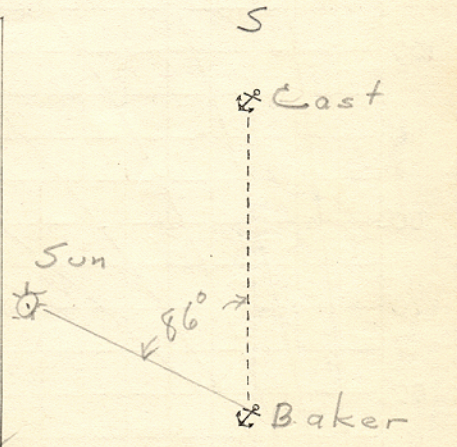
	1	2	3	4
	° '	° '	° '	° '
Observed *h*	39 04	39 21.2		
Index cor'n	00	00		
Semi-diam.	15.8	15.8		
h	39 19.8	39 37.1		
	Range off slightly			
Obs. incl. angle	78 37	78 43		
Index cor'n	00	00		
Semi-diam.	15.8	15.8		
i	78 52.8	78 58.8		

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.285 252	9.281 378		
Log cos *h*	9.888 465	9.886 665		
Log cos Δ_{approx}	9.396 787	9.394 713		
Δ_{approx}	75 33.7	75 37.9		
Dip correction*	- 02.7	- 02.7	-	-
Δ_{true}	75 31.0	75 35.2		
Az. cel. object	86 48.4	86 58.9		
Az. horiz. object	162 19.4	162 34.1		
			Mean	162-19.4

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34°			At latitude: 35°			Latitude of observation
	δ 23	δ 24	δ 23.2	δ 23	δ 24	δ 23.2	34.467
08 10	86-30	85 21	86 16.2	87 19	86 11	87 05.4	86 39.2
11.1							86 48.4
12.35							86 58.9
08 20	87-49	86 38	87 34.8	88 41	87 31	88 27.0	88 03.8

43.8
5.4
49.2
25.2
27
52.4

80

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp. by WBB X
RHT

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

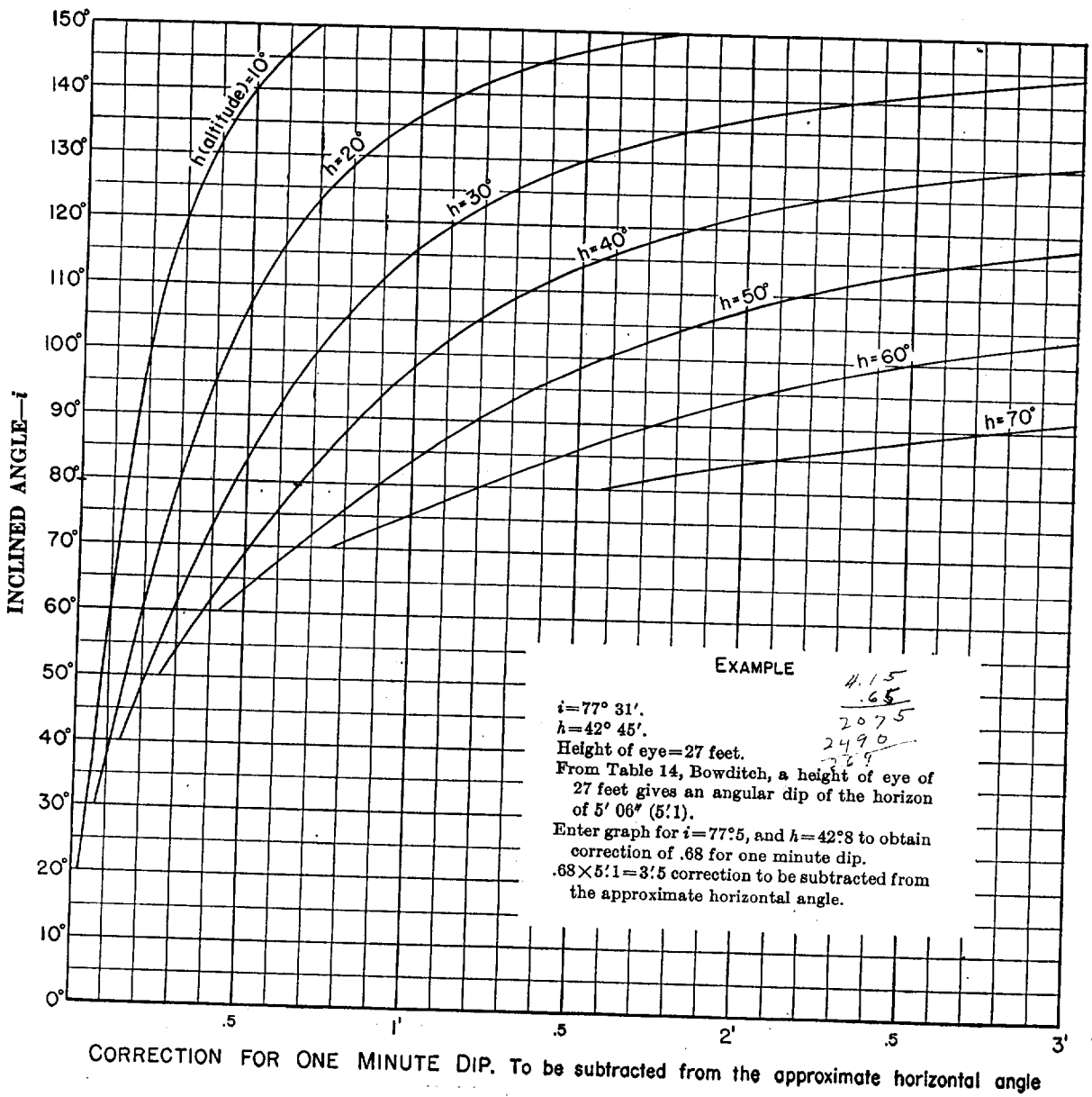
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{s}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 4 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Cast to Buoy: Dog

U. S. ~~C. & G. S.~~ N Ship Advance, Lt Stanwood Commanding.

Project Special Survey, Locality Cape Lookout, Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Celestial object observed ☉ bearing 86° true.

Horizon object observed C bearing ____° true.

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object.

Inclined angle *i* by ILER using Sextant No. 617 I. C. = 00

Latitude 34° 24.99, 24.95

Longitude 76° 31.8, 32.7

Longitude h. 5 m. 6 s. 9.2, 10.8

R. A. ____ Decl. δ + 23° 11.8

H. I. 1.9'

Chronometer No. 17029 Sid. M. T. ____ Watch No. ____ Sid. M. T.

Vertical angle *h* by CEL using Sextant No. 729 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	13 43 06	13 44 12		
Chron. cor'n	− 351	− 51		
G. C. T	13 42 15	13 43 21		
Eq. of time or *R.A. M.S.+12 hr.*	− 03 23.8	− 03 23.8		
Cor'n, Table III (N.A.)	13 38 51.2	13 39 57.2		
G. A. T. or *G. S. T*	10.8	10.8		
Longitude	5 06 47.2	5 06 47.2		
L. A. T. or *L. S. T*	08 32 40.9 46.4	08 33 46.4 58.3		
R. A				
Hour angle, *t*				

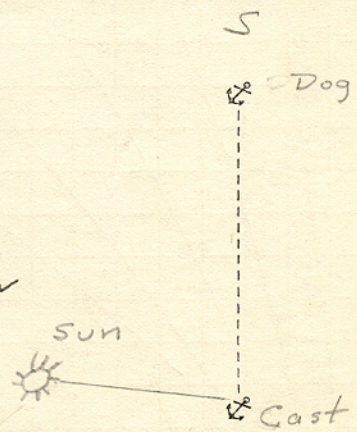
	1	2	3	4
	° ′	° ′	° ′	° ′
Observed *h*	43 29	43 41 30		
Index cor'n	00	00		
Semi-diam	15.8	15.8		
h	43 44.8	43 57.3		
Obs. incl. angle	72 46	72 51		
Index cor'n	00	00		
Semi-diam	15.8	15.8		
i	73 01.8	73 06.8		

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.465191	9.463115		
Log cos *h*	9.858780	9.857263		
Log cos Δ_{approx}	9.606411	9.605852		
Δ_{approx}	66 10.2	66 12.2		
Dip correction*	− 02.6	− 02.6	−	−
Δ_{true}	66 07.6	66 09.6		
Az. cel. object	89 41.6 40.9	89 51.0 50.5		
Az. horiz. object	155 49.2	156 00.6		155 − 54.2
	155 48.5	156 00.0	Mean	155 − 54.8

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34			At latitude: 35			Latitude of observation
	δ 23	δ 24	δ 23.2	δ 23	δ 24	δ 23.2	34.412
08 30	89 10	87 56	88 55.2	90 06	88 53	89 51.4	89 1.8.3
32.67							89 41.6 40.9
33.77							89 51.0 50.5
08 40	90 34	89 18	90 18.8	91 34	90 19	91 19	90 43.9
			25.1				

AZIMUTH

	° ′
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION 25.3

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction ′
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp. by WBO X RHT

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

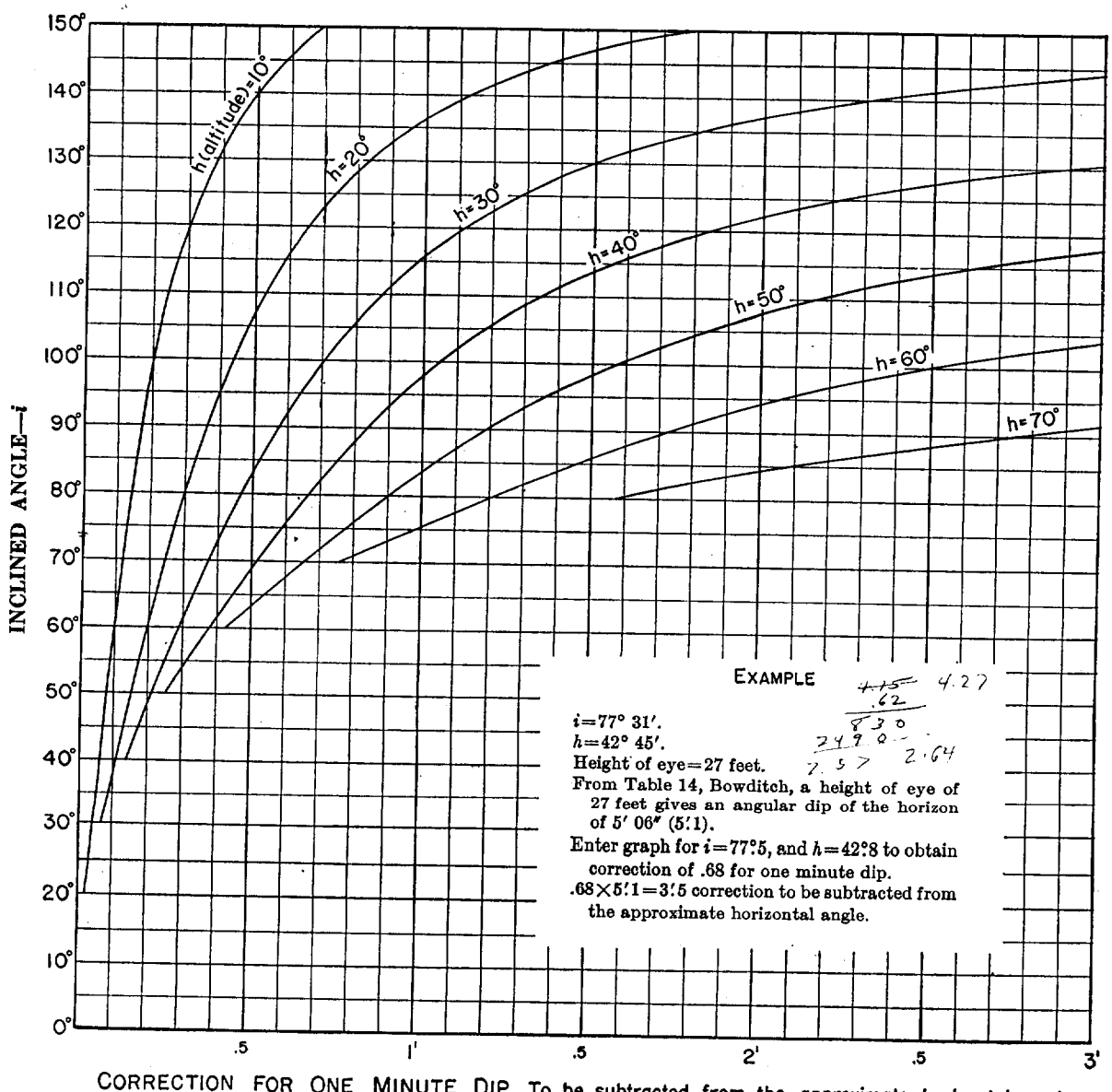
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Form No. 720
Ed. May 1935

Sheet No. 5 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Dog to Buoy: Easy

U. S. ~~C. & G. S.~~ Ship Advance, Lt. Stanwood Commanding.

Latitude 34° 27.9'

Longitude 26 22.5 / 31.3

Project Special Survey, Locality Cape Lookout, Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude h. 05 m. 5 s. 59.52

Celestial object observed ☉ bearing ____° true. R. A. ____ Decl. δ +23 11.7

Horizon object observed D bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 17029 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 612 I. C. = 00 Vertical angle *h* by CEL using Sextant No. 739 I. C. = 0.0

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	14 01 50	14 02 59	04 38	
Chron. cor'n	− 01 32	− 52	52	
G. C. T	14 00 58	14 02 07	14 03 46	
Eq. of time or *R*|*A. M. S.*+12 hr.	− 03 24	− 03 24	− 03 24	
Cor'n, Table III (N. A.)				
G. A. T. or *G. S. T*	13 57 34	13 58 43	14 00 22	
Longitude	5 05 52.5	5 05 52.5	5 05 52.5	
L. A. T. or *L. S. T*	8 51 41.5	8 52 50.5	8 54 29.5	
R. A	42	51	30	
Hour angle, *t*				

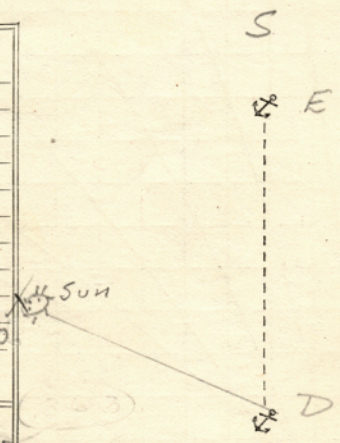
	1	2	3	4
	° ′	° ′	° ′	° ′
Observed *h*	47 27	47 40	47 56	
Index cor'n	00	00	00	
Semi-diam	15.8	15.8	15.8	
h	47 42.8	47 55.8	48 11.8	
Obs. incl. angle	72 45	72 38	72 29	
Index cor'n	00	00	00	
Semi-diam	15.8	15.8	15.8	
i	73 00.8	72 53.8	72 44.8	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.465605	9.468489	9.472167	
Log cos *h*	9.827912	9.826099	9.823850	
Log cos Δ_{approx}	9.637693	9.642390	9.648317	
Δ_{approx}	64 15.9	63 57.9	63 34.8	
Dip correction*	− 03.0	− 03.0	− 03.0	−
Δ_{true}	64 12.9	63 54.9	63 31.8	
Az. cel. object	92 ~~28.5~~	92 ~~33.6~~	92 ~~49.0~~	
	24.7	35.4	50.3	
Az. horiz. object	156 ~~35.3~~	156 ~~28.5~~	156 ~~21.0~~	
	37.6	30.3	Mean 22.1	156 − 30.0

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34			At latitude: 35			Latitude of observation
	δ 23	δ 24	δ 23.195	δ 23	δ 24	δ 23.195	34.36
08 50	92 07	90 42	91 45.6	93 05	91 47	92 48.8	92 09.1
51.8			23.5				92 24.7
52.8	85						92 35.4
54.8	5						92 50.3
08 60	93 31	92 09	93 15	94 41	93 21	94 25.4	93 40.8
			25.8				

AZIMUTH

	° ′
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction ′
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

comp ✓ W80 X R14.5

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

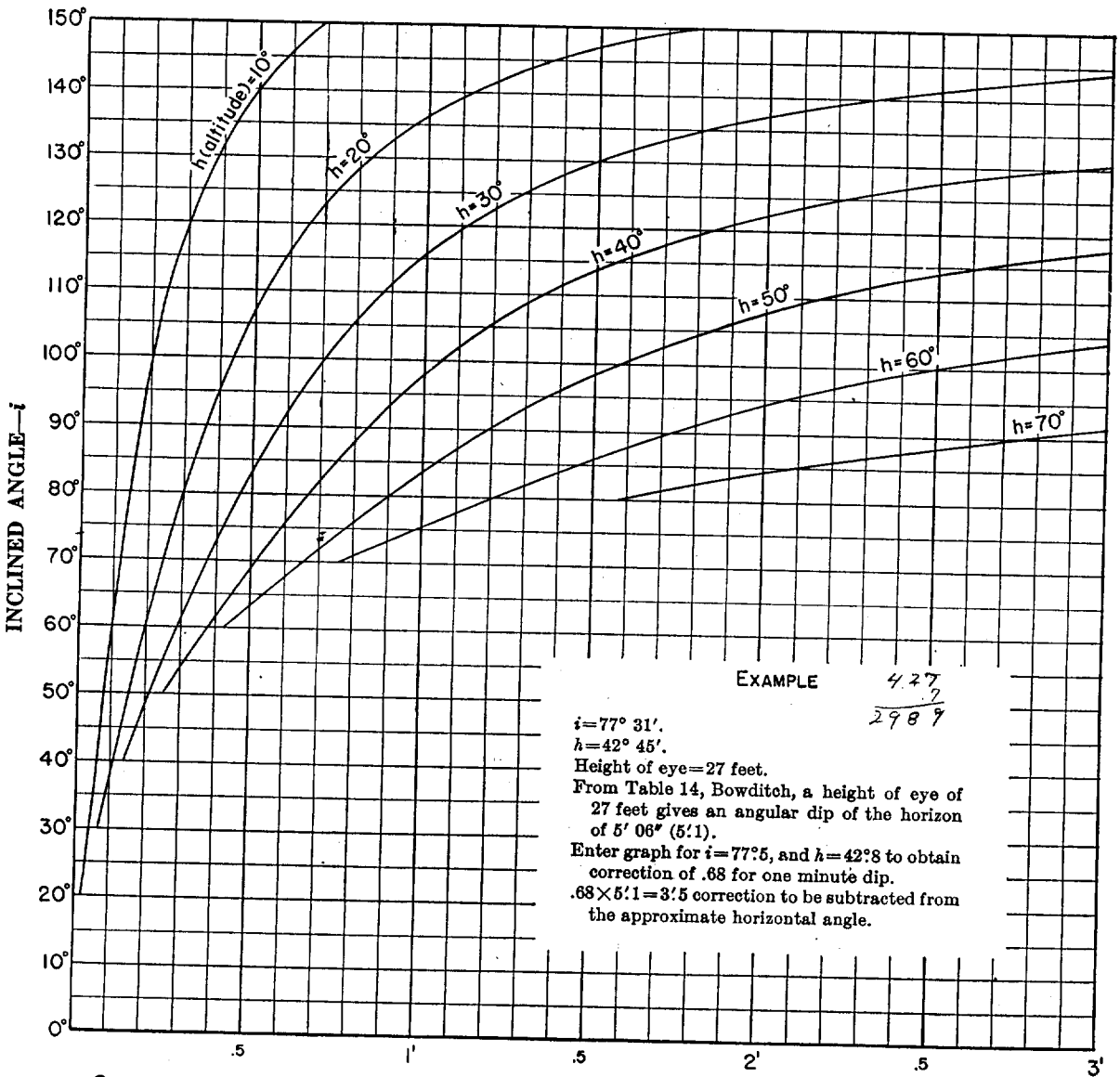
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 6 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Easy to Buoy: Fox

U. S. ~~C. & G. S.~~ N. Ship Advance, Lt. Stanwood Commanding.
Project Special Survey, Locality Cape Lookout, N.C., Date 6/30, 1942

Latitude 34° 19.25
Longitude 76° 29.8

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude 5h 05m 54.8s

Celestial object observed ☉ bearing 95° true. R. A. ____ Decl. δ + 23° 11.2'

Horizon object observed E bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 70291 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C. = 00 Vertical angle *h* by CEL using Sextant No. 239 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	14 20 35	14 22 01	14 23 45	
Chron. cor'n	− 54	− 54	− 54	
G. C. T.	14 19 41	14 21 07	14 22 51	
Eq. of time or *R.A. M.S.+12hr.*	− 03 24.2	− 03 24.2	− 03 24.2	
Cor'n, Table III (N.A.)	14 16 16.8	14 18 42.8	14 19 26.8	
G. A. T. or *G. S. T.*	5 05 57.3 54.8	5 05 57.3 54.8	5 05 57.3 54.8	
Longitude	9 10 22.5	9 12 48.0	9 13 32.0	
L. A. T. or *L. S. T.*	9 10 17.6	9 11 43.6	9 13 27.6	
R. A.				
Hour angle, *t*				

	1	2	3	4
	° ′	° ′	° ′	° ′
Observed *h*	51 30	51 45	51 58	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
h	51 45.8	52 00.8	52 13.8	

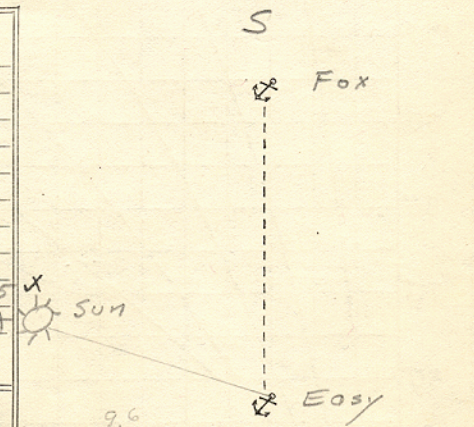
	1	2	3	4
	° ′	° ′	° ′	° ′
Obs. incl. angle	72 37	72 47	72 22	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
i	72 52.8	73 02.8	72 37.8	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.468899	9.464777	9.475004	
Log cos *h*	9.791628	9.789213	9.787101	
Log cos Δ_{approx}	9.677271	9.675564	9.687903	
Δ_{approx}	61 36.0	61 43.3	60 49.7	
Dip correction*	− 03.3	− 03.3	− 03.3	−
Δ_{true}	61 32.7	61 40.0	60 46.4	
Az. cel. object	95 17.2	95 31.8	95 49.3	
Az. horiz. object	156 49.9	157 11.8	156 35.7	52.5
			Mean	156 53.1

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34			At latitude: 35			Latitude of observation
	δ 23	δ 24	δ 23.195	δ 23	δ 24	δ 23.195	34.321
						04.6	14.2
9 10	95 07	93 42	94 50.4	96 21	94 57	96 02.7	95 13.6
10.29	26.8		23.8	1 24			95 17.2
11.72							95 31.8
13.46							95 49.3
9 20	96 47	95 18	96 29.7	98 07	96 40	97 50	96 55.8
	27		26.1	27			
	17.3						

AZIMUTH

	° ′
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction ′
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp by WBO RHS

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

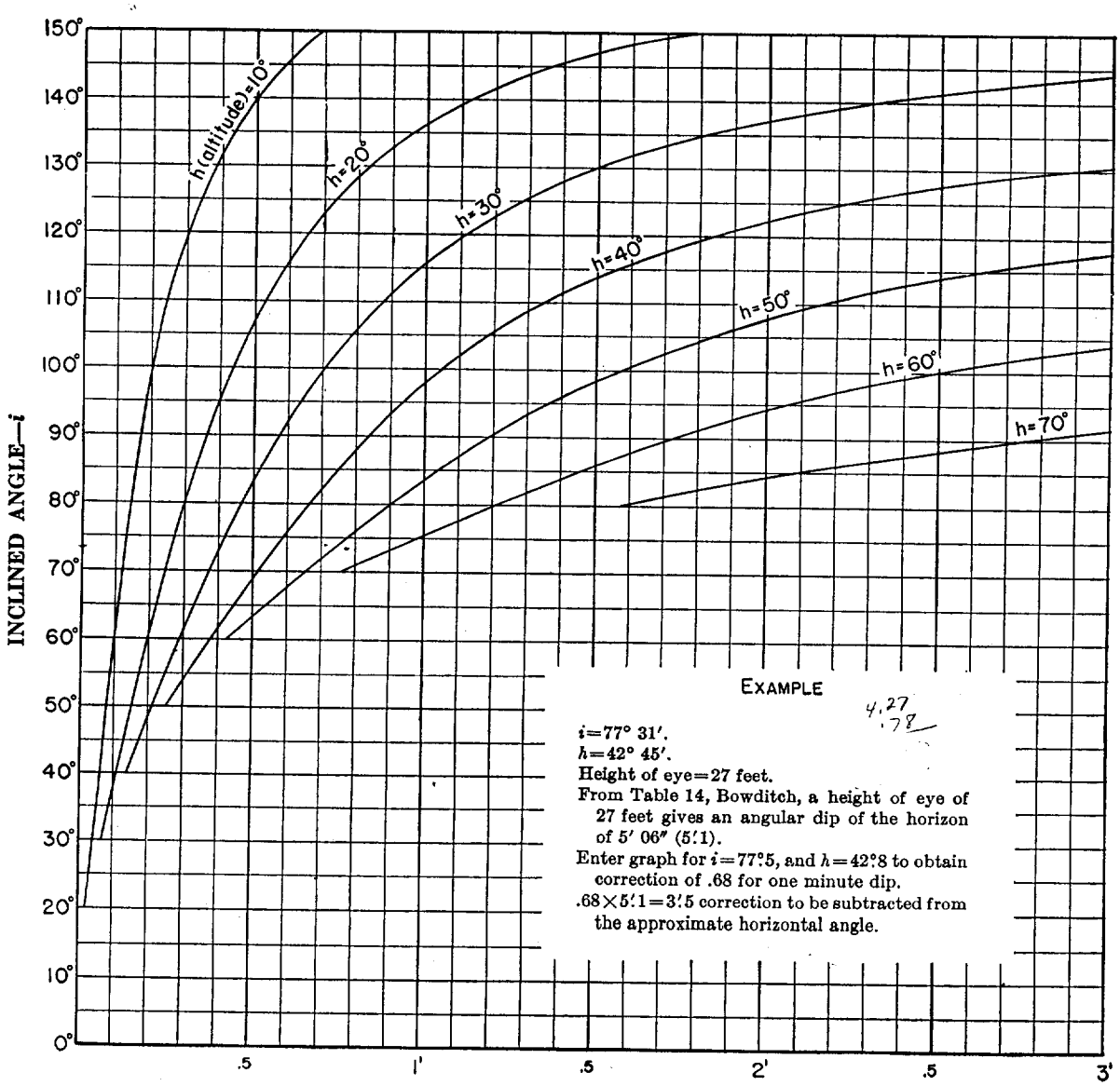
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{s}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 7 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Fox to Buoy: George

U. S. ~~C. & G. S.~~ N Ship Advance, Lt Stanwood Commanding.

Project Special Survey, Locality Cape Lookout, Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Celestial object observed ☉ bearing ____° true.

Horizon object observed F bearing ____° true.

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object.

Latitude 34 16.8 / 28.40

Longitude 76 26.25

Longitude (h. m. s.) 05 05 45 / 53.6

R. A. (h. m. s.) ____ Decl. δ + 23 11.6

H. I. 19.1

Chronometer No. 17029 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 612 I. C. = 00 Vertical angle *h* by CEL using Sextant No. 739 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	14 40 31	14 42 14	14 43 30	14 44 53
Chron. cor'n	− 56	−56	−56	−56
G. C. T	14 39 35	14 41 18	14 42 34	14 43 57
Eq. of time or *R.A.M.S.+12 hr.*	− 3 24.3	− 3 24.3	− 3 24.3	− 3 24.3
Cor'n, Table III (N.A.)	14 36 10.7	14 37 53.7	14 39 09.7	14 40 32.7
G. A. T. or *G. S. T*	53.6		53.6	53.6
Longitude	05 05 45	05 05 45	05 05 45	05 05 45
L. A. T. or *L. S. T*	09 30 25.9	09 32 08.7	09 33 24.7	09 34 47.9
R. A	17.1	00.1	16.1	39.1
Hour angle, *t*				

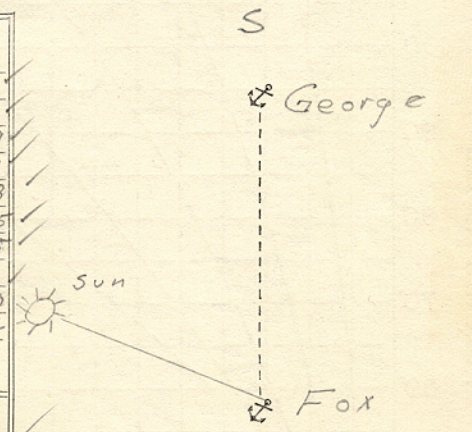
	1	2	3	4
	° ′	° ′	° ′	° ′
Observed *h*	55 28.3	55 50	56 13	56 33
Index cor'n	00	00	00	00
Semi-diam	+ 15.8	15.8	15.8	15.8
h	55 44.1	56 05.8	56 28.8	56 48.8
Obs. incl. angle	74 07	74 21	74 02	74 25
Index cor'n	00	00	00	00
Semi-diam	15.8	15.8	15.8	15.8
i	74 22.8	74 36.8	74 17.8	74 40.8

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.430165	9.423789	9.432418	9.421949
Log cos *h*	9.750488	9.746473	9.742118	9.738280
Log cos Δ_{approx}	9.679677	9.677316	9.690300	9.683669
Δ_{approx}	61 25.6	61 35.8	60 39.1	61 08.3
Dip correction*	− 03.8	− 03.8	− 03.8	− 03.8
Δ_{true}	61 21.8	61 32.0	60 35.3	61 04.5
Az. cel. object	98 42.9	99 02.8	99 17.5	99 33.5
Az. horiz. object	160 04.7 R	160 34.8	159 52.8	160 38.0
			Mean	160 36.4

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34			At latitude: 35			Latitude of observation
	δ 23	δ 24	δ 23.193	δ 23	δ 24	δ 23.193	34.274
		6 59	151				
09 30	98 34	98 ~~01~~	98 ~~16~~	100 00	98 28	99 42.4	98 39.7
30.28							98 42.9
32.00							99 02.8
33.27							99 17.5
34.65		49	09.7		3	1	99 33.5
09 40	100 29	98 ~~51~~	100 ~~70~~	102 01	100 25	101 42.5	100 35.2
	1 38						

AZIMUTH

	° ′
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction ′
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp. By WRB RHT

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

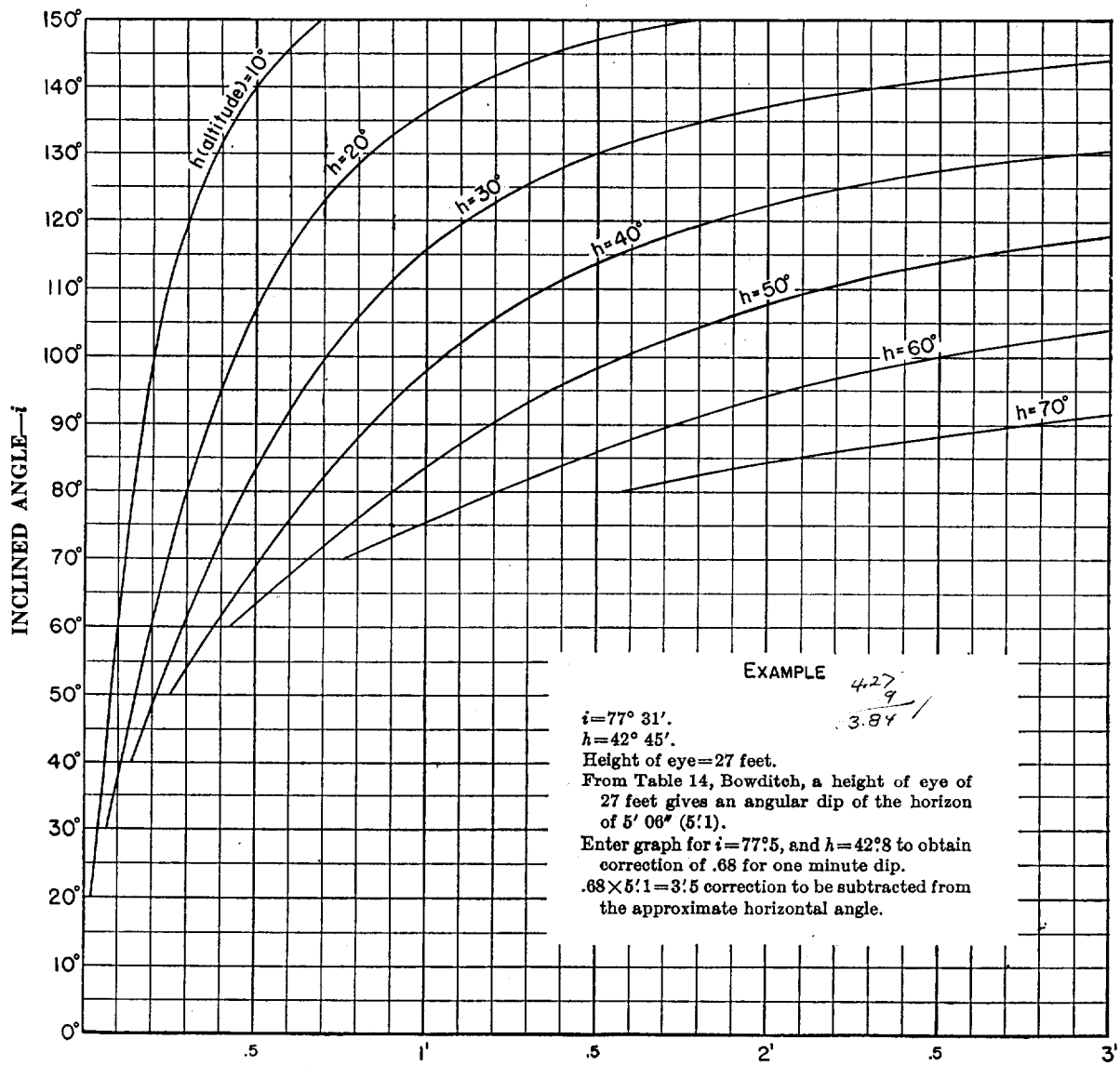
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Form No. 720
Ed. May 1935

Sheet No. 8 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: George to Buoy: Hypo

U. S. ~~C. & G.~~ N. S. Ship Advance, Lt Stanwood Commanding.

Latitude 34° 13.7' / 14.0

Longitude 76° 25.2 / 27.2

Project Special Survey, Locality Cape Lookout, Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude h. 5 m. 05 s. 48.8

Celestial object observed ☉ bearing ____° true. R. A. ____ Decl. δ + 23° 11.6'

Horizon object observed G bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 17029 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C.= 00 Vertical angle *h* by CEL using Sextant No. 739 I. C.= 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	15 00 27	15 01 52	15 03 03	
Chron. cor'n	57	57	57	
G. C. T	14 59 30	15 00 55	15 02 06	
Eq. of time or *R.A. M.S.+12 hr.*	− 3 24.5	− 3 24.5	− 3 24.5	
Cor'n, Table III (N.A.)	14 56 05.5	14 57 30.5	14 58 41.5	
G. A. T. or *G. S. T*				
Longitude	05 05 48.8	05 05 48.8	05 05 48.8	
L. A. T. or *L. S. T*	09 50 16.7	09 51 41.7	09 52 52.7	
R. A				
Hour angle, *t*				

	1	2	3	4
	° '	° '	° '	° '
Observed *h*	59 27	60 01 30	60 03	
Index cor'n	00	00	00	
Semi-diam	15.8	15.8	15.8	
h	59 42.8	60 17.3	60 18.8	

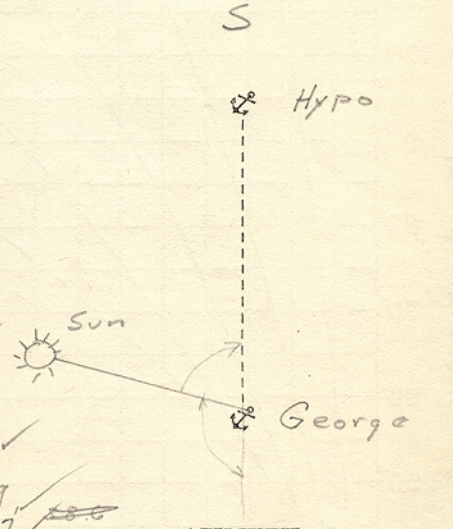
	1	2	3	4
	° '	° '	° '	° '
Obs. incl. angle	74 37	74 56	74 50	
Index cor'n	00	00	00	
Semi-diam	15.8	15.8	15.8	
i	74 52.8	75 11.8	74 05.8	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	9.416377	9.407394	9.410254	
Log cos *h*	9.702712	9.695162	9.694830	
Log cos Δ_{approx}	9.713665	9.712232	9.715424	
Δ_{approx}	58 51.3	58 58.1	58 42.9	
Dip correction*	− 04.1	− 04.1	− 04.1	−
Δ_{true}	58 47.2	58 54.0	58 38.8	
Az. cel. object	102 40.7	102 59.6	103 15.9	
Az. horiz. object	161 27.9	161 53.8	161 54.7	
	R		Mean	161 − 54.2

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34° δ 23	δ 24	δ 23.193	At latitude: 35° δ 23	δ 24	δ 23.193	Latitude of observation 24.228
		49					39.1
09 50	102 34	108 54	102 14.1	104 12	102 ~~32~~	103 52.8	102 36.6
50.28	43			19.3		38.6	102 40.5
51.69							102 59.6
52.88		N-59			48		103 15.9
10 00	104 49	108 ~~00~~	104 28	106 36	104 ~~01~~	106 15.2	104 52.5
			24.3	1 07.7		42.7	

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp by WBP

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

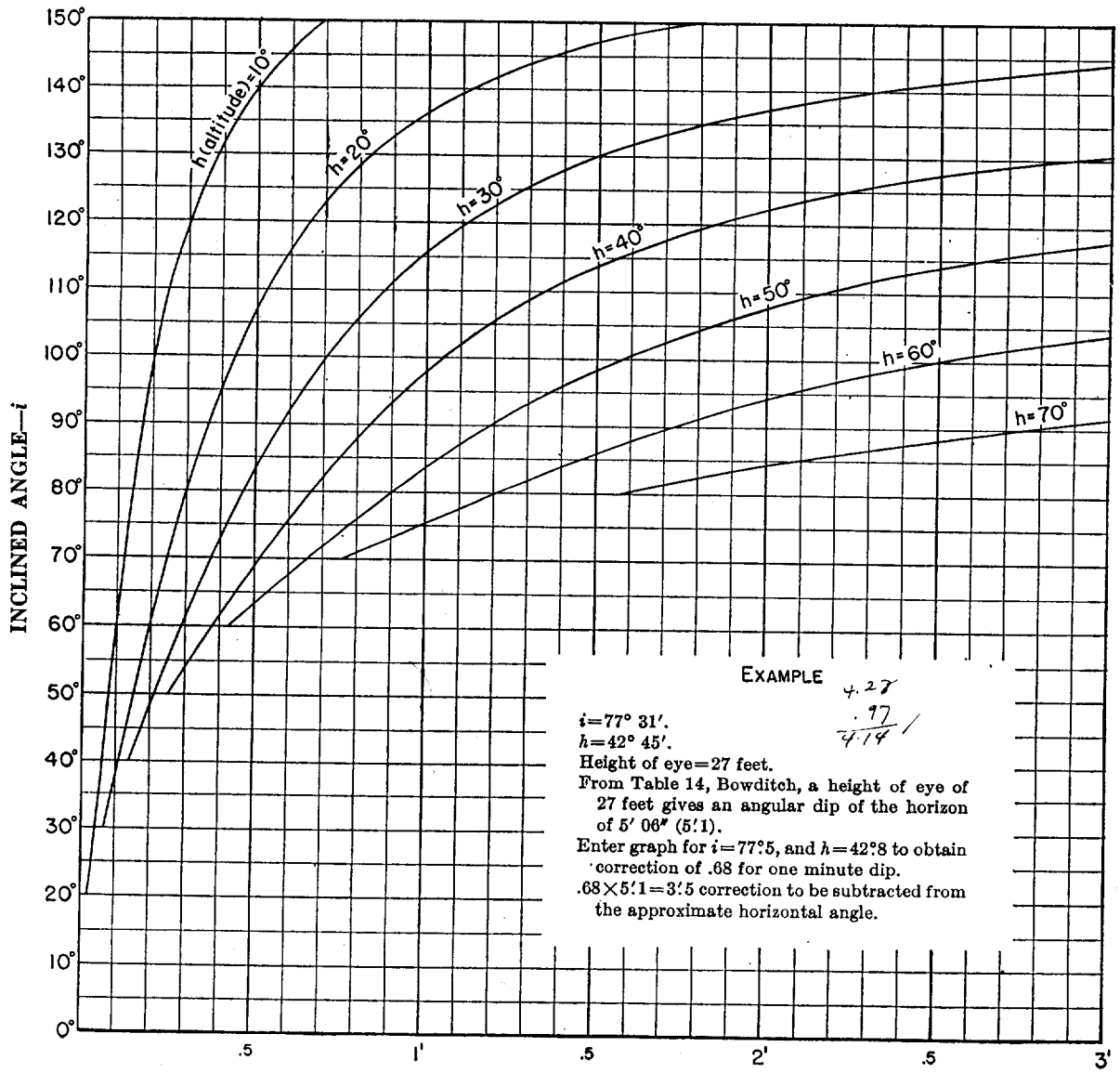
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11536 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 9 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Mike to Buoy: Love

U. S. ~~C. & G. S.~~ N Ship Advance, Lt. Stanwood Commanding.
Project Special Survey, Locality Cape Look Out, N.C., Date 6/30, 1942

Latitude 34° 00.0'
Longitude 76° 21.7'

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude h. 5 m. 05 s. 27

Celestial object observed ☉ bearing 233° true. R. A. h. m. s. Decl. δ 23° 11' N.

Horizon object observed M bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 170291 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C.= 0.0 Vertical angle *h* by CEL using Sextant No. 739 I. C.= 0.0

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	18 32 53	18 35 29	18 37 16	
Chron. cor'n	- 01 13	- 01 14	- 01 14	
G. C. T.	18 31 40	18 34 15	18 36 02	
Eq. of time or *R.A. M.S.+12 hr.*	- 03 26.3	- 03 26.3	- 03 26.3	
Cor'n, Table III (N.A.)				
G. A. T. or *G. S. T.*	18-28-13.7	18 30 48.7	18 32-35.7	
Longitude	5 05 27	5 05 27	5 05 27	
L. A. T. or *L. S. T.*	13-22-46.7	13 25 21.7	13-27-08.7	
R. A.				
Hour angle, *t*	1-22-46.7	1-25-21.7	1-27-08.7	

	1	2	3	4
	° ′	° ′	° ′	° ′
Observed *h*	69 00	68 43.3	68 06 30	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
h	69 15.8	68 59.3	68 22.3	
Obs. incl. angle	91 28	90 54	90 36	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
i	91 43.8	91 09.8	90 51.8	

No correction should be included for parallax or refraction.

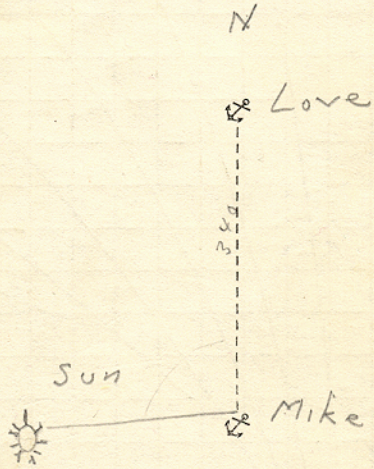
COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	8.479858	8.307552	8.178039	
Log cos *h*	9.549093	9.554560	9.566537	
Log cos Δ_{approx}	8.930765	8.752992	8.611502	
Δ_{approx}	94-58-28.3	93-14-45.8	92-20-34.3	
Dip correction*	- 11.3'	- 11.3'	- 11.3'	-
Δ_{true}	94-42.2'	93-03.5'	92-09.3'	
Az. cel. object	244-29	245-25	246-04	
	339-17.2'	338-28.5	338-13.1	
Az. horiz. object			338-19-23	37.6
	338-35-35	1,2,3 Mean		338-39.7

INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34°-00			At latitude:			Latitude of observation
	δ 23°	δ 24°	δ 23°-11'	δ	δ	δ	34.00
13-20	116-54	114-41	116-38				
22.78			115-29 31				
25.36			114-33 35				
27.14			113-54 56				
30	113-17	111-10	112-54				

SKETCH



AZIMUTH

	° ′
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction ′
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1′							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

RHS.

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

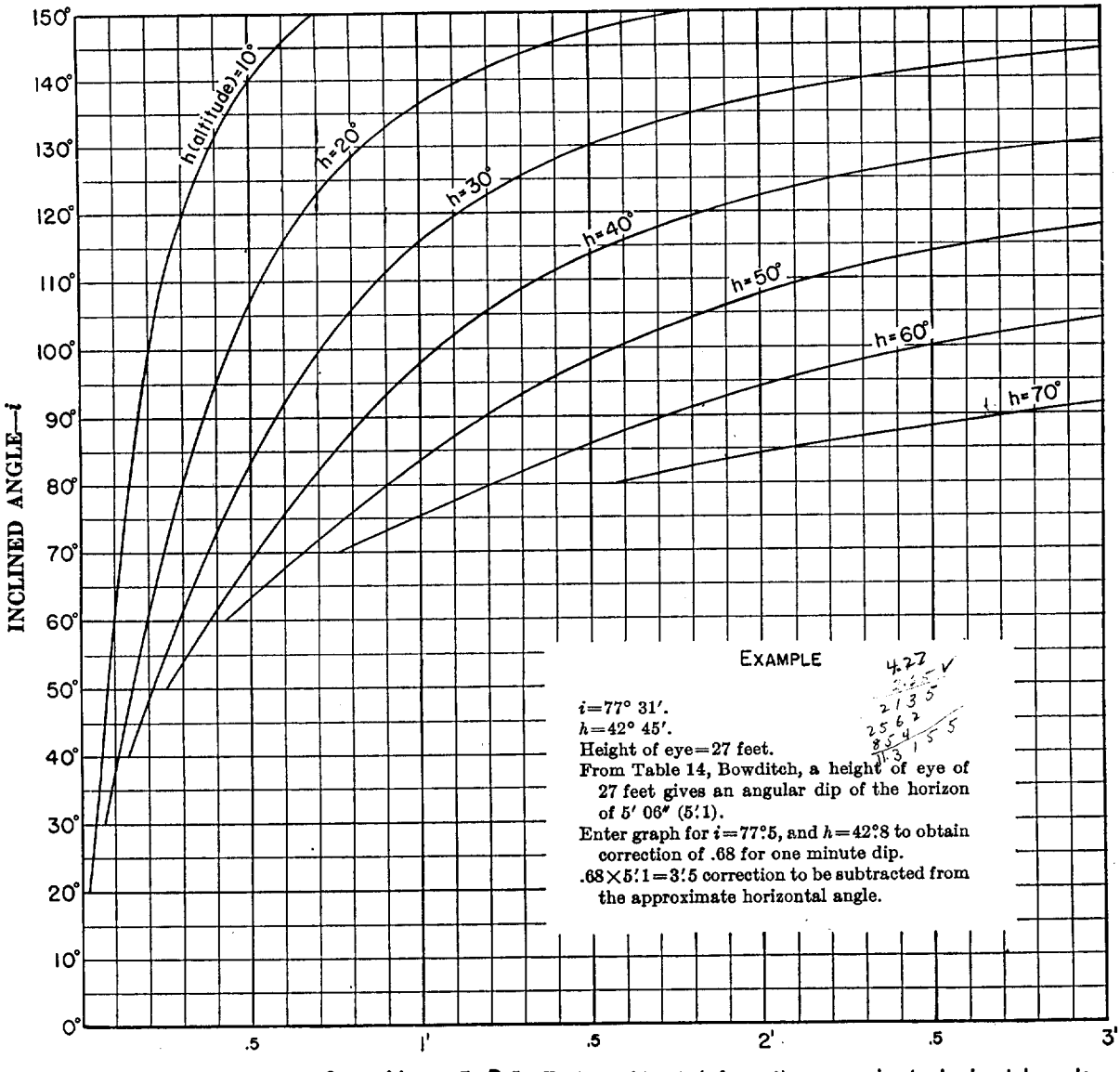
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{s}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 10 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: Love to Buoy: King

U. S. ~~C. & G. S.~~ N Ship Advance, Lt. Stanwood Commanding.

Latitude 34° 01.6'
Longitude 76° 22.5³

Project Special Survey, Locality Cape Lookout, N. C., Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude h. 5 m. 05 s. 20

Celestial object observed ☉ bearing ____° true. R. A. h. m. s. Decl. δ 23° 11' 00"

Horizon object observed L bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 170291 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C. = 00 Vertical angle *h* by CEL using Sextant No. 239 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	18 46 35	18 47 57	18 49 24	
Chron. cor'n	1 15	1 15	1 15	
G. C. T.	18 45 23	18 46 45	18 48 09	
Eq. of time or *R.A. M.S.+12 hr.*	- 03 26.4	- 03 26.4	- 03 26.4	
Cor'n, Table III (N.A.)	2	5	7	
G. A. T. or *G. S. T.*	18 -41 -56.6	18-43 -18.6	18-44 -45.6	
Longitude	5 05 30.2	5 05 30.2	5 05 30.2	
L. A. T. or *L. S. T.*	13-36-26.4	13-37-48.4	13-39-15.4	
R. A.		46.4	13.4	
Hour angle, *t*	1-36.4 07	1-37.8	1-39.2 23	

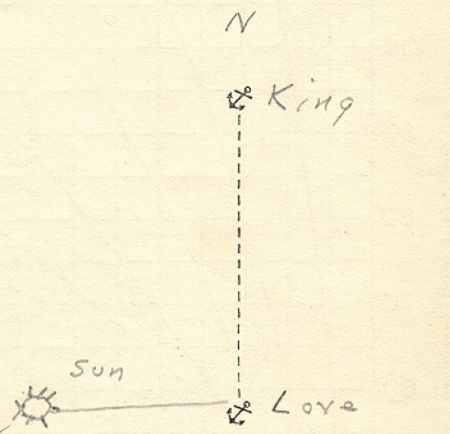
	1	2	3	4
	° '	° '	° '	° '
Observed *h*	66 16 30	66 13 30	65 58	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
h	66 32.3	66 29.3	66 13.8	
Obs. incl. angle	90 15	90 11	90 00	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
i	90 30.8	90 26.8	90 15.8	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	7.95 22 71	7.89 18 56	7.66 23 82	
Log cos *h*	9.60 00 31	9.60 09 03	9.60 53 76	
Log cos Δ_{approx}	8.35 22 40	8.29 09 53	8.05 70 06	
Δ_{approx}	91-17.40	91-07.2	90-39.2	
Dip correction*	- 09.3	- 9.3	- 9.3	
Δ_{true}	91-08.1	90 57.9	90 29.9	
Az. cel. object	249-03	249-29	249 57	
	340-11	340 27	340-27	
Az. horiz. object				
		2 & 3 Mean		340-27

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34			At latitude: 35			Latitude of observation
	δ 23°	δ 24°	δ 23°11'	δ 23°	δ 24°	δ 23°11'	34°-01.6'
1-30	113-17	111-10	112-5	115-28	113-28	115-06	
36.4 07			110-54			112-59	110-57
37.8 23			110-28			112-32	110-31
39.2 23			110-00			112-04	110-03
1-40	110-08	108-08	109-46	112-10	110-15	111-49	

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp LER
ROZ

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

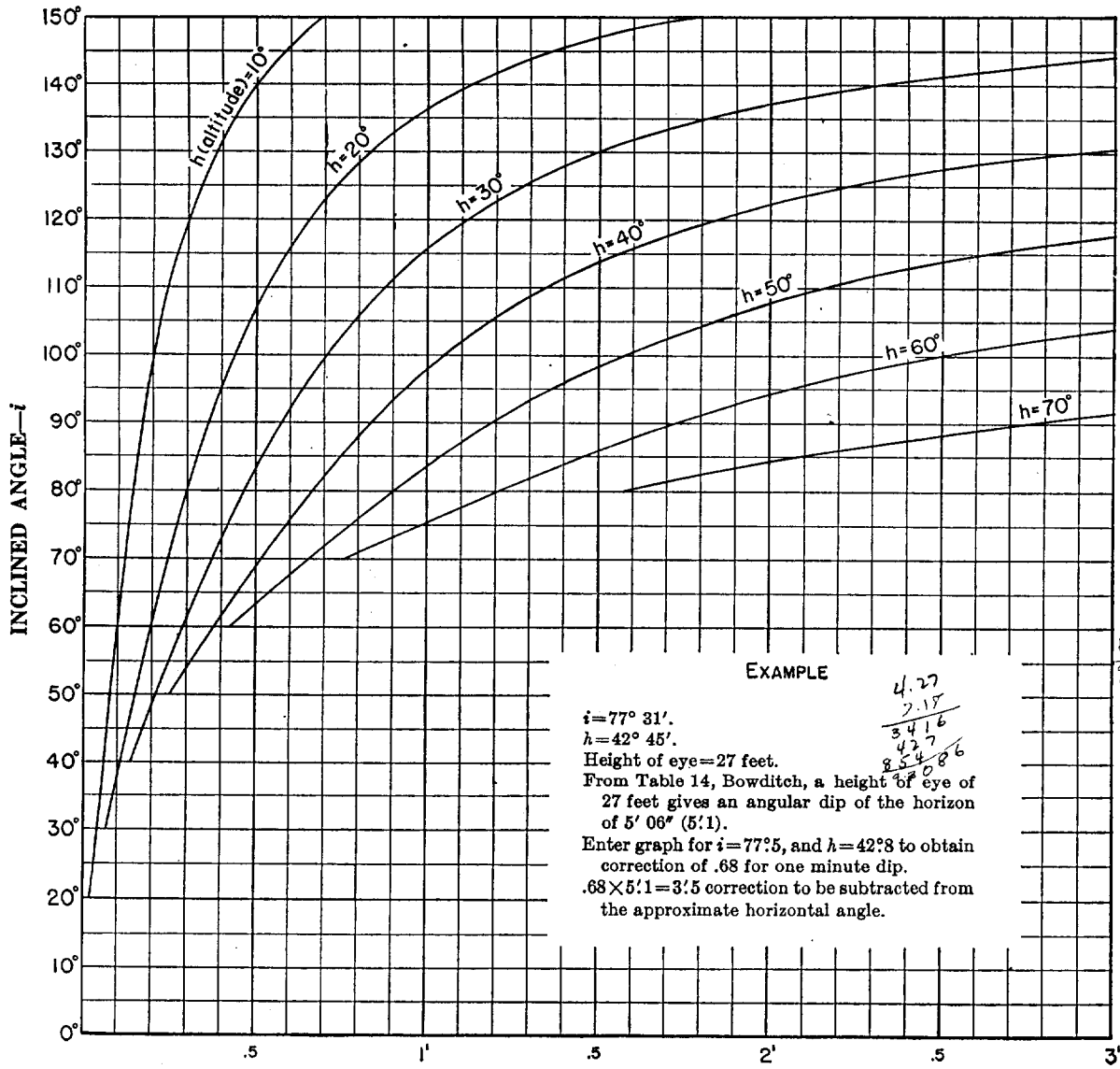
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{s}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 720
Ed. May 1935

Sheet No. 11 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: King to Buoy: Jig

U. S. ~~C. & G. S.~~ N. Ship Advance, Lt. Stanwood Commanding.

Latitude 34° 03.9'
Longitude 76° 23.25'

Project Special Survey, Locality Cape Look Out, N.C., Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude h. 5 m. 05 s. 34.3

Celestial object observed ☉ bearing ____° true. R. A. ____ h. ____ m. ____ s. Decl. δ 23° 11'

Horizon object observed K bearing ____° true. H. I. 1.91

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 17029 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C. = 0.00 Vertical angle *h* by CEG using Sextant No. 239 I. C. = 0.00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch		43		
Chron. time	18 59 06	19 00 39	19 02 02	19 04 17
Chron. cor'n	− 1 16	1 16	1 16	1 16
G. C. T.	18 57 50	18 59 27	19 00 46	19-03 01
Eq. of time or *R.A. M.S.+12 hr.*	− 3 26.5	− 3 26.5	− 3 26.5	− 3 26.5
Cor'n, Table III (N.A.)	18 54-28.5	18 56 00.5	18 57 19.5	18 -59 34.5
G. A. T. or *G. S. T.*	3	3	3	3
Longitude	5 05-34	5-05-34	5-05-34	5-05-34
L. A. T. or *L. S. T.*	13-48 -46.5	13-50-26.5	13-57-46.5	13 54-01.5
R. A.	50.	9	6	25
Hour angle, *t*	1-48.82	1-50.46	1-51.78	1-54.01
			75	

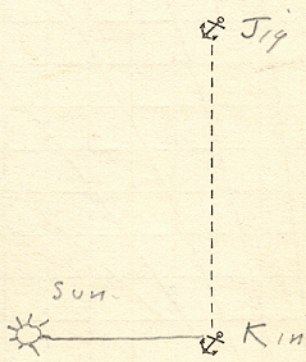
	1	2	3	4
Observed *h*	63° 47'	63° 44.3'	63° 24.3'	62° 43'
Index cor'n	00	00	00	00
Semi-diam.	15.8	15.8	15.8	15.8
h	64 02.8	64 00.3	63 40.3	62 58.8
		2		
Obs. incl. angle	88° 33'	88° 44'	88° 14'	88° 05'
Index cor'n	00	00	00	00
Semi-diam.	15.8	15.8	15.8	15.8
i	88 48.8	88 59.8	88 29.8	88 20.8

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	8.316175	8.243300	8.418883	8.460178
Log cos *h*	9.641116	9.641764	9.646908	9.657344
Log cos Δ_{approx}	8.675059	8.601536	8.771975	8.802834
Δ_{approx}	87-17.8	87-42.6	86-36.5	86-21.5
Dip correction*	− 07.8	− 07.8	− 07.8	− 07.8
Δ_{true}	87-09.5	87-34.8	86-28.7	86-13.7
Az. cel. object	252-34	252-58	253-18	253-5
	339-40.5	340-32.8	339-46.7	340-0.7
	3		8	7
Az. horiz. object				
			1 & 3 Mean	339-47.6
				6.2

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34			At latitude: 35			Latitude of observation
	δ 23	δ 24	δ 23-11	δ 23	δ 24	δ 23-11	34-04.1
1-40	110-08	108-08	109-46	112-10	110-15	111-49	03.9
48.82			107-18			109-15	107-27.6
1-50	107-20	105-26	106-59	109-14	107-24	108-54	
50.46			106-52			108-47	107-02
51.78			106-33			108-26	106-42.0
54.01			105-59			107-54	106-08.6
2-00	104-49	102-59	104-29	106-36	104-51	106-17	

= 34.081

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

Comp. by L.E.R
Red

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

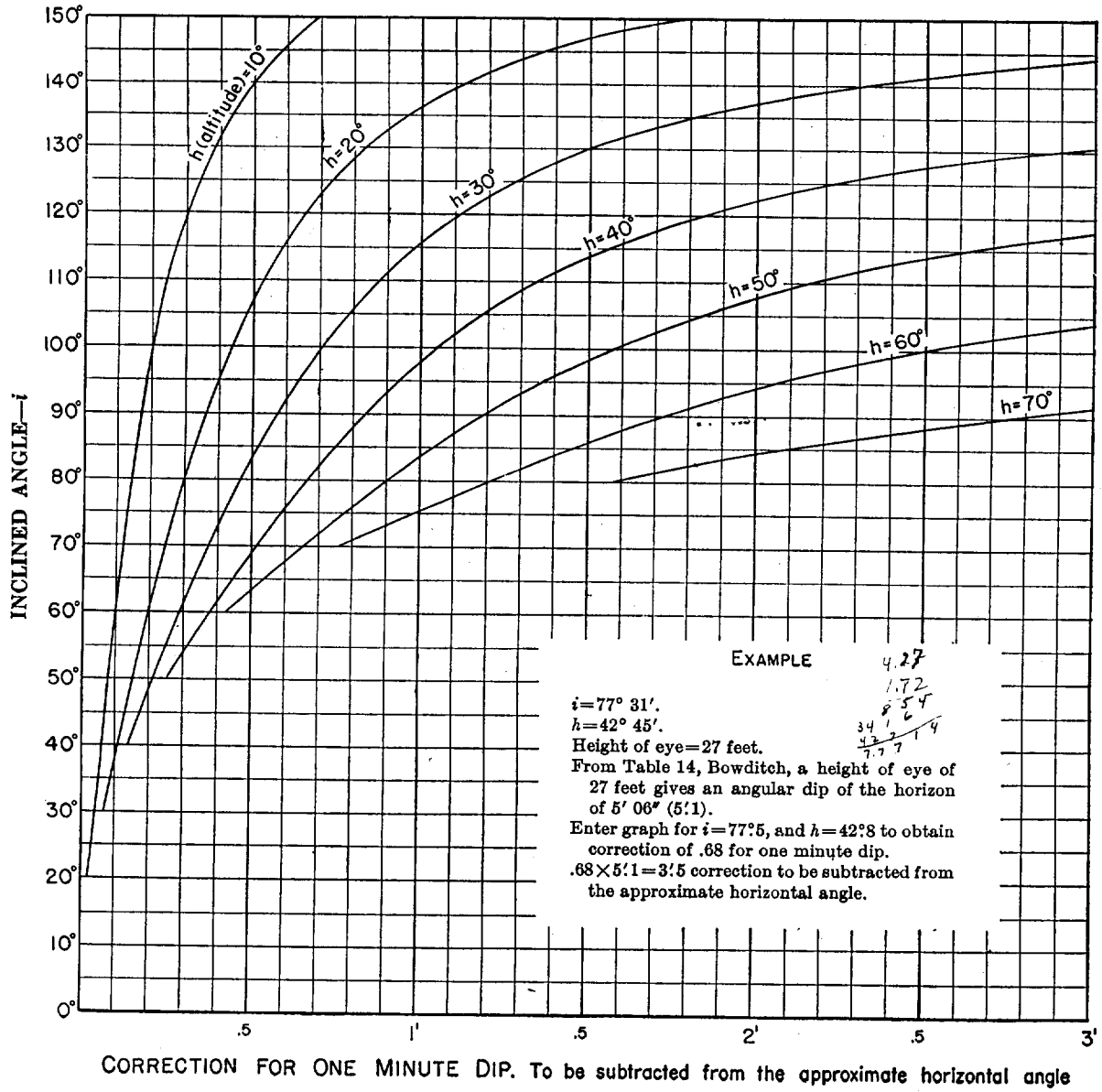
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{s}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Form No. 720
Ed. May 1935

Sheet No. 12 of 12 sheets

AZIMUTH BY INCLINED ANGLE

From Buoy: J19 to Buoy: Hypo

U. S. ~~C. & G. S.~~ Ship N Advance, Lt. Stanwood Commanding.

Latitude 34° 06.3'
Longitude 76° 24.2'

Project Special Lookout; Locality Cape Lookout, Date 6/30, 1942

Buoy ____ bears ____° true, distance ____ meters, horizontal scope ____ meters.

Longitude 5h 05m 37s

Celestial object observed ☉ bearing 250° true. R. A. ____ Decl. δ 23° 10.9'

Horizon object observed J bearing ____° true. H. I. 19'

Anchor of buoy ____ is ____ meters, bearing ____° true from horizon object. Chronometer No. 7029 Sid. M. T. Watch No. ____ Sid. M. T.

Inclined angle *i* by LER using Sextant No. 617 I. C. = 00 Vertical angle *h* by CEL using Sextant No. 739 I. C. = 00

Use italicized elements this col. for other than sun sights	1	2	3	4
	h. m. s.	h. m. s.	h. m. s.	h. m. s.
Watch reads				
Chron.-Watch				
Chron. time	19 19 45	19 20 48	19 22 11	
Chron. cor'n	- 1 17	1 17	1 17	
G. C. T.	19-18-28	19-19-31	19-20-54	
Eq. of time or *R.A. M.S.+12 hr.*	- 3 26.6	3-26.7	3-26.7	
Cor'n, Table III (N.A.)				
G. A. T. or *G. S. T.*	19-15 01.4	19 16-04.3	19-17 27.3	
Longitude	5-05-36.8	5-05-36.8	5-05-36.8	
L. A. T. or *L. S. T.*	14-09-24.6	14-10-27.5	14-11-50.5	
R. A.				
Hour angle, *t* LAT.	2-09.41	2-10.46	2-11.84	

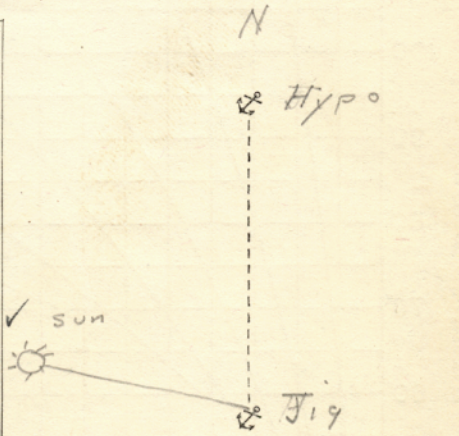
	1	2	3	4
	° '	° '	° '	° '
Observed *h*	59 51.3	59 45.3	59 13	
Index cor'n	0.0	0.0	0.0	
Semi-diam.	15.8	15.8	15.8	
h	60-07.3	60-01.3	59 28.8	
Obs. incl. angle	86 49	86 53	86 29	
Index cor'n	00	00	00	
Semi-diam.	15.8	15.8	15.8	
i	87 04.8	87 08.8	86 44.8	

No correction should be included for parallax or refraction.

COMPUTATION OF HORIZONTAL ANGLE $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$

	1	2	3	4
Log cos *i*	8.707072	8.697050	8.753972	
Log cos *h*	9.697369	9.698685	9.705726	
Log cos Δ_{approx}	9.009703	8.998365	9.048246	
Δ_{approx}	84-07.8	84 17	83-35.0	
Dip correction*	- 06.8	- 06.8	- 06.8	-
Δ_{true}	84-01.0	84-10.4	83-28.4	
Az. cel. object	257-28	257 40	257-58	
Az. horiz. object	341-29.6	341-50.4	341-26.4	
			Mean	341-35.3
			180	
				161-35.3

SKETCH



INTERPOLATION FROM AZIMUTH TABLES

Hour angle *t*	At latitude: 34 23.182			At latitude: 35 23.182			Latitude of observation
	δ 23	δ 24		δ 23	δ 24		34.105
2-10	102-34	100-47	102-15	104-12	102-29	103-53	102-25
09.41		100-58					102-32
10.46		100-46					102-20
11.84		100-29					102-02
		48			22		
2-20	100-29	98-31	100-11	102-01	100-39	101-43	100-21

note add 2.6

AZIMUTH

	° '
From ____ to ____	
Cor'n at buoy	
Cor'n at buoy	
Az. anchor to anchor	

ECCENTRIC REDUCTION

	Stations	*a*	Log sin *a*	Log *s* (meters)	Log $\frac{\sin a}{s}$	Log reduction	Reduction '
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							
Ecc. station	Buoy anchor	0°					
Dist. ____ meters, log							
colog sin 1'							
Sum							

*This correction is obtained from the graph on the back of this form and is applied to the approximate horizontal angle ($\Delta_{approx.}$) computed by the formula $\cos \Delta_{approx.} = \frac{\cos i}{\cos h}$.

R.K.G.

11—11535

INSTRUCTIONS

Form 720 is designed to permit of the simultaneous computation of four sets of azimuth observations.

INTERPOLATION FROM AZIMUTH TABLES

Azimuths should be reckoned clockwise from the north on Form 720. Space is provided for abstracting the proper values from the tables, and for making all necessary interpolations.

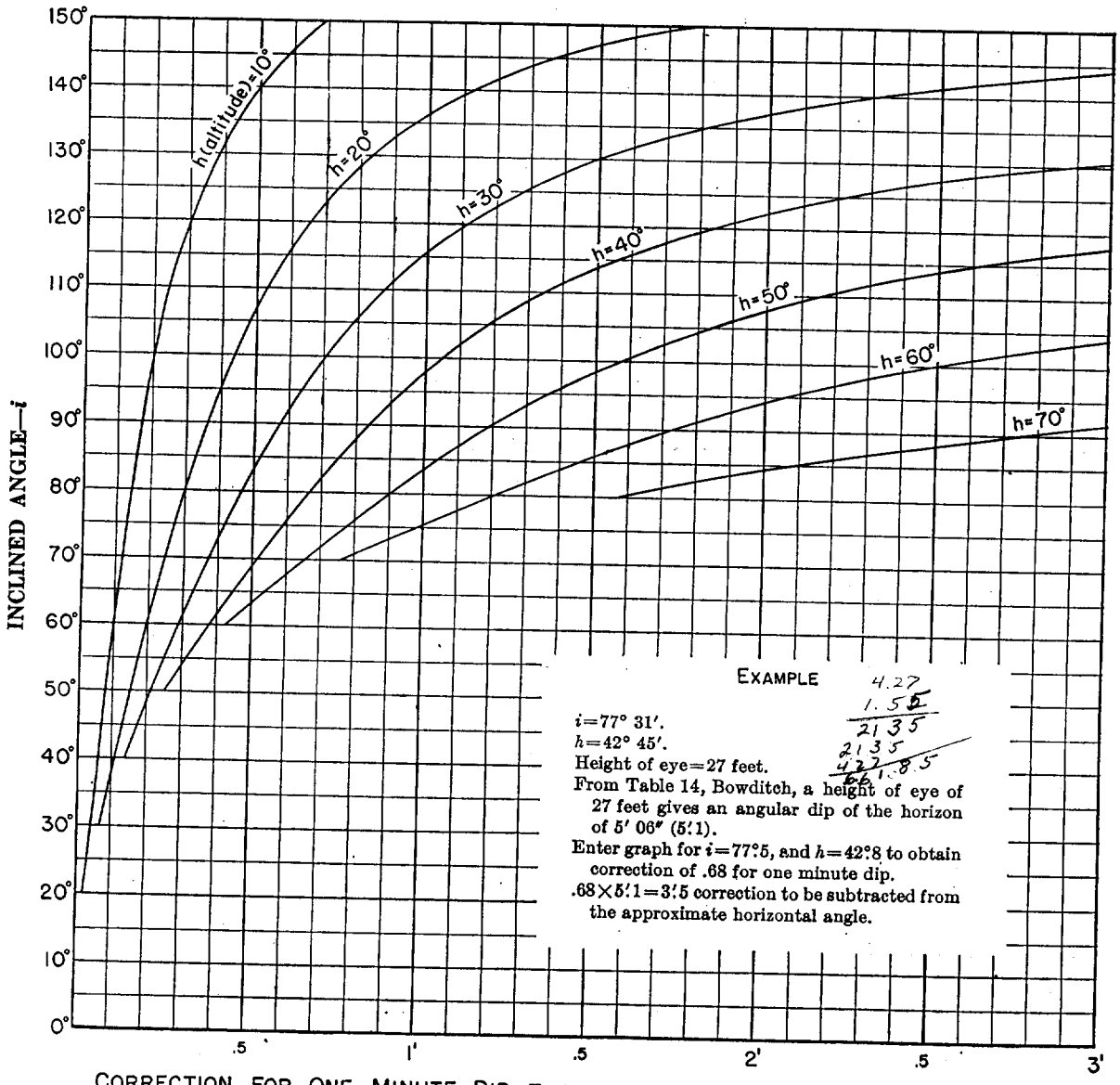
ECCENTRIC REDUCTION

In case either vessel is not on range with the buoys, the reduction can be made in the lower box—d is the distance between the buoy anchor and the eccentric station; a is the direction, in whole degrees, at the eccentric station of the distant buoy reckoned clockwise from the direction of the nearby buoy as the initial. Logs should be carried to four decimal places and distances to whole meters. The quantity "log of reduction" is obtained by adding the "sum" obtained at the left of the form with the quantity $\log \frac{\sin a}{d}$.

It should be noted that the result is expressed in minutes of arc.

DIP CORRECTION

The dip correction, which is obtained from the graph below, is applied to the approximate horizontal angle, "$\Delta_{approx.}$", to obtain the true horizontal angle. In measuring the inclined angle it is assumed that the point on the visual sea horizon at the buoy is used.



CORRECTION FOR ONE MINUTE DIP. To be subtracted from the approximate horizontal angle

11—11535 U. S. GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form No. 777
(Ed. Oct. 1939)

LOG RUN ~~TAUT WIRE TRAVERSE~~ OBSERVATIONS

TRAVERSE No. ....
SHEET No. ....
OF .... SHEETS

U. S. C. and G. S. Ship Cowie, [illegible signature], Commanding.

Project No. Special Survey Locality Cape Lookout, No. Car. Height of eye .... feet. June 29 & 30, 1942

Buoy	Time Passed	Log F.= 1.020 (6/29) Reading	Distance	~~Taut Wire~~ Log F.= 1.052 (6/30) Reading	Difference	Distance	Vertical Angle	Distance Abeam	~~Side Passed~~ Dis x f	~~Current Direction~~ Mean	Gyro Bearing	From Buoy	To Buoy	Remarks
			Miles			~~Meters~~ Miles	° '	Meters		MILES				
♀			6.52						6.65			Sea Buoy		
⚓			~~6.52~~			6.32			6.65	6.65		#1	Trawl	
♀			3.44						3.51					
⚓						3.30			3.47	3.49		Trawl	"A"	
♀			3.48						3.55					
⚓						3.30			3.47	3.51		"A"	B	
♀			2.96						3.02					
⚓						2.74			2.88	2.95		B	C	
♀			3.31						3.38					
⚓						3.11			3.27	3.32		C	D	
♀			2.82						2.88					
⚓						2.58			2.71	2.80		D	E	
♀			3.19						3.25					
⚓						2.99			3.15	3.20		E	F	
♀			2.55						2.60					
⚓						2.43			2.56	2.58		F	G	
♀			2.63						2.68					
⚓						2.45			2.58	2.63		G	H	
♀														
⚓						2.39			2.51	2.51		H	J	
♀														
⚓						2.47			2.60	2.60		J	K	
♀														
⚓						2.32			2.44	2.44		K	L	
♀														
⚓						2.20			2.31	2.31		L	M	
♀														
⚓														
♀														
⚓														

U. S. GOVERNMENT PRINTING OFFICE 328860

✓ by W. B. Page

(1.)

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3			
2d ∠		&	+		
α	2	to 1	339	01	✓
Δα					
			180	00	00.0
α′	1	to 2			

			°	′	″
α	3	to 2			
3d ∠		&	−		
α	3	to 1	339 ~~+179~~	48	✓
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″
φ	34	32	56.82	2 TRAWLER BUOY	λ	76	36	11.95
Δφ	−	03	15.99	6468.8	Δλ	−	01	30.78
φ′	34	29	40.83	1 AFFIRM	λ′	76	34	41.17

	°	′	″			°	′	″
φ	34	29	40.83	3 AFFIRM	λ	76	34	41.17
Δφ	−	03	18.13	6505 m.	Δλ	−	01	27.98
φ′	34	26	22.70	1 BAKER	λ′	76	33	13.19

	Logarithms	Values in seconds
s	3.810770	(~~1258.1~~) (590.7) 1258.1
+ Cos α	9.970200	
B	8.511256	
h	2.292226	1st term +195.986
s^2	7.62154	
$\sin^2\alpha$	9.10800	
C	1.24299	
	7.97253	2d term + 0.009
h^2	4.584	
D	2.3625	
	6.946	3d term + ———
		−Δφ +195.995

	°	′	″	Logarithms	Values in seconds
½(φ+φ′)					
s				3.810770	(480.4)
Sin α				9.553999	1050.4
A′				8.509255	1530.8
Sec φ′				0.083979	−90783
Δλ				1.958003	
Sin ½(φ+φ′)					
−Δα					

	Logarithms	Values in seconds
s	3.813247	(1149.3) 699.4 1848.7
+ Cos α	9.972431	
B	8.511260	
h	2.296938	1st term +198.124
s^2	7.62649	
$\sin^2\alpha$	9.07639	
C	1.24211	
	7.94499	2d term + 0.009
h^2	4.5939	
D	2.3622	
	6.9561	3d term + ———
		−Δφ +198.133

	°	′	″	Logarithms	Values in seconds
½(φ+φ′)					
s				3.813247	(1195.0)
Sin α				9.538194	
A′				8.509256	386.7
Sec φ′				0.083693	
Δλ				1.944390	−87.981
Sin ½(φ+φ′)					
−Δα					

11—0362 U. S. GOVERNMENT PRINTING OFFICE: 1929

✓ PGK

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″								°	′	″		
α	2	to 3				α	3	to 2									
2d ∠		&	+			3d ∠		&	−								
α	2	to 1	342	19	24	α	3	to 1	335	54	12						
$\Delta\alpha$						$\Delta\alpha$											
			180	00	00.0				180	00	00.0						
α'	1	to 2				α'	1	to 3									

FIRST ANGLE OF TRIANGLE

	°	′	″			°	′	″		°	′	″			°	′	″
ϕ	34	26	22.70	2 Baker	λ	76	33	13.19	ϕ	34	23	33.65	3 Cast	λ	76	32	08.20
$\Delta\phi$	−	02	49.05	5467 m	$\Delta\lambda$	−	01	04.99	$\Delta\phi$	−	03	02.30	6153m	$\Delta\lambda$	−	01	38.28
ϕ'	34	23	33.65	1 Cast	λ'	76	32	08.20	ϕ'	34	20	31.35	1 Dog	λ'	76	30	29.92

	Logarithms	Values in seconds
s	3.737 749	(811.9)
Cos α	9.978 995	1036.9 / 1848.8
B	8.511 264	
h	2.228 008	1st term + 169.047
s^2	7.475 50	
$\sin^2\alpha$	8.964 73	
C	1.241 21	
	7.681 44	2d term + 0.005
h^2		
D	2.3617	
		3d term + ———
		$-\Delta\phi$ + 169.05

	°	′	″	Logarithms	Values in seconds
$\frac{1}{2}(\phi+\phi')$					
s				3.737 749	(1323.2)
Sin α				9.482 366	209.5 / 1532.7
A′				8.509 257	
Sec ϕ'				0.083 449	− 64.986
$\Delta\lambda$				1.812 821	
$\sin\frac{1}{2}(\phi+\phi')$					
$-\Delta\alpha$					

	Logarithms	Values in seconds
s	3.789 087	( )
Cos α	9.960 403 / 511 268	966.0
B	8.509 257	
h	2.260 758	1st term + 182.288
s^2	7.578 17	
$\sin^2\alpha$	9.221 91	
C	1.240 45	
	8.040 53	2d term + 0.011
h^2	45215	
D	2.3617	
	6.8832	3d term + ———
		$-\Delta\phi$ + 182.299

	°	′	″	Logarithms	Values in seconds
$\frac{1}{2}(\phi+\phi')$					
s				3.789 087	
Sin α				9.610 955	
A′				8.509 258	
Sec ϕ'				0.083 185	
$\Delta\lambda$				1.992 485	− 98.284
$\sin\frac{1}{2}(\phi+\phi')$					
$-\Delta\alpha$					

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3			
2d ∠		&	+		
α	2	to 1	336	30	—
Δα					
			180	00	00.0
α′	1	to 2			

			°	′	″
α	3	to 2			
3d ∠		&	−		
α	3	to 1	336	52	30
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

	°	′	″		λ	°	′	″
φ	34	20	31.35	2 DOG	λ	76	30	29.92
Δφ	−	02	34.44	5189	Δλ	−	01	20.91
φ′	34	17	56.91	1 EASY	λ′	76	29	09.01

	°	′	″		λ	°	′	″
φ	34	17	56.91	3 EASY	λ	76	29	09.01
Δφ	−	02	57.00	5930	Δλ	−	01	31.02
φ′	34	14	59.91	1 FOX	λ′	76	27	37.99

	Logarithms	Values in seconds
s	3.715084	(95.2)
		1753.5 / 1848.7
Cos α	9.962398	
B	8.511271	
h	2.188753	1st term + 154.438
s²	7.430 17	
Sin²α	9.201 40	
C	1.23964	
	7.871 21	2d term + 0.007
h²		
D	2.3613	
		3d term +
		−Δφ +154.445

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				3.715084	
Sin α				9.600699	(1303.9)
A′				8.509259	230.4
Sec φ′				0.082964	1534.3
Δλ				1.908006	−80.911
Sin ½(φ+φ′)					
−Δα					

	Logarithms	Values in seconds
s	3.773055	(2.8)
		1845.9 / 1848.7
Cos α	9.963623	
B	8.511274	
h	2.247952	1st term + 176.991
s²	7.546 11	
Sin²α	9.188 21	
C	1.23895	
	7.97327	2d term + 0.009
h²		
D	2.3611	
		3d term +
		−Δφ +177.000

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				3.773055	(563.2)
					972.1 / 1535.3
Sin α				9.594103	
A′				8.509260	
Sec φ′				0.082710	
Δλ				1.959128	−91.018
Sin ½(φ+φ′)					
−Δα					

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″				°	′	″
α	2	to 3				α	3	to 2			
2d ∠		&	+			3d ∠		&	−		
α	2	to 1	340	36	24	α	3	to 1	341	54	12
Δα						Δα					
			180	00	00.0				180	00	00.0
α′	1	to 2				α′	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″			°	′	″
φ	34	14	59.91	2	Fox	λ	76	27	37.99				
Δφ	−	02	26.37	/	4781	Δλ	−	01	02.01				
φ′	34	12	33.54	1	GEORGE	λ′	76	26	35.98				

	°	′	″			°	′	″			°	′	″
φ	34	12	33.54	3	GEORGE	λ	76	26	35.98				
Δφ	−	02	30.36		4874	Δλ	−	00	59.11				
φ′	34	10	03.18	1	HYPO	λ′	76	25	36.87				

	Logarithms	Values in seconds
s	3.679519	(815.3) 1033.4 1848.7
Cos α	9.974632	
B	8.511278	
h	2.165429	1st term + 146.367
s²	7.359 04	
Sin²α	9.042 41	
C	1.238 15	
	7.639 60	2d term + 0.004
h³		
D	2.3607	
		3d term + ———
		−Δφ +146.366

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				3.679519	(615.0) 921.1 1536.1
Sin α				9.521205	
A′				8.509261	
Sec φ′				0.082500	
Δλ				1.792485	−62.01
Sin ½(φ+φ′)					
−Δα					

	Logarithms	Values in seconds
s	3.687886	(1750.7) 98.0 1848.7
Cos α	9.977968	
B	8.511281	
h	2.177135	1st term + 150.361
s²	2.375 77	
Sin²α	8.984 46	
C	1.237 48	
	7.597 71	2d term + 0.004
h³		
D	2.3604	
		3d term + ———
		−Δφ +150.365

½(φ+φ′)	°	′	″	Logarithms	Values in seconds
s				3.687886	592.5 944.3 1536.8
Sin α				9.492231	
A′				8.509262	
Sec φ′				0.082285	
Δλ				1.771664	− 59.11
Sin ½(φ+φ′)					
−Δα					

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

HPGR

(5)

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″				°	′	″
α	2 to 3					α	3 to 2				
2d ∠	&		+			3d ∠	&		−		
α	2 to 1		341	35	18	α	3 to 1		339	46	12
$\Delta\alpha$						$\Delta\alpha$					
			180	00	00.0				180	00	00.0
α'	1 to 2					α'	1 to 3				

First Angle of Triangle

	°	′	″				°	′	″				°	′	″
ϕ	34	10	03.18	2 HYPO	λ	76	25	36.87	ϕ	34	07	39.92	3 JIG	λ	76	24	39.53
$\Delta\phi$	−	02	23.26	4652	$\Delta\lambda$	−	00	57.34	$\Delta\phi$	−	02	26.73	4818	$\Delta\lambda$	−	01	04.99
ϕ'	34	07	39.92	1 JIG	λ'	76	24	39.53	ϕ'	34	05	13.19	1 KING	λ'	76	23	34.54

	Logarithms	Values in seconds						Logarithms	Values in seconds				
s	3.667640	(618.7)		½(φ+φ′)			s	3.682869	(1442.3)		½(φ+φ′)		
Cos α	9.977180	1230.0			Logarithms	Values in seconds	Cos α	9.972347	406.4			Logarithms	Values in seconds
B	8.511284	1848.7		s	3.667640		B	8.511286	1848.7		s	3.682869	(652.8)
h	2.156104	1st term	+143.253	Sin α	9.499470	527.5	h	2.166502	1st term	+146.724	Sin α	9.538812	885.5
s²	7.335528			A′	8.509263	1012.9	s²	7.365732			A′	8.509264	1538.3
Sin² α	8.998944			Sec φ′	0.082081	1537.4	Sin² α	9.077762			Sec φ′	0.081871	
C	1.236801			Δλ	1.758454	−57.34	C	1.236131			Δλ	1.812814	−64.985
	7.571102	2d term	+0.004	Sin ½(φ+φ′)				7.679762	2d term	+0.005	Sin ½(φ+φ′)		
h²				−Δα			h²				−Δα		
D							D						
		3d term	+ —						3d term	+ —			
		−Δφ	+143.257						−Δφ	+146.73			

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1930

KKR

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

				°	′	″						°	′	″
α	2	to 3					α	3	to 2					
2d ∠		&		+			3d ∠		&		−			
α	2	to 1		340	27	✓	α	3	to 1		338	37	36 ✓	
Δα							Δα							
				180	00	00.0					180	00	00.0	
α′	1	to 2					α′	1	to 3					

First Angle of Triangle

	°	′	″		°	′	″			°	′	″			°	′	″
φ	34	05	13.19 ✓	2 KING	λ	76	23	34.54 ✓	φ	34	02	54.88 ✓	3 LOVE	λ	76	22	35.54 ✓
Δφ	−	02	18.31 ✓	4522 ✓	Δλ	−	00	59.00 ✓	Δφ	−	02	09.39 ✓	4281 ✓	Δλ	−	00	00.80 ✓
φ′	34	02	54.88 ✓	1 LOVE	λ′	76	22	35.54 ✓	φ′	34	00	45.49 ✓	1 MIKE	λ′	76	21	34.74 ✓

	Logarithms	Values in seconds		°	′	″		Logarithms	Values in seconds		°	′	″
s	3.655 331 ✓	(157.8)		½(φ+φ′)			s	3.631 545 ✓	(447.1)		½(φ+φ′)		
Cos α	9.974 212 ✓	1690.9			Logarithms	Values in seconds	Cos α	9.969 055 ✓	1401.6			Logarithms	Values in seconds
B	8.511 289 ✓	1848.7		s	3.655 331 ✓	(627.4)	B	8.511 293 ✓	1848 7 ✓		s	3.631 545 ✓	(648.2)
h	2.140 832 ✓	1st term	+ 138.303 ✓	Sin α	9.524 564 ✓	911.4	h	2.111 893 ✓	1st term	+129.388 ✓	Sin α	9.561 630 ✓	891.3
s²	7.310 66 ✓			A′	8.509 265 ✓	1538.8 ✓	s²	7.263 09 ✓			A′	8.509 266 ✓	1539.5 ✓
Sin²α	9.049 13 ✓			Sec φ′	0.081 675 ✓		Sin²α	9.123 26 ✓			Sec φ′	0.081 490 ✓	
C	1.235 45 ✓			Δλ	1.770 835 ✓	− 58.998 ✓	C	1.234 91 ✓			Δλ	1.783 931 ✓	− 60.80 ✓
	7.595 24 ✓	2d term	+ 0.004 ✓	Sin ½(φ+φ′)				7.621 26 ✓	2d term	+ 0.004 ✓	Sin ½(φ+φ′)		
h²				−Δα			h²				−Δα		
D							D						
		3d term	+						3d term	+			
		−Δφ	+138.31 ✓						−Δφ	+129.39 ✓			

11—9362 U. S. GOVERNMENT PRINTING OFFICE 1929

HBR

DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Form No. 777
(Ed. Oct. 1939)

TAUT WIRE TRAVERSE OBSERVATIONS

Traverse No. 1
Sheet No. 1
of 1 Sheets

U. S. C. and G. S. ~~Ship~~ M.V. COWIE, I.E. Rittenburg, Commanding.

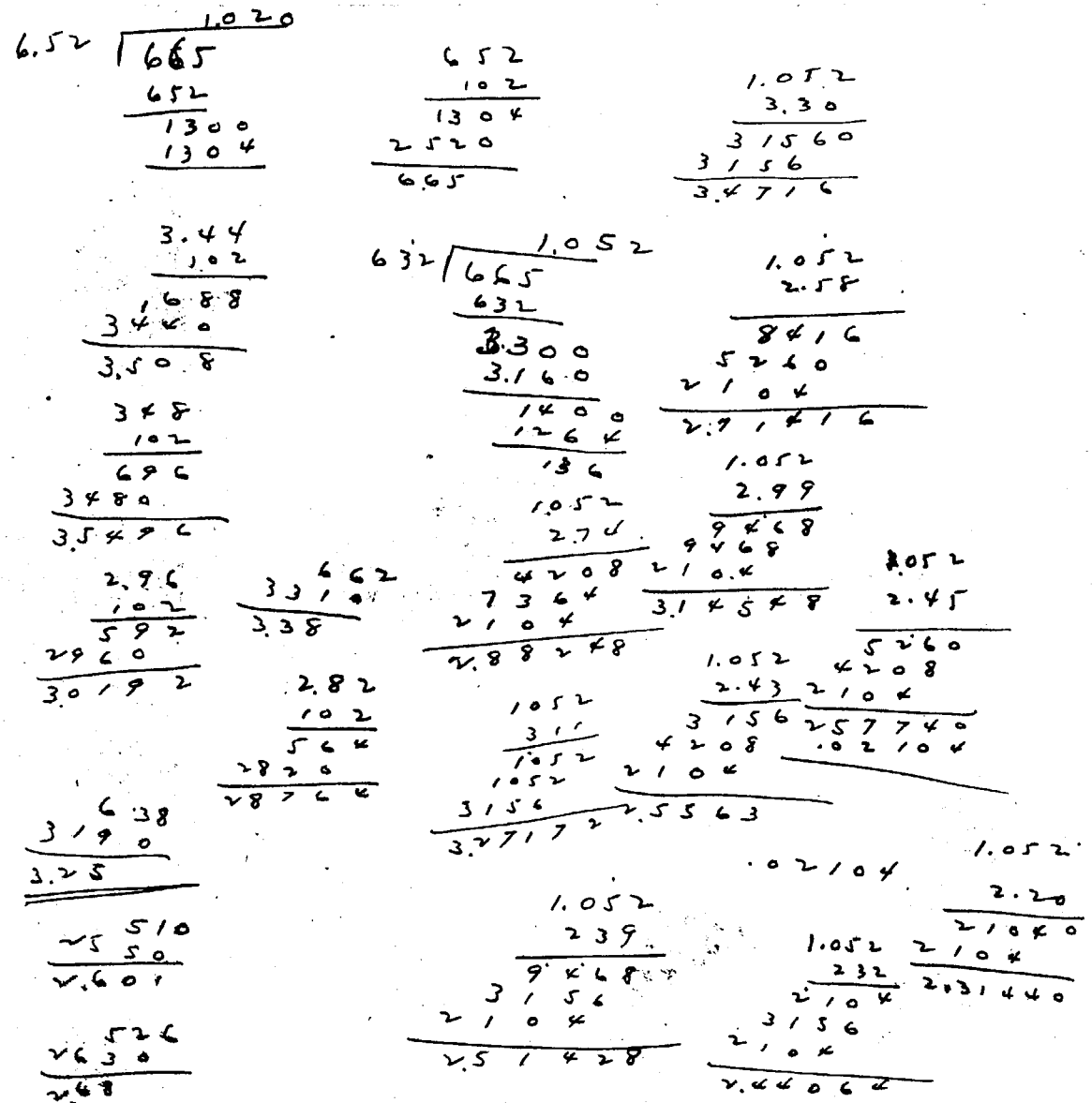
Project No. Special Surveys Locality Cape Lookout, N.C. Height of eye 16½ feet. June 19, 1942

Buoy	Time Passed	Log F.=		Taut Wire F.= 1.854			Vertical Angle	Distance Abeam	Side Passed	Current Direction	Gyro Bearing	From Buoy	To Buoy	Remarks
		Reading	Distance	Reading	Difference	Distance								
			Miles			Meters	°	Meters						
#14				583				15						
~~Stbd.~~ Starn most wreck				4479	3896	7223.2 ✓		233	port					
"2"				4526	47	87.1 ~~9.6~~		760	stbd.					

U. S. GOVERNMENT PRINTING OFFICE 228860

f = 1.020 6/29
= 1.052 6/30

	Section	Log Diff	x f	mean	
6/29	Sea buoy "1" —	6.52	6.65		11 119.50
6/30	Trawler buoy	6.32	6.65	6.65	1 111.95
					92.66
					8 | 12324.11 | 1540.51 meters 1/1000
	Trawler – AFFIRM	3.44	3.51		5559.75
		3.30	3.47	3.49	741.30
					166.79
					8 | 6467.84 | 808.48 meters
	AFFIRM – BAKER	3.48	3.55		5559.75
		3.30	3.47	3.51	926.62
					18.53
					8 | 6504.90 | 813.11
	Baker – CAST	2.96	3.02		3706.50
		2.74	2.88	2.95	1667.92
					92.66
					8 | 5467.08 | 683.38
	Cast – Dog	3.31	3.38		5559.75
		3.11	3.27	3.32	555.97
					37.06
					8 | 6152.78 | 769.09
	Dog – Easy	2.82	2.88		3706.50
		2.58	2.71	2.80	1482.60
					8 | 5189.10 | 648.64
	Easy – Fox	3.19	3.25		5559.75
		2.99	3.15	3.20	370.65
					8 | 5930.40 | 741.30
	Fox – GEORGE	2.55	2.60		3706.50
		2.43	2.56	2.58	926.62
					148.26
					8 | 4789.38 | 597.67
	Geo – Hypo	2.63	2.68		3706.50
		2.45	2.58	2.63	1111.95
					55.59
					8 | 4874.04 | 609.25
	Hypo – Jig				3706.50
		2.39	2.51		926.62
					18.53
					8 | 4651.65 | 581.46
	Jig – King	2.47			3706.50
			2.60		1111.95
					8 | 4818.45 | 602.31
	King – Love	2.32	2.44		3706.50
					741.30
					74.13
					8 | 4521.93 | 565.24
	Love – Mike				3706.50
					555.97
					18.53
					4281.00 | 595.12 45.12
		2.20	2.31		



Data from which the wreck of the Russian Ship off Cape Lookout , its moarker buoy "L" and navigation buoy 14 were located.

A taut wire and sun azimuth traverse was run from buoy 14 to the wreck and buoy L.

Buoy 14 was then located by sextant fixes as follows;

at Buoy #E"asy angle between "Fox and buoy 14 equals 82 - 43
at buoy "D"og angle between "E"asy and buoy 14 equals 52 - 12

Buoy 14 being found out of position the Coast Guard were notified and they moved it to its charted position.

WIRE DRAG

FE No.6

Diag Cht. No. 1234-2

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. ..... *Office No.* Field Exam. 6

LOCALITY

State North Carolina

General locality Cape Lookout

Locality .....

194 2

CHIEF OF PARTY

I.E.Rittenburg

LIBRARY & ARCHIVES

DATE .....

B-1870-1 (1)

FE No.6

WIRE DRAG

Form 537
(Ed. Nov. 1941)

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

Chief. Field Exam. 6/1942

REG. NO. F.E. #6

HYDROGRAPHIC TITLE SHEET

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

DECLASSIFIED BY NOAA
CONFIDENTIAL SYSTEMATIC REVIEW
PURSUANT TO GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

REGISTER No. F.E. #6

Field No. _____

State North Carolina

General locality Cape Lookout

Locality Cape Lookout

Scale 1 - 80,000 Date of survey July 4- 12, 1942

Instructions dated none see desc. report

Vessel COWIE

Chief of party I. E. Rittenburg

Surveyed by I. E. Rittenburg

Soundings taken by fathometer, graphic recorder, hand lead, wire Hand Lead

Protracted by _____

Soundings penciled by _____

Soundings in fathoms feet at MLW MLLW Feet at MLW predicted tides

REMARKS: Special survey for use of Navy Department

U. S. GOVERNMENT PRINTING OFFICE 428975

~~CONFIDENTIAL~~ ~~CONFIDENTIAL~~ F E #6

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

Descriptive report to accompany sheet of Special Survey, vicinity of Cape Lookout, North Carolina, executed at the request of the Navy Department.

AUTHORITY

No written instructions were issued covering the execution of this work. Telephonic authority to proceed with this work was obtained from the Director.

PURPOSE

The purpose of this survey was to furnish the Commanding Officer, Section Base, Morehead City, No. Carolina, with a marked lane from Lookout Bight lighted bell buoy # 2 to the 100 (fathom) curve off Cape Lookout, wire dragged to a depth of at least 35 feet, to ensure that no obstructions existed in the selected channel. The necessity arose from the fact that convoys bound both north and south were made up in Lookout Bight and went to sea after mine sweepers had preceededtthem, sweeping for mines. Due to the strong currents off Cape Lookout, uncertainty existed as to the positions of both the mine sweepers and the convoys so that there was always present the fear that the convoys were not in the swept lanes. On several occassions the mine sweepers had lost their sweeping gear on supposed obstructions with the result that these convoys had to put to sea unprotected from mines until new gear arrived. That this was a danger is evidenced by the fact that the minesweeper, U. S. S. Aggressor, had been damaged by a mine which exploded close aboard. In a conference with Capt. Estes, U. S. N., Section Base Commander, a lane was selected which ran from Lookout Bight lighted bell buoy # 2 to the buoy marking the wreck of H. M. S. Senateur Duhammel (called Trawl in these records), thence on a course of approximately 160 degrees true to the 100 fathom curve. A distance between buoys of $2\frac{1}{2}$ to 3 miles was decided upon so that at least one buoy ahead would always be visible to the mine sweepers.

EQUIPMENT

Standard survey buoy equipment was used for the marker buoys. The standard wire drag equipment, used by the Lydonia in 1941, was employed on all drag operations. Dragging was done using the U. S. S. Advance as guide launch and the U. S. S. Adamant as end launch. C. G. R. # 1238 was used as the tender on A. day, the only day it was possible to use a tender due to rough weather. On D day the U. S. S. Speedwell was used as the guide launch, her power launch as end launch, but no tender was available.

CONTROL AND METHODS.

Triangulation stations Cape Lookout L. H., 1933, Beaufort Tidewater Power Co. Watertank, and Morehead City Watertank, 1913, furnished the basic control for this work. Inverses were computed between all three of these stations, to secure necessary azimuths and distances so that the Geographic positions of Trawl and the mast of the H. M. S. Senateur Duhammel could be computed, by means of 3 point fixes etc.. See attached computations.

DECLASSIFIED F.E. #6A
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3(b), EXECUTIVE ORDER 12356.

Buoys "A"ffirm to "M"ike were then planted and located by log runs and sun azimuths. From these data the geographic position of each buoy was then computed, starting with Trawl as a basis. See attached observations and computations.

While these buoys were not located with Coast Survey standards of accuracy, it is believed that the positions obtained are not more than a quarter of a mile in error and good enough for the intended use. To have located them with our usual standards of accuracy would have entailed the use of equipment not readily available or more time than the Navy wished to spare from mine sweeping.

The wreck of the Russian ship offCape Lookout and buoy "L" marking it were located by running a taut wire and sun azimuth traverse from navigation buoy # 14. Buoy 14 was then cut in by sextant so that the true position of the wreck could be determined. The data for the location of buoy 14 is as follows;

at buoy "E"asy angle between "F"ox and buoy 14 equals 82 - 43
at buoy "D"og angle between "E"asy and buoy 14 equals 52 - 12

The position of navigation buoy 14 was furnished the Coast Guard who moved it to its charted position.

The guide launch buoy paths were located by standard wire drag dual control methods. The end launch buoy paths were also located insofar as possible by standard methds but since the end launch line followed closely the line between survey buoys, it was necessary to use the guide launch as the centre object many times. A one foot lift was obtained by test on A day. As no tender was available on B and C days a six foot lift was arbitrarily assumed as the sea was rough on both these days and no tests could be made. D day being flat calm but no tender available, zero lift was assumed.

GROUNDINGS

None. Position 20 C day was obtained at the location of a marker buoy left by the U. S. S. Adamant to mark an obstruction on which her sweep gear was lost. A least sounding of 41 feet, reduced by predicted tides, was obtained here, after ½ hour was spent in feeling around while drifting. This falls southeast of a charted 45 foot sounding and may be an old wreck now covered by sand. D day was spent in clearing this spot with a drag set at 34 feet, reduced for predicted tides.

TIDES

Predicted tides were used for the reduction of all records.

STATISTICS AND DATES OF SURVEYS

This work was done from July 4 to 12, 1942.
23 stat. miles of wire dragging,
61 positions.

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

[redacted] F.E. #6

CONCLUSIONS

This work canot be classed as a wire drag survey. At best it can be considered as a reconnaissance. It does, however, represent a survey vitally needed at the time by the armed forces. The survey buoys were to be replaced at a later date by the Coast Guard, using their number one can buoys for the purpose. Regardless of the actual true positions of the survey buoys, the lane marked by them has been wire dragged to a minimum depth of 35 feet at Mean Low Water using predicted tides for a distance of about 17 nautical miles offshore from Lookout Bight.

A smooth sheet was not considered necessary because of the above statement.

I. E. Rittenburg, Commanding,
Motor Vessel COWIE.

[redacted] F. E. #6

Data from which the positions were computed of the buoy marking the wreck of H.M.S. Senateur Duhammel, called Trawl, and the mast of the wreck itself.

3 point sextant fix	Cape Lookout L.H.	58 - 37
	Beaufort Watertank	
	Morehead City Water Tank	10 - 40
	dep. angle to Trawl	0 - 37 equals 400 yds
	H. I. 16½ feet	
	True bearing North 102 East.	

3 pojint fix taken	Cape Lookout L. H.	58- 09
	Beaufort Watertank	
	Morehead City Watertank	10- 34
	dep. angle to mast	0- 29 equals 524.3 meters
	H. I. 16½ feet	
	True bearing North 65 - 52 East.	

Inverses were computed between all three of the above stations to get the required azimuths and distances. The geographic positions of the two three point fixes above were then computed from which the geopgraphic positions of Trawl and Mast were then derived.

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

GCS (42)

INSPECTION OF FIELD EXAMINATION NO. 6, 1942

Within the area involved the effective depths of this wire drag field examination are in agreement with the charted soundings (chart 1233).

The survey positions of the wreck and buoy in Lat. 34°33', Long. 76°36' are in agreement with the charted positions. The survey position of the wreck in Lat. 34°22.5', Long. 76°21.5' is in agreement with the charted position but the buoy marking the wreck is 0.4 mile northwest of its charted position.

The sounding of 41 feet in Lat. 34°24.0', Long. 76°30' is about 1fm. shoaler than the charted depths.

R. H. Carstens

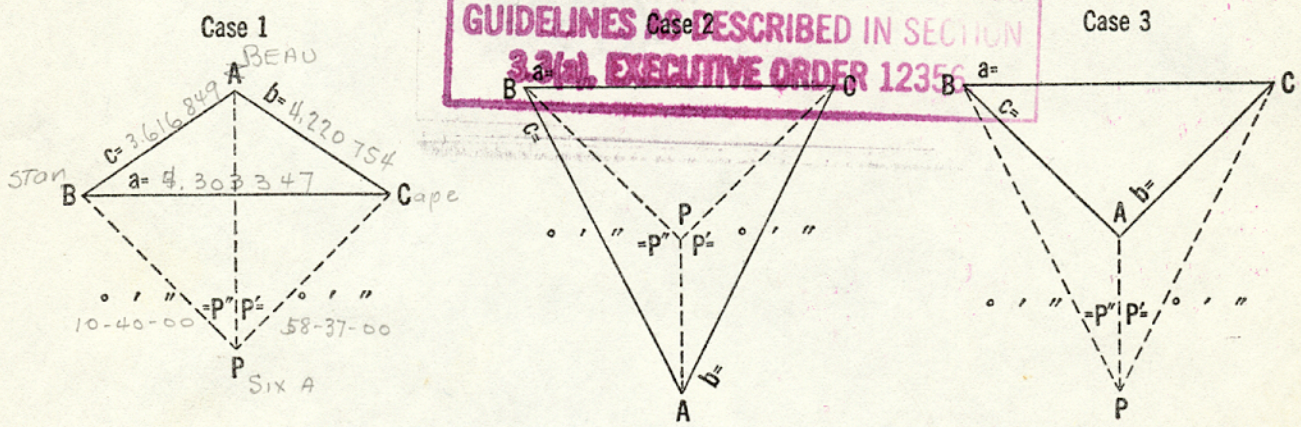
Approved:
Robert Wilson

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 655
Ed. Sept., 1929

~~CONFIDENTIAL~~ F. E. #6

DECLASSIFIED WHEN
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(b), EXECUTIVE ORDER 12356

COMPUTATION OF THREE-POINT PROBLEM



Cases 1 and 2				Case 3			
P′	58	37	00	P′			
P″	10	40	00	P″			
A	143	37	04.7				
Sum	212	54	04.7	Sum A			
½ Sum	106	27	02.3				
	180	00	00.0	A − sum			
S = 180° − ½ sum =	73	32	57.7	S = ½ (A − sum) =			

Log c =	3.616 849
Log sin P′ =	9.931 306
Colog b =	5.779 246
Colog sin P″ =	0.732 605
Sum = log tan Z =	0.060 006
Z =	48-56-44.6
Z + 45° =	93-56-44.6
Log cot (Z + 45°) =	8.838 691 n
Log tan S =	0.529 771
Sum = log tan ϵ =	9.368 462 (sign −)
ϵ	13-08-53.5
S	73-32-57.7

(Tan ϵ +)		(Tan ϵ −)
S + ϵ = angle ABP	60-24-04.2	S − ϵ = angle ABP
S − ϵ = angle ACP	86-41-51.2	S + ϵ = angle ACP

BPA	10-40-00.0	APC	58-37-00	PCB	31-01-54.6
ABP	60-24-04.2	PCA	86-41-51.2	CBP	79-41-05.4
PAB	(108-55-55.8)	CAP	(34-41-08.8)	BPC	69-17-00.0
					180-00-00.0

(For explanation of this form see Special Publication No. 138, pages 191 and 192, or Special Publication No. 145, pages 98–100)

U. S. GOVERNMENT PRINTING OFFICE: 1932
11—9912

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—9121
U. S. GOVERNMENT PRINTING OFFICE: 1930

[redacted] F.E. #6 COMPUTATION OF TRIANGLES

State: North Carolina

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						3.616 849
	1 Six A	10-40-00.8					0.732 606
	2 Stan	60-24-04.2					9.939 272
	3 Beau	108-55-55.8					9.975 847
	1-3						4.288 727 ✓
	1-2						4.325 302 ✓
		180 00 00.0					
	2-3						4.303 347
	1 Six A	69-17-00.0					0.029 030
	2 Stan	79-41-05.4					9.992 923
	3 Cape	31-01-54.6					9.712 240
	1-3						4.325 300 ✓
	1-2						4.044 617 ✓
		180 00 00.0					
	2-3						4.220 754
	1 Six A	58-37-00					0.068 694
	2 Beau	34-41-08.8					9.755 169
	3 Cape	86-41-51.2					9.999 278
	1-3						4.044 617 ✓
	1-2						4.288 726 ✓
		180 00 00.0					
	2-3						
	1						
	2						
	3						
	1-3						
	1-2						

Do not write in this margin

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

DECLASSIFIED
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

T.E. #6

			°	′	″
α	2	to 3	309	56	56.7
2d ∠		&	+ 34	41	08.8
α	2	to 1	344	38	05.5
Δα					
			180	00	00.0
α′	1	to 2			

			°	′	″
α	3	to 2	130	01	41.3
3d ∠		&	− 86	41	51.2
α	3	to 1	43	19	50.1
Δα					
			180	00	00.0
α′	1	to 3			

First Angle of Triangle

57 37 00

	°	′	″			°	′	″
φ	34	43	08.036	2 BEAU	λ	76	39	49.920
Δφ	−	10	08.418		Δλ	−	03	22.043
φ′	34	32	59.618	1 6A	λ′	76	36	27.877

	°	′	″			°	′	″
φ	34	37	21.326	3 CAPE	λ	76	31	29.621
Δφ	−	04	21.708		Δλ	+	04	58.258
(+1) φ′	34	32	59.618	1	λ′	76	36	27.879 (−1)

	Logarithms	Values in seconds
s	4.288 726	
+ Cos α	9.984 193	
B	8.511 244	
h	2.784 163	1st term ″ +608.362
s²	8.597 45	
Sin² α	8.846 40	
C	1.245 71	
	8.669 56	2d term + 0.047
h²	5.5683	
D	2.3635	
	7.9318	3d term + 0.009
		−Δφ +608.418

½(φ+φ′)		
	Logarithms	Values in seconds
s	4.288726	
Sin α	9.423196	
A′	8.509253	
Sec φ′	0.084 267	
Δλ	2.305 442	″ −202.043
Sin ½(φ+φ′)		
−Δα		

	Logarithms	Values in seconds
s	4.044 617	
Cos α	9.861 777	
B	8.511 251	
h	2.417 645	1st term ″ +261.605
s²	8.089 23	
Sin² α	9.672 91	
C	1.244 17	
	9.006 31	2d term + 0.101
h²	4.8353	
D	2.3629	
	7.1982	3d term + 0.002
		−Δφ +261.708

½(φ+φ′)		
	Logarithms	Values in seconds
s	4.044 617	
Sin α	9.836 455	
A′	8.509 253	
Sec φ′	0.084 267	
Δλ	2.474 592	″ +298.258
Sin ½(φ+φ′)		
−Δα		

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

DECLASSIFIED BY NO. 5546
PURSUANT TO DOC SYSTEMATIC RE
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356

			°	′	″
α	2	to 3			
$2^d \angle$		&	+		
α	2	to 1	282	00	00
$\Delta\alpha$					
			180	00	00.0
α'	1	to 2			

			°	′	″
α	3	to 2			
$3^d \angle$		&	−		
α	3	to 1			
$\Delta\alpha$					
			180	00	00.0
α'	1	to 3			

First Angle of Triangle

	°	′	″			°	′	″
ϕ	34	32	59.618	2 SIX A	λ	76	36	27.878
$\Delta\phi$	−	00	02.800	415 m	$\Delta\lambda$	−	00	15.924
ϕ'	34	32	56.82	1 Buoy (Trawler)	λ'	76	36	11.95

	°	′	″			°	′	″
ϕ				3	λ			
$\Delta\phi$					$\Delta\lambda$			
ϕ'				1	λ'			

	Logarithms	Values in seconds
s	2.618048	(98.0) 1750.9 1848.9
Cos α	9.317879	
B	8.511257	
h	0.447184	1st term + 2.800
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		$-\Delta\phi$

$\frac{1}{2}(\phi+\phi')$		
	Logarithms	Values in seconds
s	2.618048	
Sin α	9.990404	(1225.1) 304.7 15.98
A′	8.509253	
Sec ϕ'	0.084350	
$\Delta\lambda$	1.202055	−15.924
$\sin\frac{1}{2}(\phi+\phi')$		
$-\Delta\alpha$		

	Logarithms	Values in seconds
s		
Cos α		
B		
h		1st term
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		$-\Delta\phi$

$\frac{1}{2}(\phi+\phi')$		
	Logarithms	Values in seconds
s		
Sin α		
A′		
Sec ϕ'		
$\Delta\lambda$		
$\sin\frac{1}{2}(\phi+\phi')$		
$-\Delta\alpha$		

11—9362 U. S. GOVERNMENT PRINTING OFFICE. 1929

DECLASSIFIED BY NARA
DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

T. L. #6

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″
α	2	to 3		56	56.7
2d ∠		&	+	34	14 06
α	2	to 1	344	11	02.7
Δα			+	01	58.8
			180	00	00.0
α′	1	to 2	164	13	01.5

			°	′	″
α	3	to 2	130	01	41.3
3d ∠		&	−	87	36 54
α	3	to 1	42	24	47.3
Δα			−	02	45.3
			180	00	00.0
α′	1	to 3	222	22	02.0

FIRST ANGLE OF TRIANGLE 58 09 00 000 00 01.5

	°	′	″			°	′	″			°	′	″		
φ	34	43	08.036	2	Beau	λ	76	39	49.920	φ	34	37	21.326	3	CAPE
Δφ	−	10	10.626			Δλ	−	03	29.030	Δφ	−	04	23.914		
φ′	34	32	57.410	(+1) 1	SEVEN A	λ′	76	36	20.890	(+) φ′	34	32	57.412	(−1) 1	

	Logarithms	Values in seconds
s	4.291 250	
Cos α	9.983 239	
B	8.511 244	
h	2.785 733	1st term ″ +610.567
s²	8.582 50	
Sin² α	8.870 88	
C	1.245 71	
	8.699 09	2d term + 0.050
h²	5.571 5	
D	2.3635	
	7.9350	3d term + 0.009
		−Δφ +610.626

	°	′	″	Logarithms	Values in seconds
½(φ+φ′)	34	38	02		
s				4.291 250	
Sin α				9.435 442	
A′				8.509 253	
Sec φ′				0.084 263	
Δλ				2.320 208	″ −209.030
Sin ½(φ+φ′)				9.754 601	
−Δα				2.074 809	−118.8

	Logarithms	Values in seconds
s	4.041 817	
Cos α	9.868 232	
B	8.511 251	
h	2.421 300	1st term ″ +263.815
s²	8.083 63	
Sin² α	9.657 93	
C	1.244 17	
	8.985 73	2d term + 0.097
h²	4.8426	
D	2.3629	
	7.2055	3d term + 0.002
		−Δφ +263.914

	°	′	″	Logarithms	Values in seconds
½(φ+φ′)	34	35	09		
s				4.041 817	
Sin α				9.828 964	
A′				8.509 253	
Sec φ′				0.084 263	
Δλ				2.464 297	″ +291.271
Sin ½(φ+φ′)				9.754 073	
−Δα				2.218 370	+165.3

11—9362 U. S. GOVERNMENT PRINTING OFFICE: 1929

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 27
Ed. April, 1929

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

			°	′	″							°	′	″
α	2	to 3				α	3	to 2						
$2^d\angle$		&	+			$3^d\angle$		&	−					
α	2	to 1		245	52	α	3	to 1						
$\Delta\alpha$						$\Delta\alpha$								
				180	00	00.0						180	00	00.0
α'	1	to 2				α'	1	to 3						

First Angle of Triangle

	°	′	″			°	′	″			°	′	″			°	′	″
ϕ	34	32	57.41	2	SEVEN A	λ	76	36	20.89	ϕ				3		λ			
$\Delta\phi$	+	00	06.95		524 meters	$\Delta\lambda$	−	00	18.76	$\Delta\phi$						$\Delta\lambda$			
ϕ'	34	33	04.36	1	MAST	λ'	76	36	07.13	ϕ'				1		λ'			

	Logarithms	Values in seconds
s	2.719331	(1714.5) ✓
$\cos\alpha$	9.611576	134.3 ✓
B	8.511257	1848.8 ✓
h	0.842164	1st term − 6.95
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		$-\Delta\phi$

	° ′ ″	Logarithms	Values in seconds
$\frac{1}{2}(\phi+\phi')$			
s		2.719331	
Sin α		9.960279	(1475.5)
A′		8.509253	54.30
Sec ϕ'		0.084350	
$\Delta\lambda$		1.273213	− 18.76
$\sin\frac{1}{2}(\phi+\phi')$			
$-\Delta\alpha$			

	Logarithms	Values in seconds
s		
$\cos\alpha$		
B		
h		1st term ″
s^2		
$\sin^2\alpha$		
C		
		2d term +
h^2		
D		
		3d term +
		$-\Delta\phi$

	° ′ ″	Logarithms	Values in seconds
$\frac{1}{2}(\phi+\phi')$			
s			
Sin α			
A′			
Sec ϕ'			
$\Delta\lambda$			″
$\sin\frac{1}{2}(\phi+\phi')$			
$-\Delta\alpha$			

11—0362 U. S. GOVERNMENT PRINTING OFFICE. 1929

U.S. COAST & GEODETIC SURVEY
LIBRARY AND ARCHIVES

DEC 1 1942

ACC. No. _____

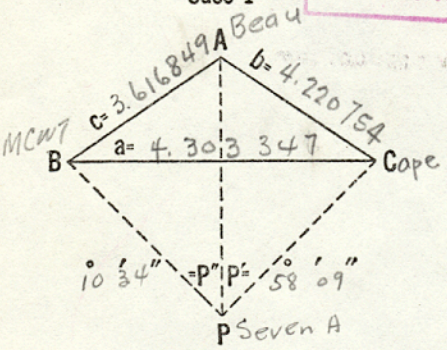
DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 655
Ed. Sept., 1929

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

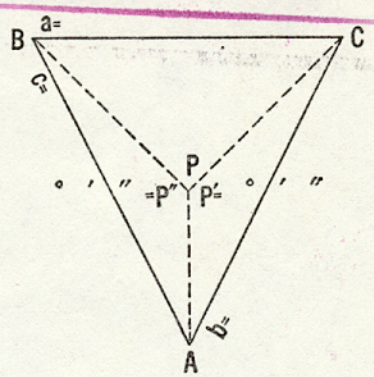
F. E. #6

COMPUTATION OF THREE-POINT PROBLEM

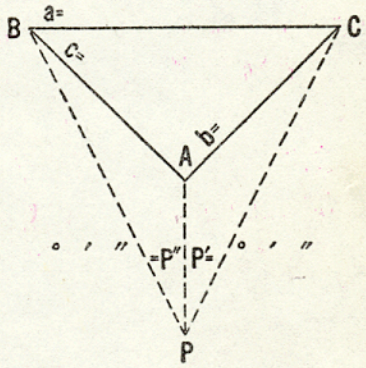
Case 1



Case 2



Case 3



Cases 1 and 2				Case 3	
P′	58	09	00	P′	
P″	10	34	00	P″	
A	143	37	04.7		
Sum	212	20	04.7	Sum	
				A	
½ Sum	106	10	02.3		
	180	00	00.0	A−sum	
S=180°−½ sum=	73	49	57.7	S=½ (A−sum)=	

Log c =	3.616 849 ✓	
Log sin P′ =	9.929 129 ✓	
Colog b =	5.779 246 ✓	
Colog sin P″ =	0.736 649 ✓	
Sum=log tan Z=	0.061 873	
Z=	49-04-03.5	
Z+45°=	94-04-03.5	
Log cot (Z+45°) =	8.851 950	neg
Log tan S=	0.537 736	pos
Sum=log tan ϵ=	9.389 686	(sign −)
ϵ	13-46-56	
S	73-49-58	

	(Tan ϵ+)	(Tan ϵ−)
S+ϵ=angle ABP	60-03-02	
S−ϵ=angle ACP	87-36-54	
S−ϵ=angle ABP		
S+ϵ=angle ACP		

BPA	10-34-00	APC	58-09-00	PCB	80-36-08	
ABP	60-03-02	PCA	87-36-54	CBP	30-40-52	
PAB	(109-22-58)	CAP	(34-14-06)	BPC	68-43-00	
	180-00		180 00		180 00	

(For explanation of this form see Special Publication No. 138, pages 191 and 192, or Special Publication No. 145, pages 98–100)

U. S. GOVERNMENT PRINTING OFFICE: 1929
11—9912

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 25
Ed. Jan., 1929

11—9121
U. S. GOVERNMENT PRINTING OFFICE: 1930

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a). EXECUTIVE ORDER 13526

COMPUTATION OF TRIANGLES

CONFIDENTIAL 7-E #6

State: North Carolina

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
	2-3						3.616 849 ✓
	1 7a	10 34 - 00					0.736 649 ✓
	2 MCWT	60 03 - 0✓					9.937 75✓
	3 Beau	109 22 - 58					9.974 660
	1-3						4.291 250
	1-2						4.328 158 ✓
	2-3						4.303 347 ✓
	1 7a	68 43 - 00					0.030 679 ✓
	2 MCWT	30 40 - 5✓					9.707 791 ✓
	3 Cape	80 36 - 08					9.994 132
	1-3					×	4.041 817 ✓
	1-2						4.328 158 ✓
	2-3						4.220 754 ✓
	1 7a	58 09 - 00					0.070 871 ✓
	2 Beau	34 14 - 06					9.750 191
	3 Cape	87 36 - 54					9.999 624 ✓
	1-3					×	4.041 816+1 ✓
	1-2						4.291 249+1 ✓
	2-3						4.220 754
1	MCWT (STAN)	29 22 09.6			0.0	09.6	0.309 416
2	Beau (BO)	143 37 04.7			0.1	04.6	9.773 177
3	Cape	07 00 45.8			0.0	45.8	9.086 679
1-3		00.1					4.303 347
1-2							3.616 849

Do not write in this margin

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 662
Rev. April, 1931

INVERSE POSITION COMPUTATION

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

CONFIDENTIAL I. E. #6

$$s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{\Delta\lambda_1 \cos\phi_m}{A_m}$$

$$s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{-\Delta\phi_1 \cos\frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha=\Delta\lambda \sin\phi_m \sec\frac{\Delta\phi}{2}+F(\Delta\lambda)^3$$

in which log $\Delta\lambda_1$=log $(\lambda'-\lambda)$−correction for arc to sin*; log $\Delta\phi_1$=log $(\phi'-\phi)$−correction for arc to sin*; and log s=log s_1+ correction for arc to sin*.

NAME OF STATION

1. ϕ	34°	43′	08.036″	Beaufort, T.P. Co. W.T.	λ	76°	39′	49.920″
2. ϕ'	34	43	16.362	M.C. W.T.	λ'	76	42	32.257
$\Delta\phi$ $(=\phi'-\phi)$		+ 00	08.326		$\Delta\lambda$ $(=\lambda'-\lambda)$		+ 02	42.337
$\frac{\Delta\phi}{2}$			4.163		$\frac{\Delta\lambda}{2}$			
$\phi_m\left(=\phi+\frac{\Delta\phi}{2}\right)$	34 −	43 −	12.199					
$\Delta\phi$ (secs.)		+ 8.326″			$\Delta\lambda$ (secs.)		+ 162.337″	

log $\Delta\phi$				**log** $\Delta\lambda$		
cor. arc−sin	−			cor. arc−sin	−	
log $\Delta\phi_1$	0.920 436			log $\Delta\lambda_1$	2.210 418 ✓	
log cos $\frac{\Delta\lambda}{2}$				**log cos** ϕ_m	9.914 842 ✓	
colog B_m	1.488 756			**colog** A_m	1.490 751 ✓	
log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	2.409 192		(opposite in sign to $\Delta\phi$)	**log** $\{s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	3 616 011 ✓	
				log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	2.409 192 ✓	
				log tan $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	1.206 819	
log $\Delta\lambda$	2.210 418	3 log $\Delta\lambda$		$\alpha+\frac{\Delta\alpha}{2}$	93° 33′ 15.2″	
log sin ϕ_m	9.755 545	log F		**log sin** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	8.792 343	
log sec $\frac{\Delta\phi}{2}$		log b		**log cos** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.999 163	
log a	1.965 963					
a				**log** s_1		
b				cor. arc−sin	+	
$-\Delta\alpha$ **(secs.)**	+ 92.46″			log s	3.616848	
$-\frac{\Delta\alpha}{2}$	46.2″					
	+ 0° 00′ 46.2″					
$\alpha+\frac{\Delta\alpha}{2}$	93 33 15.2					
α **(1 to 2)**	93 34 01.4					
$\Delta\alpha$	− 01 32.5					
180						
α' **(2 to 1)**	273 32 28.9					

*Use the table on the back of this form for correction of arc to sin.

NOTE.—For log s up to 4.52 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 10′, omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 6 decimal places. 11—9810

U. S. GOVERNMENT PRINTING OFFICE: 1931

Table of arc-sin corrections for inverse position computations

log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$
4. 177	1	2. 686	5. 223	124	3. 732	5. 525	497	4. 034
4. 327	2	2. 836	5. 234	130	3. 743	5. 530	508	4. 039
4. 415	3	2. 924	5. 243	136	3. 752	5. 534	519	4. 043
4. 478	4	2. 987	5. 253	142	3. 762	5. 539	530	4. 048
4. 526	5	3. 035	5. 260	147	3. 769	5. 543	541	4. 052
4. 566	6	3. 075	5. 269	153	3. 778	5. 548	553	4. 057
4. 599	7	3. 108	5. 279	160	3. 788	5. 553	565	4. 062
4. 628	8	3. 137	5. 287	166	3. 796	5. 557	577	4. 066
4. 654	9	3. 163	5. 294	172	3. 803	5. 561	588	4. 070
4. 677	10	3. 186	5. 303	179	3. 812	5. 566	600	4. 075
4. 697	11	3. 206	5. 311	186	3. 820	5. 570	613	4. 079
4. 716	12	3. 225	5. 318	192	3. 827	5. 575	625	4. 084
4. 734	13	3. 243	5. 326	199	3. 835	5. 579	637	4. 088
4. 750	14	3. 259	5. 334	206	3. 843	5. 583	650	4. 092
4. 765	15	3. 274	5. 341	213	3. 850	5. 587	663	4. 096
4. 779	16	3. 288	5. 349	221	3. 858	5. 591	674	4. 100
4. 792	17	3. 301	5. 356	228	3. 865	5. 595	687	4. 104
4. 804	18	3. 313	5. 363	236	3. 872	5. 600	702	4. 109
4. 827	20	3. 336	5. 369	243	3. 878	5. 604	716	4. 113
4. 857	23	3. 366	5. 376	251	3. 885	5. 608	729	4. 117
4. 876	25	3. 385	5. 383	259	3. 892	5. 612	743	4. 121
4. 892	27	3. 401	5. 390	267	3. 899	5. 616	757	4. 125
4. 915	30	3. 424	5. 396	275	3. 905	5. 620	771	4. 129
4. 936	33	3. 445	5. 403	284	3. 912	5. 624	785	4. 133
4. 955	36	3. 464	5. 409	292	3. 918	5. 628	800	4. 137
4. 972	39	3. 481	5. 415	300	3. 924	5. 632	814	4. 141
4. 988	42	3. 497	5. 422	309	3. 931	5. 636	829	4. 145
5. 003	45	3. 512	5. 428	318	3. 937	5. 640	845	4. 149
5. 017	48	3. 526	5. 434	327	3. 943	5. 644	861	4. 153
5. 035	52	3. 544	5. 440	336	3. 949	5. 648	877	4. 157
5. 051	56	3. 560	5. 446	345	3. 955	5. 652	893	4. 161
5. 062	59	3. 571	5. 451	354	3. 960	5. 656	909	4. 165
5. 076	63	3. 585	5. 457	364	3. 966	5. 660	925	4. 169
5. 090	67	3. 599	5. 462	373	3. 971	5. 663	941	4. 172
5. 102	71	3. 611	5. 468	383	3. 977	5. 667	957	4. 176
5. 114	75	3. 623	5. 473	392	3. 982	5. 671	973	4. 180
5. 128	80	3. 637	5. 479	402	3. 988	5. 674	989	4. 183
5. 139	84	3. 648	5. 484	412	3. 993	5. 678	1005	4. 187
5. 151	89	3. 660	5. 489	422	3. 998			
5. 163	94	3. 672	5. 495	433	4. 004			
5. 172	98	3. 681	5. 500	443	4. 009			
5. 183	103	3. 692	5. 505*	453	4. 014			
5. 193	108	3. 702	5. 510	464	4. 019			
5. 205	114	3. 714	5. 515	474	4. 024			
5. 214	119	3. 723	5. 520	486	4. 029			

Spec. Pub. 192
pp 32 - 69

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 662
Rev. April, 1931

INVERSE POSITION COMPUTATION

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION
3.3(a), EXECUTIVE ORDER 12356.

CONFIDENTIAL T.E. #6

$$s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{\Delta\lambda_1 \cos\phi_m}{A_m}$$

$$s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{-\Delta\phi_1 \cos\frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha=\Delta\lambda \sin\phi_m \sec\frac{\Delta\phi}{2}+F(\Delta\lambda)^3$$

in which log $\Delta\lambda_1$=log $(\lambda'-\lambda)$−correction for arc to sin*; log $\Delta\phi_1$=log $(\phi'-\phi)$−correction for arc to sin*; and log s=log s_1+ correction for arc to sin*.

NAME OF STATION

1. ϕ	84 ° 37 ′ 21.326	Cape lookout L.H.	λ	76 ° 31 ′ 29.621	
2. ϕ'	34 43 16.362	M.C.W.T.	λ'	76 42 32.257	
$\Delta\phi$ $(=\phi'-\phi)$	+ 05 - 55.036		$\Delta\lambda$ $(=\lambda'-\lambda)$	11 02.636	
$\frac{\Delta\phi}{2}$	02 - 57.5		$\frac{\Delta\lambda}{2}$		
$\phi_m\left(=\phi+\frac{\Delta\phi}{2}\right)$	34 - 40 - 18.8				
$\Delta\phi$ (secs.)	355.036		$\Delta\lambda$ (secs.)	+ 662.636	

log $\Delta\phi$			**log** $\Delta\lambda$		
cor. arc−sin	−		cor. arc−sin	−	
log $\Delta\phi_1$	2. 550 272		log $\Delta\lambda_1$	2. 821 275	
log cos $\frac{\Delta\lambda}{2}$			**log cos** ϕ_m	9. 915 095	
colog B_m	1. 488 752		**colog** A_m	1. 490 749	
log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	4. 039 024	(opposite in sign to $\Delta\phi$)	**log** $\{s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	4. 227 119 p	
			log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	4.039 024 n	
log $\Delta\lambda$	2. 821 275	3 log $\Delta\lambda$	**log tan** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	0.188 095	
log sin ϕ_m	9. 755 018	log F	$\alpha+\frac{\Delta\alpha}{2}$	122 ° 57 ′ 47 ″	
log sec $\frac{\Delta\phi}{2}$		log b	**log sin** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.923 773	
log a	2.576 293		**log cos** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9. 735 677	
a			**log** s_1		
b			cor. arc−sin	+	
$-\Delta\alpha$ **(secs.)**	+ 377.0		log s	4. 303 346	
$-\frac{\Delta\alpha}{2}$	188.5				
	+ 03 ° 08 ′ 08.5 ″				
$\alpha+\frac{\Delta\alpha}{2}$	122 57 47.0				
α **(1 to 2)**	123 00 55.5				
$\Delta\alpha$	− 06 17.0				
	180				
α' **(2 to 1)**	302 54 38.5				

* Use the table on the back of this form for correction of arc to sin.

NOTE.—For log s up to 4.52 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 10′, omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 6 decimal places. 11—9810

U. S. GOVERNMENT PRINTING OFFICE: 1931

Table of arc-sin corrections for inverse position computations

log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$
4. 177	1	2. 686	5. 223	124	3. 732	5. 525	497	4. 034
4. 327	2	2. 836	5. 234	130	3. 743	5. 530	508	4. 039
4. 415	3	2. 924	5. 243	136	3. 752	5. 534	519	4. 043
4. 478	4	2. 987	5. 253	142	3. 762	5. 539	530	4. 048
4. 526	5	3. 035	5. 260	147	3. 769	5. 543	541	4. 052
4. 566	6	3. 075	5. 269	153	3. 778	5. 548	553	4. 057
4. 599	7	3. 108	5. 279	160	3. 788	5. 553	565	4. 062
4. 628	8	3. 137	5. 287	166	3. 796	5. 557	577	4. 066
4. 654	9	3. 163	5. 294	172	3. 803	5. 561	588	4. 070
4. 677	10	3. 186	5. 303	179	3. 812	5. 566	600	4. 075
4. 697	11	3. 206	5. 311	186	3. 820	5. 570	613	4. 079
4. 716	12	3. 225	5. 318	192	3. 827	5. 575	625	4. 084
4. 734	13	3. 243	5. 326	199	3. 835	5. 579	637	4. 088
4. 750	14	3. 259	5. 334	206	3. 843	5. 583	650	4. 092
4. 765	15	3. 274	5. 341	213	3. 850	5. 587	663	4. 096
4. 779	16	3. 288	5. 349	221	3. 858	5. 591	674	4. 100
4. 792	17	3. 301	5. 356	228	3. 865	5. 595	687	4. 104
4. 804	18	3. 313	5. 363	236	3. 872	5. 600	702	4. 109
4. 827	20	3. 336	5. 369	243	3. 878	5. 604	716	4. 113
4. 857	23	3. 366	5. 376	251	3. 885	5. 608	729	4. 117
4. 876	25	3. 385	5. 383	259	3. 892	5. 612	743	4. 121
4. 892	27	3. 401	5. 390	267	3. 899	5. 616	757	4. 125
4. 915	30	3. 424	5. 396	275	3. 905	5. 620	771	4. 129
4. 936	33	3. 445	5. 403	284	3. 912	5. 624	785	4. 133
4. 955	36	3. 464	5. 409	292	3. 918	5. 628	800	4. 137
4. 972	39	3. 481	5. 415	300	3. 924	5. 632	814	4. 141
4. 988	42	3. 497	5. 422	309	3. 931	5. 636	829	4. 145
5. 003	45	3. 512	5. 428	318	3. 937	5. 640	845	4. 149
5. 017	48	3. 526	5. 434	327	3. 943	5. 644	861	4. 153
5. 035	52	3. 544	5. 440	336	3. 949	5. 648	877	4. 157
5. 051	56	3. 560	5. 446	345	3. 955	5. 652	893	4. 161
5. 062	59	3. 571	5. 451	354	3. 960	5. 656	909	4. 165
5. 076	63	3. 585	5. 457	364	3. 966	5. 660	925	4. 169
5. 090	67	3. 599	5. 462	373	3. 971	5. 663	941	4. 172
5. 102	71	3. 611	5. 468	383	3. 977	5. 667	957	4. 176
5. 114	75	3. 623	5. 473	392	3. 982	5. 671	973	4. 180
5. 128	80	3. 637	5. 479	402	3. 988	5. 674	989	4. 183
5. 139	84	3. 648	5. 484	412	3. 993	5. 678	1005	4. 187
5. 151	89	3. 660	5. 489	422	3. 998			
5. 163	94	3. 672	5. 495	433	4. 004			
5. 172	98	3. 681	5. 500	443	4. 009			
5. 183	103	3. 692	5. 505	453	4. 014			
5. 193	108	3. 702	5. 510	464	4. 019			
5. 205	114	3. 714	5. 515	474	4. 024			
5. 214	119	3. 723	5. 520	486	4. 029			

DECLASSIFIED BY NOAA
PURSUANT TO DOC SYSTEMATIC REVIEW
GUIDELINES AS DESCRIBED IN SECTION 3.4(a) EXECUTIVE ORDER 12356.
CONFIDENTIAL

Spec. Pub. # 192
pp 69-70
F. E. #6

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 662
Rev. April, 1931

INVERSE POSITION COMPUTATION

$$s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{\Delta\lambda_1 \cos\phi_m}{A_m}$$

$$s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)=\frac{-\Delta\phi_1 \cos\frac{\Delta\lambda}{2}}{B_m}$$

$$-\Delta\alpha=\Delta\lambda \sin\phi_m \sec\frac{\Delta\phi}{2}+F(\Delta\lambda)^3$$

in which $\log \Delta\lambda_1=\log(\lambda'-\lambda)-$correction for arc to sin*; $\log \Delta\phi_1=\log(\phi'-\phi)-$correction for arc to sin*; and $\log s=\log s_1+$ correction for arc to sin*.

NAME OF STATION

1. ϕ	34°	37′	21.326″	Cape Lookout LH.	λ	76°	31′	29.621″
2. ϕ'	34	43	08.036	Beaufort, T.P.Co.WT.	λ'	76	39	49.920
$\Delta\phi$ $(=\phi'-\phi)$		+ 05	46.710		$\Delta\lambda$ $(=\lambda'-\lambda)$		+ 08	20.299
$\frac{\Delta\phi}{2}$		02	53.3		$\frac{\Delta\lambda}{2}$			
$\phi_m\left(=\phi+\frac{\Delta\phi}{2}\right)$	34	40	14.6					
$\Delta\phi$ (secs.)			+346.71″		$\Delta\lambda$ (secs.)			+500.299″

log $\Delta\phi$					**log** $\Delta\lambda$		
cor. arc−sin	−				cor. arc−sin	−	
log $\Delta\phi_1$	2.539 966				log $\Delta\lambda_1$	2.699 230	
log cos $\frac{\Delta\lambda}{2}$					**log cos** ϕ_m	9.915 101	
colog B_m	1.488 752				**colog** A_m	1.490 749	
log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	4.028 718			(opposite in sign to $\Delta\phi$)	**log** $\{s_1 \sin\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	4.105 080	p
					log $\{s_1 \cos\left(\alpha+\frac{\Delta\alpha}{2}\right)\}$	4.028 718	n
log $\Delta\lambda$	2.699 230	3 log $\Delta\lambda$			**log tan** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	0.076 362	
log sin ϕ_m	9.755 005	log F			$\alpha+\frac{\Delta\alpha}{2}$	129° 59′ 19.0″	
log sec $\frac{\Delta\phi}{2}$		log b			**log sin** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.884 326	
log a	2.454 235				**log cos** $\left(\alpha+\frac{\Delta\alpha}{2}\right)$	9.807 964	
a					**log** s_1		
b					cor. arc−sin	+	
$-\Delta\alpha$ **(secs.)**	+284.6″				log s	4.220 754	
$-\frac{\Delta\alpha}{2}$	142.3″						
	+ 02′ 22.3″						
$\alpha+\frac{\Delta\alpha}{2}$	129° 59′ 19.0″						
α **(1 to 2)**	130 01 41.3						
$\Delta\alpha$	− 04 44.6						
	180						
α' **(2 to 1)**	309 56 − 56.7						

*Use the table on the back of this form for correction of arc to sin.

NOTE.—For log s up to 4.52 and for $\Delta\phi$ or $\Delta\lambda$ (or both) up to 10′, omit all terms below the heavy line except those printed (in whole or in part) in heavy type or those underscored, if using logarithms to 6 decimal places. 11—9810

U. S. GOVERNMENT PRINTING OFFICE: 1931

Table of arc-sin corrections for inverse position computations

log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$	log s_1	Arc-sin correction in units of seventh decimal of logarithms	log $\Delta\phi$ or log $\Delta\lambda$
4. 177	1	2. 686	5. 223	124	3. 732	5. 525	497	4. 034
4. 327	2	2. 836	5. 234	130	3. 743	5. 530	508	4. 039
4. 415	3	2. 924	5. 243	136	3. 752	5. 534	519	4. 043
4. 478	4	2. 987	5. 253	142	3. 762	5. 539	530	4. 048
4. 526	5	3. 035	5. 260	147	3. 769	5. 543	541	4. 052
4. 566	6	3. 075	5. 269	153	3. 778	5. 548	553	4. 057
4. 599	7	3. 108	5. 279	160	3. 788	5. 553	565	4. 062
4. 628	8	3. 137	5. 287	166	3. 796	5. 557	577	4. 066
4. 654	9	3. 163	5. 294	172	3. 803	5. 561	588	4. 070
4. 677	10	3. 186	5. 303	179	3. 812	5. 566	600	4. 075
4. 697	11	3. 206	5. 311	186	3. 820	5. 570	613	4. 079
4. 716	12	3. 225	5. 318	192	3. 827	5. 575	625	4. 084
4. 734	13	3. 243	5. 326	199	3. 835	5. 579	637	4. 088
4. 750	14	3. 259	5. 334	206	3. 843	5. 583	650	4. 092
4. 765	15	3. 274	5. 341	213	3. 850	5. 587	663	4. 096
4. 779	16	3. 288	5. 349	221	3. 858	5. 591	674	4. 100
4. 792	17	3. 301	5. 356	228	3. 865	5. 595	687	4. 104
4. 804	18	3. 313	5. 363	236	3. 872	5. 600	702	4. 109
4. 827	20	3. 336	5. 369	243	3. 878	5. 604	716	4. 113
4. 857	23	3. 366	5. 376	251	3. 885	5. 608	729	4. 117
4. 876	25	3. 385	5. 383	259	3. 892	5. 612	743	4. 121
4. 892	27	3. 401	5. 390	267	3. 899	5. 616	757	4. 125
4. 915	30	3. 424	5. 396	275	3. 905	5. 620	771	4. 129
4. 936	33	3. 445	5. 403	284	3. 912	5. 624	785	4. 133
4. 955	36	3. 464	5. 409	292	3. 918	5. 628	800	4. 137
4. 972	39	3. 481	5. 415	300	3. 924	5. 632	814	4. 141
4. 988	42	3. 497	5. 422	309	3. 931	5. 636	829	4. 145
5. 003	45	3. 512	5. 428	318	3. 937	5. 640	845	4. 149
5. 017	48	3. 526	5. 434	327	3. 943	5. 644	861	4. 153
5. 035	52	3. 544	5. 440	336	3. 949	5. 648	877	4. 157
5. 051	56	3. 560	5. 446	345	3. 955	5. 652	893	4. 161
5. 062	59	3. 571	5. 451	354	3. 960	5. 656	909	4. 165
5. 076	63	3. 585	5. 457	364	3. 966	5. 660	925	4. 169
5. 090	67	3. 599	5. 462	373	3. 971	5. 663	941	4. 172
5. 102	71	3. 611	5. 468	383	3. 977	5. 667	957	4. 176
5. 114	75	3. 623	5. 473	392	3. 982	5. 671	973	4. 180
5. 128	80	3. 637	5. 479	402	3. 988	5. 674	989	4. 183
5. 139	84	3. 648	5. 484	412	3. 993	5. 678	1005	4. 187
5. 151	89	3. 660	5. 489	422	3. 998			
5. 163	94	3. 672	5. 495	433	4. 004			
5. 172	98	3. 681	5. 500	443	4. 009			
5. 183	103	3. 692	5. 505	453	4. 014			
5. 193	108	3. 702	5. 510	464	4. 019			
5. 205	114	3. 714	5. 515	474	4. 024			
5. 214	119	3. 723	5. 520	486	4. 029			

Cape Lookout Lighthouse
1933

Lookout Bight

East Radio Tower
Cape Lookout, 1933

West Radio Tower
Cape Lookout, 1933

F.E. 6, 1942

MAST (wreck)

TRAWL
(Cape Lookout
Wreck Lighted Buoy)

AFFIRM

1C

5C

BAKER

10C

CAST

14C

19C

DOG

WRECK

Whistle
6s FIW
14'

EASY

FOX

GEORGE

HYPO

JIG

KING

LOVE

MIKE

FE.-6-1942

35'

76°30'

25'

20'

U.S. COAST & GEODETIC SURVEY
LIBRARY AND ARCHIVES
DEC 1 1942
ACC. No.

applies to Clk. 1001 S.R. 12/21/42