# F00141

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

Type of Survey: Field Examination

Field No.:

Registry No.: F00144

LOCALITY

State: Maryland

General Locality: Chesapeake Bay

Sublocality: San Marcos Wreck

1956

CHIEF OF PARTY

LIBRARY & ARCHIVES

DATE

F00141

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.7 1956

22/MEK
S-1-CO

10 September 1956

To: Commanding Officer
USC&GSS COWIE
102 West Olney Road
Norfolk 10, Virginia

Subject: Additional investigation, San Marcos wreck

Your letter of 24 August 1956 concerning the discrepancy between your location and the 1950 location of the San Marcos wreck has been received.

The United States Government is involved in a court case resulting from a small craft striking the San Marcos wreck. Therefore, this office desires that you return to the wreck location between now and the end of the season when visibility is suitable, and observe a complete round of angles to all objects visible which have been located by triangulation. If practicable, and visible, the objects observed shall include:

- Windmill Point Lighthouse
- Kilmarnock Municipal water tank
- Reedville Municipal water tank
- Great Wicomico River Lighthouse
- Bulleye
- Tangier Island Swain Memorial Church spire
- Tangier Sound Lighthouse
- gone Watts Island Lighthouse

It is necessary that the position of this wreck be fixed beyond doubt as it may affect the decision of the court.

(Signed) H. Arnold Karo

Director

cc. Norfolk District Officer
Chart Division

Field Examination No. F.E. 7 (1956)

The purpose of the field examination was to verify the position of the San Marcos Wreck and the wreck buoy reported in Chart Letter 724 (1956) which differed with the position previously reported in F. E. 3 (1950). Sextant angles taken at the wreck and wreck buoy were scribed on plastic and an adjusted position from observed angles was plotted on a metal mounted sheet.

The position of the wreck and wreck buoy determined by the present investigation verified the position reported in Chart Letter 724 (1956) and supersedes the position determined in F. E. 3 (1950). The present position of the wreck also verifies the triangulation position Texas Stack 1911.

R. H. Carstens

R. H. Carstens
10/19/56

There is a plotting sheet (large metal mount) for this field in vault.

W. A. Bruder

FE #7

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 24A
Rev. Oct., 1932

# LIST OF DIRECTIONS

Computations by Geodesy

Station San Marcos Wreck State

Chief of party Date Computed by

Observer Instrument Checked by

U. S. GOVERNMENT PRINTING OFFICE, 1932 11—6503

| OBSERVED STATION | Observed direction | Eccentric reduction | Sea level reduction* | Station Adjusted MEAN Corrected direction with zero initial | Adjusted direction* |
|---|---|---|---|---|---|
| | ° ′ ″ | ′ ″ | ″ | ° ′ ″ | ′ ″ |
| KILMARNOCK MUNI WATER TANK | 0 00 00.00 | | | 0 00 00.00 | |
| REEDVILLE MUNI WATER TANK | 39 16 | 17 | 13 | 39 17 | |
| SMITH POINT LIGHTHOUSE | | | | 64 30 | |
| BULLEYE | 100 23 | 23 | 11 | 100 24 | |
| TANGIER ID, SWAIN MEM. CH., SPIRE | 124 10 | 07 | 55 | 124 11 | |
| TANGIER SOUND LIGHTHOUSE | 141 36 | 35 | 18 | 141 39 | |
| BUOY | 289 35 | 44 | 43 | 289 53 | |
| HORIZON CL L | 70 10 | 08 | 57 | 70 07 | |
| | 359° 45′ | 52′ | 40 | | |

Do not use these computations observed angle SPIRE to TANG in error

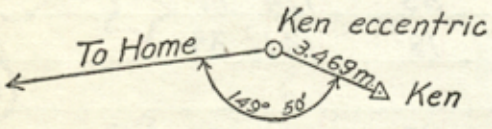
* These columns are for office use and should be left blank in the field.

*Station:* Ken | *State:* Maryland

*Chief of party:* C. V. H. | *Date:* 1917 | *Computed by:* O. P. S.

*Observer:* C. V. H. | *Instrument:* No. 168 | *Checked by:* W. F. R.

| OBSERVED STATION | Observed direction | | | Eccentric reduction | | Sea level reduction | Corrected direction with zero initial | | | Adjusted direction | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ° | ′ | ″ | ′ | ″ | ″ | ° | ′ | ″ | ′ | ″ |
| Chevy | 0 | 00 | 00.00 | − | 7.31 | | 0 | 00 | 00.00 | | |
| Tank west of △ Dulce | 29 | 03 | 37.0 | −1 | 09.8 | | 29 | 02 | 34.5 | | |
| Ken (center), 3.469 meters | 176 | 42 | | | | | | | | | |
| Forest Glen standpipe | 313 | 24 | 53.0 | +3 | 01.2 | | 313 | 28 | 01.5 | | |
| Home | 326 | 31 | 30.21 | + | 31.93 | | 326 | 32 | 09.45 | | |
| Bureau of Standards, wireless pole | 352 | 17 | 20.8 | + | 5.7 | | 352 | 17 | 33.8 | | |
| Reno | 357 | 28 | 48.63 | − | 1.16 | | 357 | 28 | 54.78 | | |
| Reference mark, 16.32 m | 358 | 31 | 20 | | | | | | | | |




This form, with the first three and fifth columns properly filled out and checked, must be furnished by field parties. *To be acceptable it must contain every direction observed at the station.*

It should be used for observations with both repeating and direction theodolites.

The directions at only one station should be placed on a page.

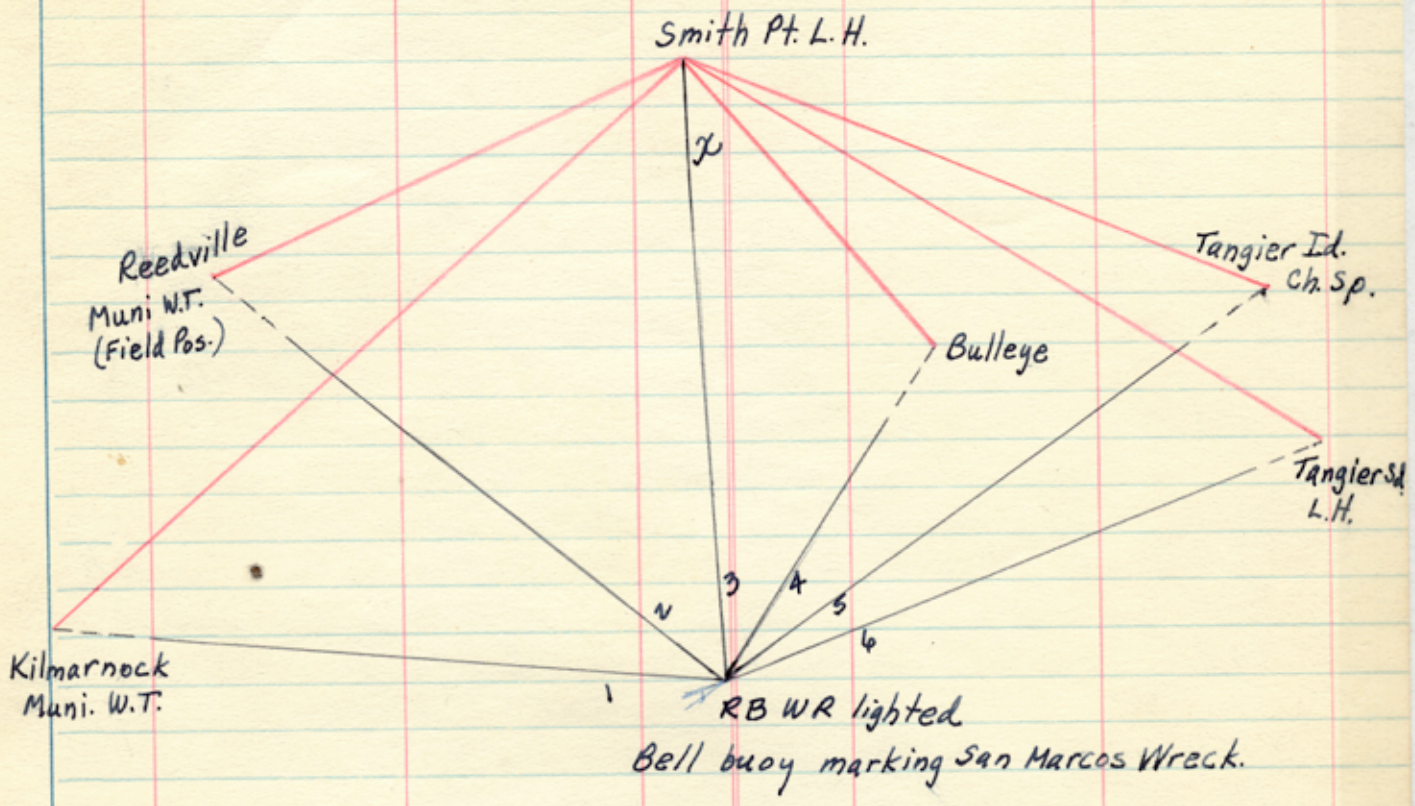
If a repeating theodolite is used, do not abstract the angles in tertiary triangulation. The local adjustment corrections (to close horizon only) are to be written in the Horizontal Angle Record, and the List of Directions is to be made from that record directly.

Choose as an initial for Form 24A some station involved in the local adjustment, and preferably one which has been used as an initial for a round of directions on objects not in the main scheme. Use but one initial at a station. Call the direction of the initial 0° 00′ 00.″ 00, and by applying the corrected angles to this, fill in opposite each station its direction reckoned *clockwise* around the whole circumference regardless of the direction of graduation of the instrument. The clockwise reckoning is necessary for uniformity and to make the directions comparable with azimuths.

If a station has been occupied eccentrically, reduce to the center and enter in this form, in ink, the resulting corrections to the observed directions in the column provided for them. If an eccentric reduction is necessary, but not made in the field, leave the column blank. If the station was occupied centrally, and no eccentric reduction is required, put dashes in the column to show that no corrections are necessary.

Directions in the main scheme should be entered to hundredths of seconds in first-order triangulation; otherwise to tenths only. Points observed upon but once, direct and reverse, should be carried to tenths in first-order and second-order triangulation, and to even seconds only in third-order triangulation. In general, but two uncertain figures should be given.

It is recommended that the following simple plan of observing be used with a repeating instrument: Measure each single angle in the scheme at each station and the outside angle necessary to close the horizon. *Measure no sum angles.* Follow each measurement of every angle immediately by a measurement of its explement. Six repetitions are to constitute a measurement. The local adjustment will consist simply of the distribution of the error of closure of the horizon.




| | | | |
|---|---|---|---|
| | 4.403279 | | 4.142384 |
| $+1^{+x}-3$ 42 26 | 9.8291312 +2.30 | $-1+3$ 64 30 | 9.9554882 +1.00 |
| $-3+4$ 35 54 | 9.768 1735 +2.91 | $+3^{-x}-4$ 124 41 | 9.915 0354 -1.46 |
| | 4.000 5837 | | 4.0129076 |

A - $0 = -12323.9 + 0.84(x) + 3.30(1) - 4.75(3) + 1.45(4)$

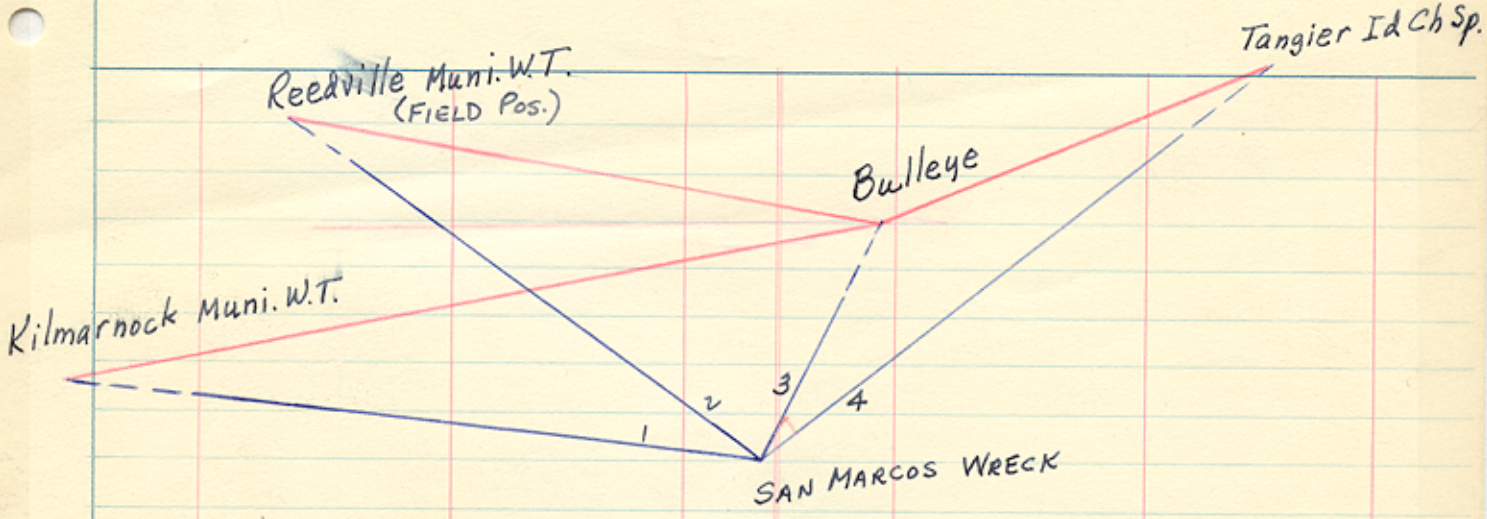
| | | | |
|---|---|---|---|
| | 3.969 558$^3$ | | 4.142384 |
| $+2^{+x}-3$ 66 42 | 9.9630538 +0.91 | $-2+3$ 25 13 | 9.6294529 +4.47 |
| $-3+4$ 35 54 | 9.768 1735 +2.91 | $+3^{-x}-4$ 124 41 | 9.9150354 -1.46 |
| | 3.700 7856 | | 3.6868723 |

B - $0 = +13913.3 - 0.55(x) + 5.38(2) - 6.83(3) + 1.45(4)$

1.527

| | | | |
|---|---|---|---|
| | 4.403279 | | 4.251579 |
| $+1^{+x}-3$ 42 26 | 9.8291312 +2.30 | $-1+3$ 64 30 | 9.9554882 +1.00 |
| $-3+5$ 59 41 | 9.936 1360 +1.23 | $+3^{-x}-5$ 79 38 | 9.9928522 +0.38 |
| | 4.168 5462 | | 4.199 9194 |

C - $0 = -31373.2 + 2.68(x) + 3.30(1) - 4.91(3) + 1.61(5)$




Pos confirms graphic plot

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 4.403279 | | | | | 4.324464 | |
| $+x$ $+1-3$ | 42 | 26 | 9.8291312 | +2.30 | $-1+3$ | 64 | 30 | 9.9554882 | +1.00 |
| $-3+6$ | 77 | 09 | 9.9889849 | +0.48 | $-x$ $+3-6$ | 71 | 56 | 9.9780418 | +0.69 |
| | | | 4.2213951 | | | | | 4.2579940 | |

D - $0 = -36598.9 + 2.99(x) + 3.30(1) - 4.47(3) + 1.17(6)$

A&B $\times 1.527272727$ $\quad +21249.4 - 0.84x + 8.22(2) - 10.43(3) + 2.21(4)$

$1 - 0 = +8925.5 + 3.30(1) + 8.22(2) - 15.18(3) + 3.66(4)$

A&C $\quad +39319.1 - 2.68(x) - 10.53(1) + 15.15(3) - 4.63(4)$

$3.190476190\times$

$2 - 0 = +7945.9 - 7.23(1) + 10.24(3) - 4.63(4) + 1.61(5)$

$1.115671641\times$ C&D $\quad +35002.2 - 2.99x - 3.68(1) + 5.48(3) - 1.80(5)$

$3 - 0 = -1596.7 - 0.38(1) + 1.01(3) - 1.80(5) + 1.17(6)$

| | 1 | 2 | 3 | V's | adopt. V's. |
|---|---|---|---|---|---|
| 1 | +3.30 | -7.23 | -0.38 | +993.915 | + 16.56' |
| 2 | +8.22 | | | -1216.102 | - 20.27' |
| 3 | -15.18 | +10.24 | +1.01 | +257.615 | + 4.29' |
| 4 | +3.66 | -4.63 | | +464.911 | + 7.75' |
| 5 | | +1.61 | -1.80 | -773.417 | -12.89' |
| 6 | | | +1.17 | +275.251 | +4.59' |
| $x$ | | | | +11420.9' | +190.34' |

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 665a
Ed. March 1952

# TRIANGLE COMPUTATION USING TWO SIDES AND INCLUDED ANGLE

(for calculating machine computation)

$$\left[\cot B_p = \left(\frac{a}{b} - \cos C_p\right) / \sin C_p^{**}; \quad c = \frac{a \sin C_p}{\sin A_p}\right]^*$$

| | ° ′ ″ | | | |
|---|---|---|---|---|
| $C_s$ | | $a$ | | Log $m$ |
| Sph. excess / 3 | | $b$ | | Log sin $C_s$ |
| $C_p$ | | $\frac{a}{b}$ | 1.82345497 | Log $a$ |
| $B_p$ | 28 09 24.6 | $\cos C_p$ | - 0.04317378 | Log $b$ |
| $B_p + C_p$ | | $\frac{a}{b} - \cos C_p$ | 1.86662875 | Log sph. ex. |
| $A_p$ | | $\sin C_p$ | 0.99906758 | Sph. excess |
| | | $\cot B_p$** | 1.86837086 | |
| | | | (Sketch) | |

## CHECK COMPUTATION

| NO. | STATION | SPHERICAL ANGLE | SPHERICAL EXCESS | PLANE ANGLE AND DISTANCE | LOGARITHM |
|---|---|---|---|---|---|
| | 2-3 | | | | 4.468141 |
| | 1 Smith Pt. L.H. | 92 28 28.0 | | | 0.0004051 |
| | 2 Bulleye | 59 22 07.4 | | | 9.9347327 |
| | 3 Kilmarnock Muni W.T. | 28 09 24.6 | | | 9.6738377 |
| | 1-3 | | | 25309.234 | 4.403279 |
| | 1-2 | | | 13879.824 | 4.142384 |
| Bulleye-Kilmarnock Muni. W.T. | | 71° 00′ 41.3″ | | | |
| Kil. M W.T. — Bulleye | | 250° 49′ 05.9″ | | | |
| | 2-3 | | | | |
| | 1 | | | | |
| | 2 | | | | |
| | 3 | | | | |
| | 1-3 | | | | |
| | 1-2 | | | | |

*The subscripts $s$ and $p$ on this form refer to spherical and plane angles respectively.

**When $B_p$ is very small, yielding a large value for cot $B_p$, use the reciprocal of this formula to give tan $B_p$.

U. S. GOVERNMENT PRINTING OFFICE 16—66441-1

Form 25
(10-8-53)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

# COMPUTATION OF TRIANGLES

State _____

| | Station | Observed angle | Corr'n | Spher'l angle | Spher'l excess | Plane angle and distance | Logarithm |
|---|---|---|---|---|---|---|---|
| | 2-3 | | | | | | 4.403279 |
| -1+3 | 1 Buoy | 64 30 | -12.3' | | | 64° 17.7' | 0.045256 |
| | 2 Kil. Muni. W.T. | (42 26 | )+3° 22.6' | | | 45° 48.6' | 9.855539 |
| -χ | 3 Smith Pt L.H. | 73 04 | -3° 10.3' | | | 69° 53.7' | 9.972695 |
| | 1-3 | | | | | | 4.30406 |
| | 1-2 | | | | | | 4.42122 |
| | | | | | | | |
| | 2-3 | | | | | | 3.969558[3] |
| -2+3 | 1 Buoy | 25 13 | +24.6' | | | 25° 37.6' | 0.364008 |
| | 2 Reedville Muni W.T. | (66 42 | )+2° 45.7' | | | 69° 27.7' | 9.971479 |
| -χ | 3 Smith Pt. L.H. | 88 05 | -3° 10.3 | | | 84° 54.7' | 9.998285 |
| | 1-3 | | | | | | 4.30504 |
| | 1-2 | | | | | | 4.33185 |
| | | | | | | | |
| | 2-3 | | | | | | 4.142384 |
| -3+4 | 1 Buoy | 35 54 | +3.5' | | | 35° 57.5' | 0.231216 |
| +χ | 2 Smith Pt. L.H. | 19 25 | +3° 10.3' | | | 22° 35.3' | 9.584453 |
| | 3 Bulleye | (124 41 | )-3° 13.8' | | | 121° 27.2' | 9.930982 |
| | 1-3 | | | | | | 3.95805 |
| | 1-2 | | | | | | 4.30458 |
| | | | | | | | |
| | 2-3 | | | | | | 4.251579 |
| -3+5 | 1 Buoy | 59 41 | -17.2' | | | 59° 23.8' | 0.065142 |
| +χ | 2 Smith Pt. L.H. | 40 41 | +3° 10.3' | | | 43° 51.3' | 9.840630 |
| | 3 Tangier Id Ch Sp. | (79 38 | )-2° 53.1' | | | 76° 44.9' | 9.988279 |
| | 1-3 | | | | | | 4.15735 |
| | 1-2 | | | | | | 4.30500 |

Comm-DC 34338

Form 25
(10-8-53)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

## COMPUTATION OF TRIANGLES

State _____

| | Station | Observed angle | Corr'n | Spher'l angle | Spher'l excess | Plane angle and distance | Logarithm |
|---|---|---|---|---|---|---|---|
| | 2-3 | | | | | | 4.324464 |
| -3+6 | 1 Buoy | 77 09 | +0.3' | | | 77° 09.'3 | 0.011006 |
| +2 | 2 Smith Pt. LH. | 30 55 | +3° 10.'3 | | | 34° 05.'3 | 9.748553 |
| | 3 Tangier Sd. L.H. | (71 56 | )-3° 10.'6 | | | 68° 45.'4 | 9.969439 |
| | 1-3 | | | | | | 4.08402 |
| | 1-2 | | | | | | 4.30491 |
| | | | | | | | |
| | 2-3 | | | | | 4.30472 | |
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 1-3 | | | | | | |
| | 1-2 | | | | | | |
| | | | | | | | |
| | 2-3 | | | | | | |
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 1-3 | | | | | | |
| | 1-2 | | | | | | |
| | | | | | | | |
| | 2-3 | | | | | | |
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 1-3 | | | | | | |
| | 1-2 | | | | | | |
| | | | | | | | |

Form 25
(10-8-53)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

## COMPUTATION OF TRIANGLES

SAN MARCOS WRECK State THREE PT. FIX

| Station | Observed angle | Corr'n | Spher'l angle | Spher'l excess | Plane angle and distance | Logarithm |
|---|---|---|---|---|---|---|
| 2-3 | | | | | | 4.286399 |
| 1 WRECK | 60 52 00.0 | | | | | 0.0587425 |
| 2 REEDVILLE MUNI W.T. | 23 40 21.1 | | | | | 9.6036950 |
| 3 BULLEYE | 95 27 38.9 | | | | | 9.9980245 |
| 1-3 | | | | | | 3.94884 ~~36~~ |
| 1-2 | | | | | | 4.34317 |
| | | | | | | |
| 2-3 | | | | | | 3.847375 |
| 1 WRECK | 24 06 00.0 | | | | | 0.3889882 |
| 2 BULLEYE | 124 50 50.1 | | | | | 9.9141730 |
| 3 Tangier Id. Ch.Sp. | 31 03 09.9 | | | | | 9.7125040 |
| 1-3 | | | | | | 4.15054 |
| 1-2 | | | | | 8389.4 | 3.94887 |
| | | | | | | |
| 2-3 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 1-3 | | | | | | |
| 1-2 | | | | | | |
| | | | | | | |
| 2-3 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 1-3 | | | | | | |
| 1-2 | | | | | | |
| | | | | | | |

Comm-DC 34338

Form 25
(10-8-53)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

SAN MARCOS WRECK.

## COMPUTATION OF TRIANGLES

State THREE PT FIX

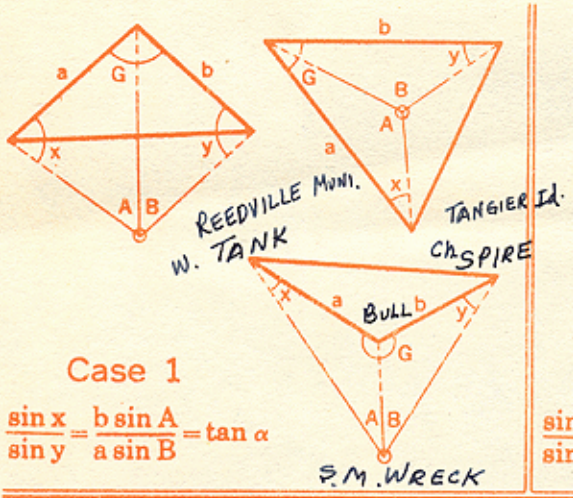
| | Station | Observed angle | Corr'n | Spher'l angle | Spher'l excess | Plane angle and distance | Logarithm |
|---|---|---|---|---|---|---|---|
| | 2-3 | | | | | | 4.468141 |
| | 1 WRECK | 99 50 00.0 | | | | | 0.0064277 |
| | 2 KILMARNOCK MUNI W.T. | 17 21 36.1 | | | | | 9.4747625 |
| | 3 BULLEYE | (62 48 23.9) | | | | | 9.9491310 |
| | 1-3 | | | | | | 3.94933 |
| | 1-2 | | | | | | 4.42370 |
| | | | | | | | |
| | 2-3 | | | | | | 3.847375 |
| | 1 WRECK | 24 06 00.0 | | | | | 0.3889882 |
| | 2 BULLEYE | (124 48 37.3) | | | | | 9.9143675 |
| | 3 TANGIER ID. CH. SPIRE | 31 05 22.7 | | | | | 9.7129682 |
| | 1-3 | | | | | | 4.15073 |
| | 1-2 | | | | | 8898.8 | 3.94933 |
| | | | | | | | |
| | 2-3 | | | | | | |
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 1-3 | | | | | | |
| | 1-2 | | | | | | |
| | | | | | | | |
| | 2-3 | | | | | | |
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 1-3 | | | | | | |
| | 1-2 | | | | | | |
| | | | | | | | |

Comm-DC 34338

Form 655a
(6-4-54)

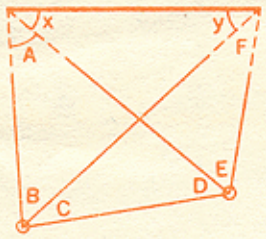
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

# SPECIAL ANGLE COMPUTATION



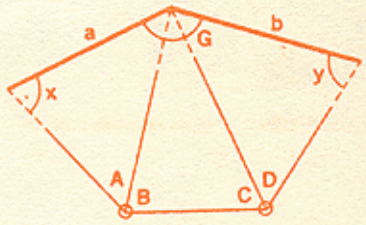

**Case 1**

$$\frac{\sin x}{\sin y} = \frac{b \sin A}{a \sin B} = \tan \alpha$$




**Case 2**

$$\frac{\sin x}{\sin y} = \frac{\sin A \sin C \sin E}{\sin B \sin D \sin F} = \tan \alpha$$




**Case 3**

$$\frac{\sin x}{\sin y} = \frac{b \sin A \sin C}{a \sin B \sin D} = \tan \alpha$$

$$\frac{1}{2}(x+y) = \begin{cases} \text{Case 1: } 180° - \frac{1}{2}(A+B+G) = \text{27° 21′ 41.″0} \\ \text{Case 2: } \frac{1}{2}(C+D) = \\ \text{Case 3: } 270° - \frac{1}{2}(A+B+C+D+G) = \end{cases}$$

Leave blanks below here for values not involved in the CASE used.

| | | | |
|---|---|---|---|
| log b = | 3.847375 | log a = | 4.286399 |
| log sin A = | 9.941258 | log sin B = | 9.611012 |
| log sin C = | | log sin D = | |
| log sin E = | | log sin F = | |
| *① Sum = | 3.788633 | *② Sum = | 3.897411 |
| -② – | | -① – | 3.788633 |
| log tan α = | ° ′ ″ | log tan α = | 0.108778 |
| α = | | α = | 52° 06′ 05.″7 |
| α - 45° = | | α - 45° = | 7 06 05.7 |

| | | | |
|---|---|---|---|
| log tan ½(x+y) = | | log tan ½(x+y) = | 9.7139071 |
| log tan (α-45°) = | | log tan (α-45°) = | 9.0954646 |
| Sum = log tan ½(x−y) = | | Sum = log tan ½(y−x) = | 8.8093717 |
| ½(x−y) = | ° ′ ″ | ½(y−x) = | 3° 41′ 19.″9 |
| ½(x+y) = | | ½(y+x) | 27 21 41.0 |
| x | | y | 31 03 09.9 |
| y | | x | 23 40 21.1 |

α is an auxiliary angle needed only for the computation: it is always between 45° and 90°

* Where ① is greater than ② use only the left side of the form below here, and vice-versa.

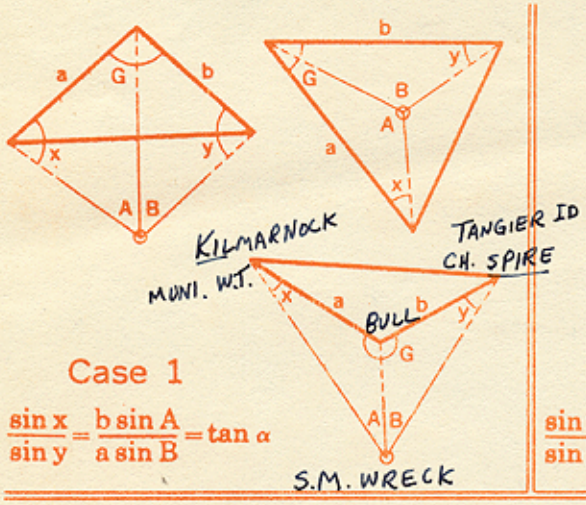
Comm-DC-57884

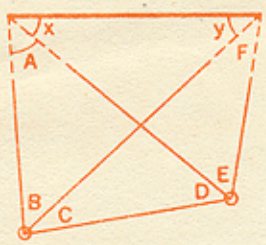
Form 655a
(6-4-54)

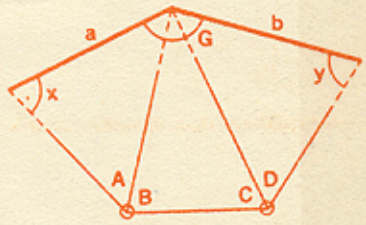
U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

# SPECIAL ANGLE COMPUTATION

A = 99° 50′
B = 24° 06′





**Case 1**

$$\frac{\sin x}{\sin y} = \frac{b \sin A}{a \sin B} = \tan \alpha$$

**Case 2**

$$\frac{\sin x}{\sin y} = \frac{\sin A \sin C \sin E}{\sin B \sin D \sin F} = \tan \alpha$$

**Case 3**

$$\frac{\sin x}{\sin y} = \frac{b \sin A \sin C}{a \sin B \sin D} = \tan \alpha$$

$\frac{1}{2}(x+y) =$
- Case 1: $180° - \frac{1}{2}(A+B+G) =$ 24° 13′ 29.″4
- Case 2: $\frac{1}{2}(C+D) =$
- Case 3: $270° - \frac{1}{2}(A+B+C+D+G) =$

Leave blanks below here for values not involved in the CASE used.

| | | | |
|---|---|---|---|
| log b = | ~~4.286~~ 3.847375 | log a = | 4.468141 |
| log sin A = | ~~10.761128~~ 9.993572 | log sin B = | ~~9.6506199~~ 9.611012 |
| log sin C = | | log sin D = | |
| log sin E = | | log sin F = | |
| *① Sum = | 3.840947 | *② Sum = | 4.079153 |
| -② – | | -① – | 3.840947 |
| log tan α = | ° ′ ″ | log tan α = | 0.238206 |
| α = | | α = | 59° 58′ 47.″0 |
| α - 45° = | | α - 45° = | 14 58 47.0 |

| | | | |
|---|---|---|---|
| log tan ½(x+y) = | | log tan ½(x+y) = | 9.6531536 |
| log tan (α-45°) = | | log tan (α-45°) = | 9.4274373 |
| Sum = log tan ½(x−y) = | ° ′ ″ | Sum = log tan ½(y−x) = | 9.0805909 |
| ½(x−y) = | | ½(y−x) = | 6° 51′ 53.″3 |
| ½(x+y) = | | ½(y+x) | 24 13 29.4 |
| x | | y | 31 05 22.7 |
| y | | x | 17 21 36.1 |

α is an auxiliary angle needed only for the computation: it is always between 45° and 90°

* Where ① is greater than ② use only the left side of the form below here, and vice-versa.

Comm-DC-57884

Department of Commerce
U. S. Coast and Geodetic Survey
Form 26 Rv
Ed. December 1944

# GEOGRAPHIC POSITIONS Revised 2-24-50

785
Accession No. of Computation: 68215

Locality Chincoteague — North American 1927 Datum — Third —order Triangulation. State Virginia

| STATION | LATITUDE AND LONGITUDE ° ′ ″ | SECONDS IN METERS | AZIMUTH ° ′ ″ | BACK AZIMUTH ° ′ ″ | TO STATION | DISTANCE LOGARITHM (METERS) | DISTANCE METERS | DISTANCE FEET |
|---|---|---|---|---|---|---|---|---|
| Chincoteague, Naval Airbase, | 37 56 43.359 | 1336.8 | 218 20 58.5 | 38 21 58.3 | Snead 2 | 3.583 566 | 3,833.2 | 12,576 |
| Airway beacon, 1949 d. | 75 27 47.318 | 1155.4 | 317 47 04.7 | 137 50 34.1 | Peter | 4.093 452 | 12,400.9 | 40,685 |
| | | | 326 25 23.5 | 146 25 37.8 | Testcell | 3.011 881 | 1,027.7 | 3,372 |
| | | | 347 40 55.6 | 167 41 37.6 | Easy R. M. No. 2 | 3.894 674 | 7,846.5 | 25,743 |
| | | | 2 06 35.7 | 182 06 26.1 | Oboe | 4.014 306 | 10,334.9 | 33,907 |
| | | | 26 11 37.9 | 206 09 49.0 | Arbuckle | 3.991 814 | 9,813.3 | 32,196 |
| Chincoteague, N.A.O.T.S., | 37 56 20.782 | 640.7 | 222 04 35.9 | 42 06 00.1 | Snead 2 | 3.697 961 | 4,988.4 | 16,366 |
| water tank, 1949 d. | 75 28 26.834 | 655.3 | 275 57 27.2 | 95 58 05.8 | Testcell | 3.187 988 | 1,541.7 | 5,058 |
| | | | 356 31 15.6 | 176 31 30.3 | Oboe | 3.984 507 | 9,649.5 | 31,658 |
| | | | 22 32 23.0 | 202 30 58.4 | Arbuckle | 3.943 522 | 8,780.6 | 28,808 |
| Chincoteague, N.A.O.T.S., | 37 56 27.640 | 852.2 | 217 41 30.3 | 37 42 38.3 | Snead 2 | 3.644 594 | 4,411.6 | 14,474 |
| control tower, 1949 d. | 75 28 00.385 | 9.4 | 292 43 05.0 | 112 43 27.3 | Testcell | 2.983 231 | 962.1 | 3,156 |
| | | | 344 29 12.5 | 164 30 02.6 | Easy R.M. No.2 | 3.872 309 | 7,452.6 | 24,451 |
| | | | 0 21 19.1 | 180 21 17.5 | Oboe | 3.993 147 | 9,843.4 | 32,295 |
| Hallwood, John B. Taylor | 37 52 30.724 | 947.3 | 205 22 45.6 | 25 22 51.2 | Chinco S. W. Base | 2.717 070 | 521.3 | 1,710 |
| Packing Co., Stack 1949 d. | 75 35 31.901 | 779.7 | 207 38 34.5 | 27 40 36.6 | Chinco N. E. Base | 4.019 381 | 10,456.4 | 34,306 |
| | | | 278 07 01.6 | 98 08 14.0 | Conquest | 3.464 510 | 2,914.1 | 9,561 |
| Joynes 2, R.M. No. 3. 1933 | 37 41 49.498 | 1526.1 | 207 53 56.6 | 27 55 49.3 | Sutton | 3.983 832 | 9,634.6 | 31,610 |
| r. 1949 d.m. | 75 36 49.077 | 1202.3 | 319 53 36.1 | 139 54 41.1 | Cedar | 3.607 211 | 4,047.7 | 13,280 |
| Taylor, 1849, r. 1949 | 37 52 34.881 | 1075.4 | 270 02 50.2 | 90 04 46.1 | Easy R. N. No. 2 | 3.664 131 | 4,614.6 | 15,140 |
| d.m. | 75 29 47.642 | 1164.4 | 316 09 22.0 | 136 10 26.3 | Oboe | 3.567 883 | 3,697.3 | 12,130 |
| Oyster, 1949 | 37 49 48.708 | 1501.7 | 328 21 34.7 | 148 22 18.0 | Tangier 3 | 3.518 003 | 3,296.1 | 10,814 |
| Elev. 3.1 m; 10 ft. d.m. | 76 00 04.759 | 116.4 | 108 55 55.6 | 288 49 11.9 | Smith Pt. L. H. | 4.230 432 | 16,999.3 | 55,772 |
| Mac, 1949 | 37 51 07.185 | 221.5 | 199 28 47 | 19 28 47 | Oboe | 1.590 875 | 38.983 | 127.90 |
| d.m. | 75 28 03.414 | 83.5 | | | | | | |
| Easy, 1949 | 37 52 34.536 | 1064.8 | 142 27 57 | 322 27 57 | Easy R.M. No. 2 | 0.843 108 | 6.968 | 22.86 |
| d.m. | 75 26 38.651 | 944.6 | | | | | | |
| Easy R. M. No. 1, 1949 | 37 52 10.684 | 329.4 | 180 00 10.7 | 00 00 10.6 | Easy | 2.866 522 | 735.398 | 2412.72 |
| d.m. | 75 26 38.652 | 944.7 | 239 10 34.2 | 59 13 48.1 | Assateague L. H. | 3.953 242 | 8979.3 | 29,460 |
| Bulleye, 1949 | 37 47 55.649 | 1,715.7 | 130 22 48.7 | 310 18 25.4 | Smith Point L.H. | 4.142 384 | 13,879.8 | 45,537 |
| d. | 76 03 50.087 | 1,225.4 | 257 40 11.7 | 57 42 29.9 | Oyster | 3.814 329 | 6,521.2 | 21,395 |
| | | | 264 26 56.5 | 84 29 57.9 | Tangier 3 | 3.861 736 | 7,273.4 | 23,863 |

[illegible]; n.=not; r.=recovered; l.=lost; p.=probably. (Examples: n. d.=not described; p. l.=probably lost.)

8-2778 2-50++

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 665a
Ed. March 1952

# TRIANGLE COMPUTATION USING TWO SIDES AND INCLUDED ANGLE

(for calculating machine computation)

$$\left[\cot B_p = \left(\frac{a}{b} - \cos C_p\right) / \sin C_p^{**};\quad c = \frac{a \sin C_p}{\sin A_p}\right]^*$$

| | ° ′ ″ | | | |
|---|---|---|---|---|
| $C_s$ | | $a$ | | Log $m$ |
| $\frac{\text{Sph. excess}}{3}$ | | $b$ | | Log sin $C_s$ |
| $C_p$ | | $\frac{a}{b}$ | 1.48876430 | Log $a$ |
| $B_p$ | 26 40 30.6 | $\cos C_p$ − | 0.36462896 | Log $b$ |
| $B_p + C_p$ | | $\frac{a}{b} - \cos C_p$ | 1.85339326 | Log sph. ex. |
| $A_p$ | | $\sin C_p$ | 0.93115290 | Sph. excess |
| | | $\cot B_p$** | 1.99042849 | |

(Sketch)

## CHECK COMPUTATION

| NO. | STATION | SPHERICAL ANGLE | SPHERICAL EXCESS | PLANE ANGLE AND DISTANCE | LOGARITHM |
|---|---|---|---|---|---|
| | 2-3 | | | | 4.286399 |
| | 1 Smith Pt. L.H. | 111 23 05.1 | | | 0.0309789 |
| | 2 Bulleye | 26 40 30.6 | | | 9.6521803 |
| | 3 Reedville Muni W.T. | 41 56 24.3 | | | 9.8250060 |
| | 1-3 | | | 9323.050 | 3.969558 |
| | 1-2 | | | 13879.824 | 4.142384 |
| Bulleye - Reedville Muni. W.T. | | 103 42 18.1 | | | |
| Reedville Muni. W.T. - Bulleye | | 283 34 26.8 | | | |
| | 2-3 | | | | |
| | 1 | | | | |
| | 2 | | | | |
| | 3 | | | | |
| | 1-3 | | | | |
| | 1-2 | | | | |

*The subscripts $s$ and $p$ on this form refer to spherical and plane angles respectively.

**When $B_p$ is very small, yielding a large value for cot $B_p$, use the reciprocal of this formula to give tan $B_p$.

U. S. GOVERNMENT PRINTING OFFICE 16—65441-1

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 665a
Ed. March 1952

# TRIANGLE COMPUTATION USING TWO SIDES AND INCLUDED ANGLE

(for calculating machine computation)

$$\left[\cot B_p = \left(\frac{a}{b} - \cos C_p\right) / \sin C_p^{**}; \quad c = \frac{a \sin C_p}{\sin A_p}\right]^*$$

| | ° ′ ″ | | | |
|---|---|---|---|---|
| $C_s$ | | $a$ | | Log $m$ |
| $\frac{\text{Sph. excess}}{3}$ | | $b$ | | Log sin $C_s$ |
| $C_p$ | | $\frac{a}{b}$ | 1.28586400 | Log $a$ |
| $B_p$ | | cos $C_p$ | 0.93183169 | Log $b$ |
| $B_p + C_p$ | | $\frac{a}{b}$ − cos $C_p$ | 0.35403231 | Log sph. ex. |
| $A_p$ | | sin $C_p$ | 0.36289075 | Sph. excess |
| | | cot $B_p$** | 0.97558924 | |

(Sketch)

## CHECK COMPUTATION

| NO. | STATION | SPHERICAL ANGLE | SPHERICAL EXCESS | PLANE ANGLE AND DISTANCE | LOGARITHM |
|---|---|---|---|---|---|
| | 2-3 | | | | 3.847375 |
| | 1 Smith Pt. L.H. | 21 16 40.2 | | | 0.4402241 |
| | 2 Tangier Id Ch Sp. | 45 42 28.5 | | | 9.8547851 |
| | 3 Bulleye | 113 00 51.3 | | | 9.9639802 |
| | 1-3 | | | 13879.824 | 4.142384 |
| | 1-2 | | | 17847.566 | 4.251579 |
| Tangier Id Ch Sp. - Bulleye | | 63° 26′ 18.″0 | | | |
| Bulleye - Tangier Id Ch Sp. | | 243° 23′ 40.″0 | | | |
| | 2-3 | | | | |
| | 1 | | | | |
| | 2 | | | | |
| | 3 | | | | |
| | 1-3 | | | | |
| | 1-2 | | | | |

*The subscripts $s$ and $p$ on this form refer to spherical and plane angles respectively.

**When $B_p$ is very small, yielding a large value for cot $B_p$, use the reciprocal of this formula to give tan $B_p$.

U. S. GOVERNMENT PRINTING OFFICE 16—66441-1

Form 26a
(1-30-56)

# POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

SAN MARCOS WRECK

| | | | ° | ' | " | | | | ° | ' | " |
|---|---|---|---|---|---|---|---|---|---|---|---|
| α | 2 | to 3 | 243 | 23 | 40 | α | 3 | to 2 | 63 | 26 | 18 |
| 2d ∠ | | & | + 124 | 48 | 37 | 3d ∠ | | & | − 31 | 05 | 23 |
| α | 2 | to 1 | 8 | 12 | 17 | α | 3 | to 1 | 32 | 20 | 55 |
| Δα | | | − | | 32 | Δα | | | − | 3 | 10 |
| | | | 180 | 00 | 00.00 | | | | 180 | 00 | 00.00 |
| α' | 1 | to 2 | 188 | 11 | 45 | α' | 1 | to 3 | 212 | 17 | 45 |

First Angle of Triangle 24 06 00.0

| | ° | ' | " | | | ° | ' | " | | ° | ' | " | | | ° | ' | " |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| φ | 37 | 47 | 55.649 | 2 BULLEYE | λ | 76 | 03 | 50.087 | φ | 37 | 49 | 37.786 | 3 TANGIER ID. CH. SPIRE | λ | 75 | 59 | 32.818 |
| | | | | s=8898.800 | Δλ | + | | 51.853 | | | | | s=14149.100 | Δλ | + | 5 | 09.122 |
| φ' | 37 | 43 | 09.963 | 1 WRECK | λ' | 76 | 04 | 41.940 | φ' | | | | 1 WRECK | λ' | 76 | 04 | 41.940 |

| | | | |
|---|---|---|---|
| Δφ 307.1593m | (log s= 3.94933 1027.1525m) b=(y/10,000)² | Δφ | (log s= 4.15073) b=(y/10,000)² |
| sin α + | x cor. = −½fb | sin α + | x cor. = −½fb |
| cos α + | x' + 1269.952 | cos α + | x' + 7570.749 |
| x=s sin α + | H 0.040831039 | x=s sin α + | H |
| y= −s cos α − | Hx' = (approx. Δλ") | y= −s cos α − | Hx' = (approx. Δλ") |
| a= (x'/10,000)² 0.01613 | Arc−sin cor = + V (Va) / 15 | a= (x'/10,000)² 0.57316 | Arc−sin cor = + V (Va) / 15 |
| y cor. = +fa | Δλ" 51.8535 | y cor. = +fa | Δλ" 309.1215 |
| y₀ 4,184,959.682 | sin φ 0.61289038 | y₀ 4,188,108.637 | sin φ 0.61328157 |
| y' − 8 807.716 | sin φ' | y' − 11 953.275 | sin φ' |
| y₁ 4,176,151.966 | 1 + cos Δφ | y₁ 4,176,155.362 | 1 + cos Δφ |
| Va − .098 | (sin φ + sin φ') / (1 + cos Δφ) | Va − 3.471 | (sin φ + sin φ') / (1 + cos Δφ) |
| y₂ 4,176,151.868 | −Δα" (approx.) | y₂ 4,176,151.891 | −Δα" (approx.) |
| V 6.05538 | + F (Δλ")³ | V | + F (Δλ")³ |
| K (Va/1,000)² + | − Δα" | K (Va/1,000)² + | −Δα" |

Form 26a
(1-30-56)

# POSITION COMPUTATION, FIRST-ORDER TRIANGULATION

(For calculating machine computation)

RB WR LIGHTED BELL BUOY MARKING SAN MARCOS WRECK.

| | | | ° | ' | " | | | | ° | ' | " |
|---|---|---|---|---|---|---|---|---|---|---|---|
| α | 2 | to 3 | 310 | 18 | 23 | α | 3 | to 2 | 130 | 22 | 49 |
| 2d ∠ | | & | + 22 | 35 | 18 | 3d ∠ | | & | − 121 | 27 | 12 |
| α | 2 | to 1 | 332 | 53 | 41 | α | 3 | to 1 | 8 | 55 | 37 |
| Δα | | | + | 3 | 50 | Δα | | | − | | 35 |
| | | | 180 | 00 | 00.00 | | | | 180 | 00 | 00.00 |
| α′ | 1 | to 2 | 152 | 57 | 31 +1 | α′ | 1 | to 3 | 188 | 55 | 02 |

First Angle of Triangle 35° 57′ 30″

| | ° | ' | " | | | ° | ' | " | | ° | ' | " | | | ° | ' | " |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| φ | 37 | 52 | 47.090 | 2 SMITH PT. L.H. | λ | 76 | 11 | 02.732 | φ | 37 | 47 | 55.649 | 3 BULLEYE | λ | 76 | 03 | 50.087 |
| | | | | s=20170.650 | Δλ | − | 6 | 15.242 | | | | | s=9079.200 | Δλ | + | | 57.524 |
| φ′ | 37 | 43 | 04.538 | 1 BUOY | λ′ | 76 | 04 | 47.490 | φ′ | 37 | 43 | 04.724 | 1 BUOY | λ′ | 76 | 04 | 47.611 |

| | | | |
|---|---|---|---|
| Δφ 139.9065 M | (log s= 4.30472 ) b=(y/10,000)² | Δφ 1163.125 m | (log s= 3.95805 ) b=(y/10,000)² |
| sin α − | x cor. = −½fb | sin α + | x cor. = −½fb |
| cos α + | x′ − 9190.291 | cos α + | x′ + 1408.865 |
| x=s sin α − | H 0.040830212 | x=s sin α + | H 0.040830240 |
| y= −s cos α − | Hx′ = (approx. Δλ″) | y= −s cos α − | Hx′ = (approx. Δλ″) |
| a= (x′/10,000)² 0.84461 | Arc−sin cor = + V (Va) / 15 | a= (x′/10,000)² 0.01985 | Arc−sin cor = + V (Va) / 15 |
| y cor. = +fa | Δλ″ 375.2415 | y cor. = +fa | Δλ″ 57.5243 |
| y₀ 4,193,945.052 | sin φ 0.61400623 | y₀ 4,184,959.682 | sin φ 0.61289038 |
| y′ − 17 955.324 | sin φ′ | y′ − 8 969.224 | sin φ′ |
| y₁ 4,175,989.728 | 1 + cos Δφ | y₁ 4,175,990.458 | 1 + cos Δφ |
| Va − 5.114 | (sin φ + sin φ′) / (1 + cos Δφ) | Va − .120 | (sin φ + sin φ′) / (1 + cos Δφ) |
| y₂ 4,175,984.614 | −Δα″ (approx.) | y₂ 4,175,990.338 | −Δα″ (approx.) |
| V 6.05506 | + F (Δλ″)³ | V | + F (Δλ″)³ |
| K (Va/1,000)² + | − Δα″ | K (Va/1,000)² + | −Δα″ |

| | | | |
|---|---|---|---|
| $-147.944\overset{32}{\cancel{20}}$ | $-217.362\overset{27}{\cancel{44}}$ | $+235.25741$ | |
| 1 | 2 | 3 | n |
| 322.2864 | −196.2480 | −16.5858 | +8925.5 |
| $c_1$ | +0.60892 | +0.05146 | −27.6943 |
| | 181.1595 | +10.1918 | +7945.9 |
| | 61.6602 | +0.0924 | +13380.8529 |
| | $c_2$ | −0.00150 | −217.00955 |
| | | 5.7734 | −1596.7 |
| | | 4.9198 | −1157.4194 |
| | | $c_3$ | +235.25741 |

Wed. 11111 # #

| NY | Br. | Br | NY |
|---|---|---|---|
| 0 | 3 | 4 | 5 |
| 8 | 9 | 5 | 7 |
| 4 | 2 | 2 | 4 |
| 7 | 1 | 7 | 3 |
| 1 | 7 | 1 | 9 |

143"

~~39~~ 76

~~77~~

~~13~~

| | | | |
|---|---|---|---|
| 39 | 15' | ~~20"~~ | + 2' |
| 61 | 03' | ~~40"~~ | + 3' |
| 23 | 45' | 00" | + 2' |
| 17 | 25' | ~~40~~ | + 2' |
| 148° | 14' | 00 | + 3' |
| 70° | 05' | 00 | + 2' |
| 359° | ~~45'~~ | ~~40"~~ | |
| | ~~14'~~ | ~~20"~~ | |

61 07

6

60 58

57

68

70

61

147° 59'

148° 09

148° 25'

148 11

REEDVILLE MUNI W.T.

$\phi$ 37 50 23.556
$\lambda$ 76 16 38.420

$\alpha$ to Smith Pt L.H. 241 38 02.5
61 41 28.5

~~149 47~~
Smith Pt LH - Bmy - 329 43

RHC

Form 712
(11-30-55)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

# TIDE NOTE FOR HYDROGRAPHIC SHEET

Chart Division: R. H. Carstens 2 January 1957

Plane of reference approved in
1 volumes of sounding records for

HYDROGRAPHIC SHEET FE No. 7 1956

Locality San Marcos Wreck, Chesapeake Bay

Chief of Party: L. G. Taylor in 1956

Plane of reference is mean low water

ft. on tide staff at

ft. below B.M.

Height of mean high water above plane of reference is 1½ feet.

NOTE: Tide reducers were entered and verified using Hampton Roads observations with the following allowances:

| Time Difference | Ratio of Range |
|---|---|
| +3 Hrs. | 0.5 |

Condition of records satisfactory except as noted below:

Signature

Chief, Tides Branch

Comm-DC 34330

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. F.E.No. 7, 1956

Records accompanying survey:

Boat sheets .....; sounding vols. ..1..; wire drag vols. .....;

bomb vols. .....; graphic recorder rolls .....;

special reports, etc. 1-Aluminum mounted sheet and 1-Envelope of records.....

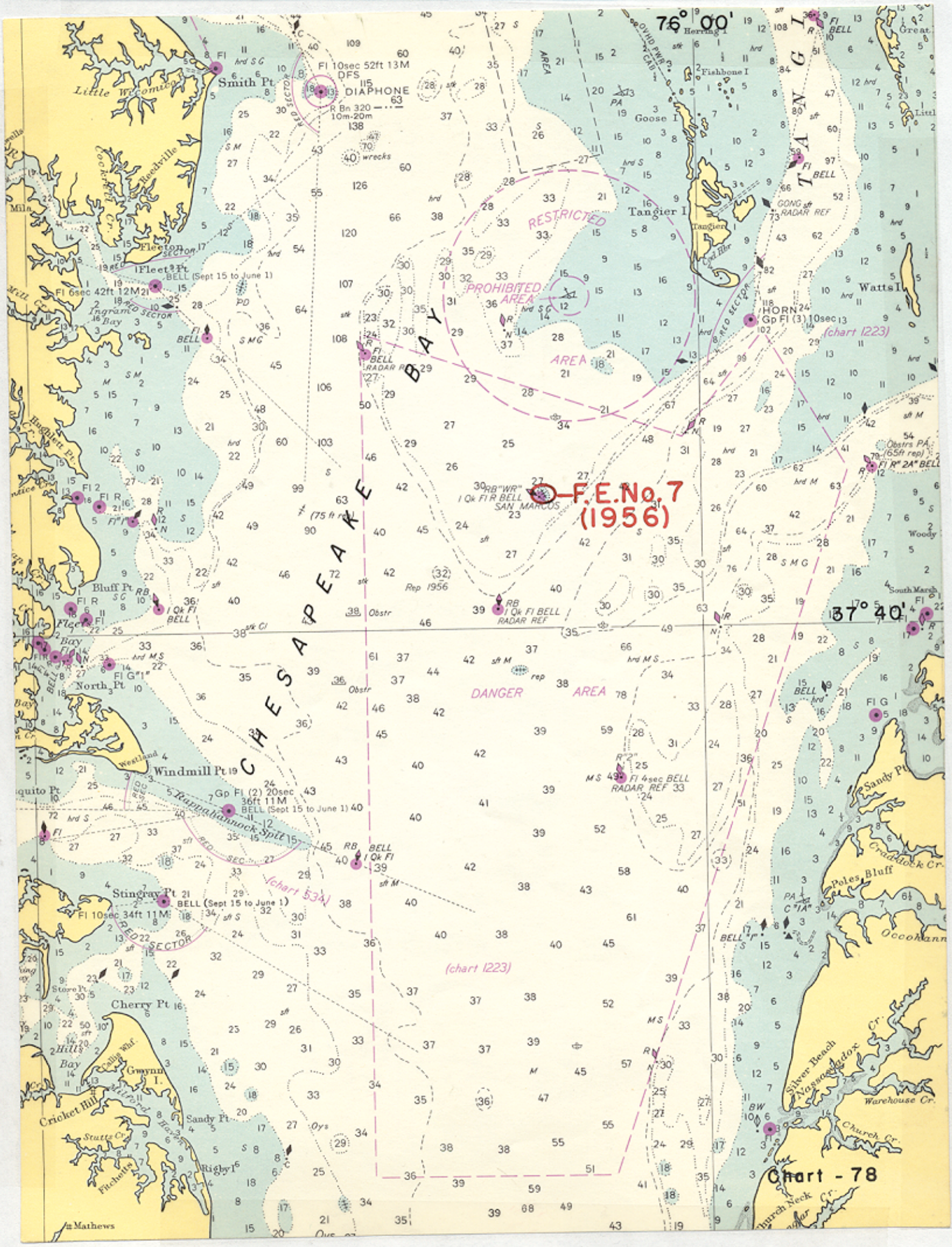
The following statistics will be submitted with the cartographer's report on the sheet:

| | | |
|---|---|---|
| Number of positions on sheet | | ..... |
| Number of positions checked | | ..... |
| Number of positions revised | | ..... |
| Number of soundings revised (refers to depth only) | | ..... |
| Number of soundings erroneously spaced | | ..... |
| Number of signals erroneously plotted or transferred | | ..... |
| Topographic details | Time | ..... |
| Junctions | Time | ..... |
| Verification of soundings from graphic record | Time | ..... |

Verification by.....Total time ..... Date .....

Reviewed by..... Time ..... Date .....

M-2232-1



76° 00'
37° 40'
F.E.No.7
(1956)
CHESAPEAKE BAY
RESTRICTED
PROHIBITED AREA
AREA
DANGER AREA
Smith Pt
Fl 10sec 52ft 13M
DFS
DIAPHONE
R Bn 320
10m-20m
Little Wicomico
Reedville
Fleeton
Fleet Pt
BELL (Sept 15 to June 1)
Fl 6sec 42ft 12M
Ingram Bay
Bluff Pt
Fleets Bay
North Pt
Windmill Pt
Gp Fl (2) 20sec
36ft 11M
BELL (Sept 15 to June 1)
Rappahannock Spit
Stingray Pt
BELL (Sept 15 to June 1)
Fl 10sec 34ft 11M
Cherry Pt
Hills Bay
Gwynn I.
Cricket Hill
Sandy Pt
Rigby I
Mathews
Tangier I
Goose I
Fishbone I
Herring I
Watts I
HORN
Gp Fl (3) 10sec
(chart 1223)
(chart 534)
(chart 1223)
Fl 4sec BELL
RADAR REF
Sandy Pt
Poles Bluff
Silver Beach
Nassawadox Cr.
Warehouse Cr.
Church Cr.
Church Neck
Chart - 78

# NAUTICAL CHARTS BRANCH

SURVEY NO. F.E. 7, 1956

## Record of Application to Charts

| DATE | CHART | CARTOGRAPHER | REMARKS |
|---|---|---|---|
| 12-12-56 | 1223 | M. Rogers | ~~Before~~ After Verification and Review ✓ |
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| 5/24/57 | 568 | M. Rogers | ~~Before~~ After Verification and Review ✓ |
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A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.