

MARK III PLOTTING BOARD

Instructions For Use and Problem Portfolio

AIR NAVIGATION BULLETIN

SUPPLEMENT NO. 7

OPNAV 33-NY-33

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MARK III PLOTTING BOARD

The Mark III Plotting Board is a device designed to serve a dual purpose: to represent a plotting sheet on which positions are located and to solve problems determining course, heading, wind direction and force, drift, interception, and similar factors necessary in aerial navigation.

The Mark III board can be worked with one hand and does away with plotting sheets, dividers, and rulers. A complete flight can be planned, logged, and charted with the assistance of no other navigational aid.

Attached to the lower right-hand corner is a Mark VIII Computer for solving speed-time-distance problems and for determining airspeed and altitude corrections.

Maps or charts designed specifically for use on the board are provided in the form of templates which, when attached, facilitate the location of positions.

The instrument consists of a transparent plastic plotting surface with a matte finish, which makes a suitable writing surface and also permits lines to be erased. A compass rose and a north-pointing arrow are inscribed on the under side of the plotting surface.

A grid disc fastened to a pivot (a grommet or snap fastener) rotates under the plotting surface. On this disc are printed a rectangular grid and a series of concentric circles. A speed-distance scale is printed on the two center lines. At the ends of these lines "true index" markers are printed. Either of the center lines may be used for finding direction and distance, but for convenience in explanation here "true index" will refer to the line showing direction and "cross index" to the line perpendicular to it.

By revolving the disc the grid lines may be oriented in any direction by means of the compass rose on the plotting surface. The disc has a low-speed scale on one side and a high-speed scale on the reverse. Either of these scales may be used, depending on the speed of the aircraft or the distance to be covered. A variation scale is provided to obtain magnetic headings, but its use is not recommended.

The Mark III board reproduces the standard vector diagram with the standard method of lettering and labeling. This is shown diagrammatically in the solution of the problems which follow. The dotted lines are drawn for illustration purposes only. *Do not draw them.* A lettered dot (such as "p," "e," or "s") suffices in actual operation. A circled dot is used to distinguish geographic positions from parts of the vector triangle. The time is entered with a geographic position to eliminate any possible confusion. *All work should remain on the board until a mission is completed.*

In the problems and illustrations which follow, unless otherwise stated, the values given are true for all courses, tracks, headings, etc.

DRIFT			TS	TAS	CAS	IAS
CH	MH	TH	DA			

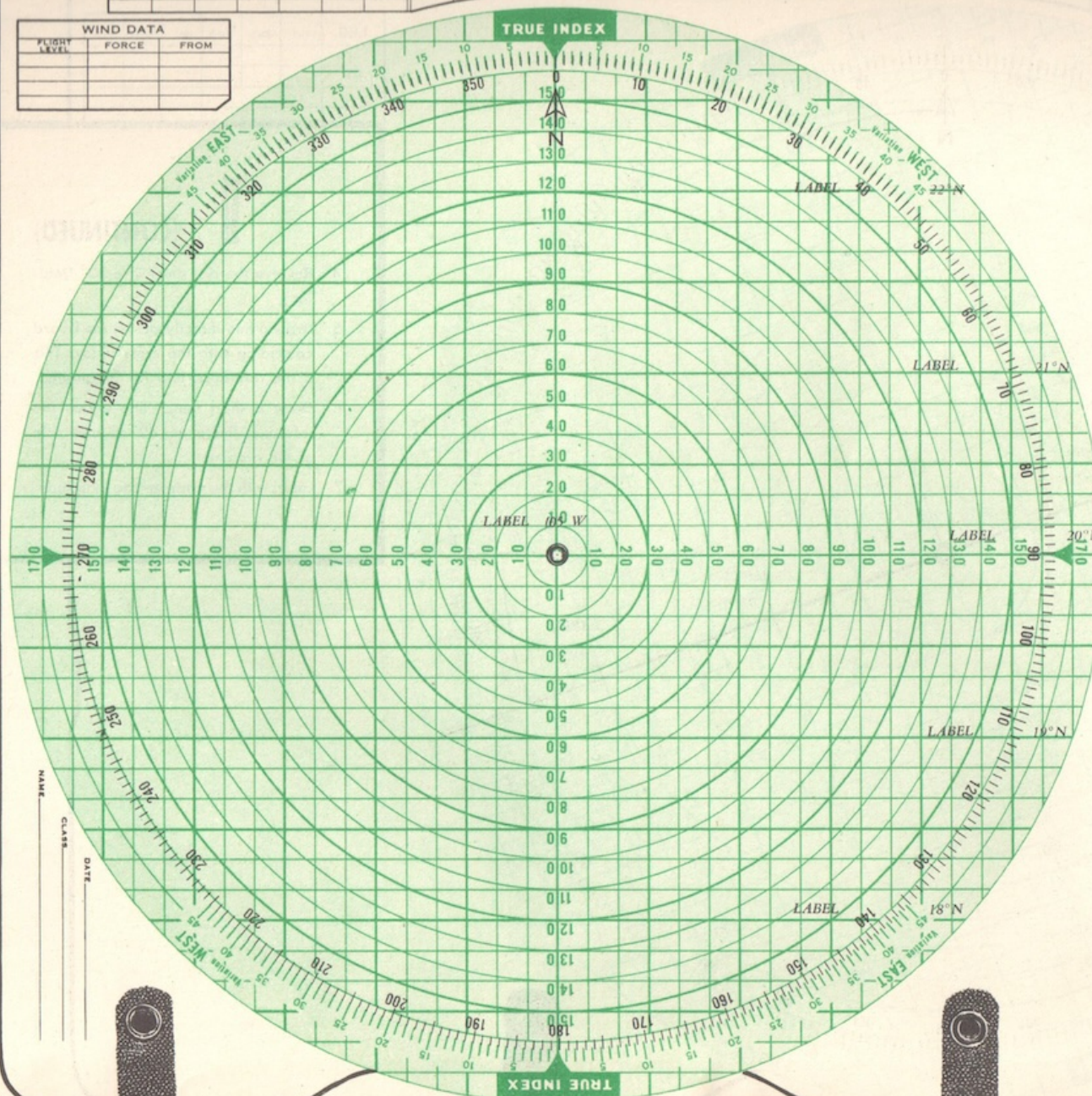
WIND STAR	TIME	DIR
FORCE		
TIME	DIR	
FORCE		

SHIP DATA	NAME	TIME	CUS	SPEED	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES
CUS	DRM	CH	GS	SRM	DIST	MIN	TYT	DIST	MIN	TYT
					2V			2V		
					2V			2V		
					2V			2V		
					2V			2V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						



1 HOW TO CONSTRUCT THE CHART

Given

Mid-latitude 20° N

Mid-longitude 05° W

Procedure

1. Set the true index directly under 0° or N.
2. Label the true index 05° W (Mid-long.).
3. Label the cross index 20° N (Mid-lat.) and every 60' above and below with appropriate latitude.

NAME _____

CLASS _____

DATE _____

DRIFT SIGHTS					
CH	MH	TH	DA	TAB	CAS

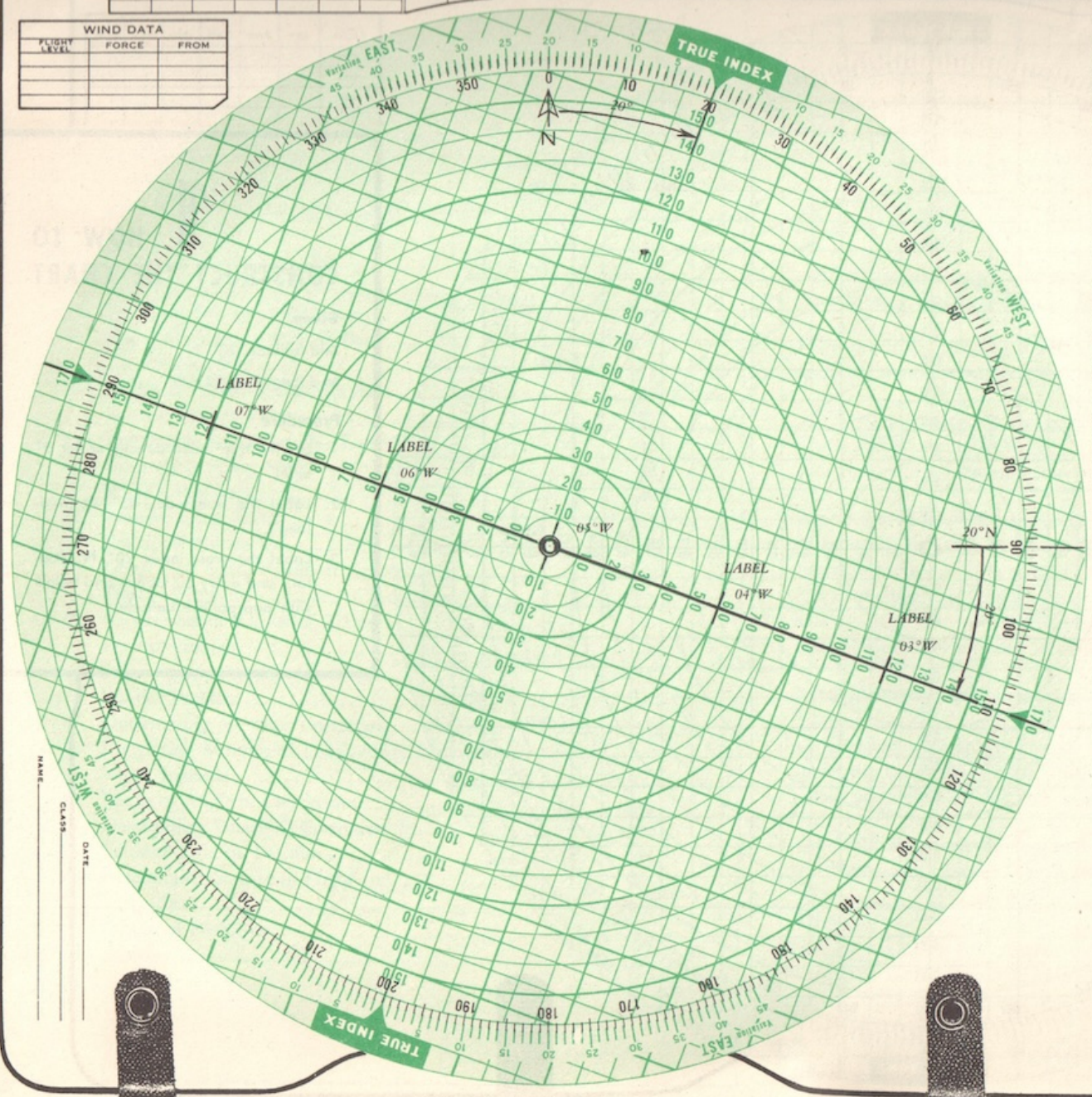
WIND STAR	
TIME	DIR
	FORCE
TIME	DIR
	FORCE

NAME	TIME	CUS	SPEED	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	CH	SS	SM	DIST	MIN	YTY	DIST	MIN	YTY	6V		
				3V						6V		
				2V						6V		
				4V						6V		
				2V						6V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1st	2nd	3rd	4th	5th	6th
CH						
MH						
VAR						
TH						



1 (CONTINUED)

4. Revolve the disc clockwise 20° (Mid-lat.).
5. Draw a line directly across the board coinciding with the cross index. This is the reference line for longitude.
6. Draw a short pencil line across the reference line every 60' on each side of the grommet.
7. Label with the appropriate longitude.

CH	MH	TH	DA	YAS	CAS	IAP

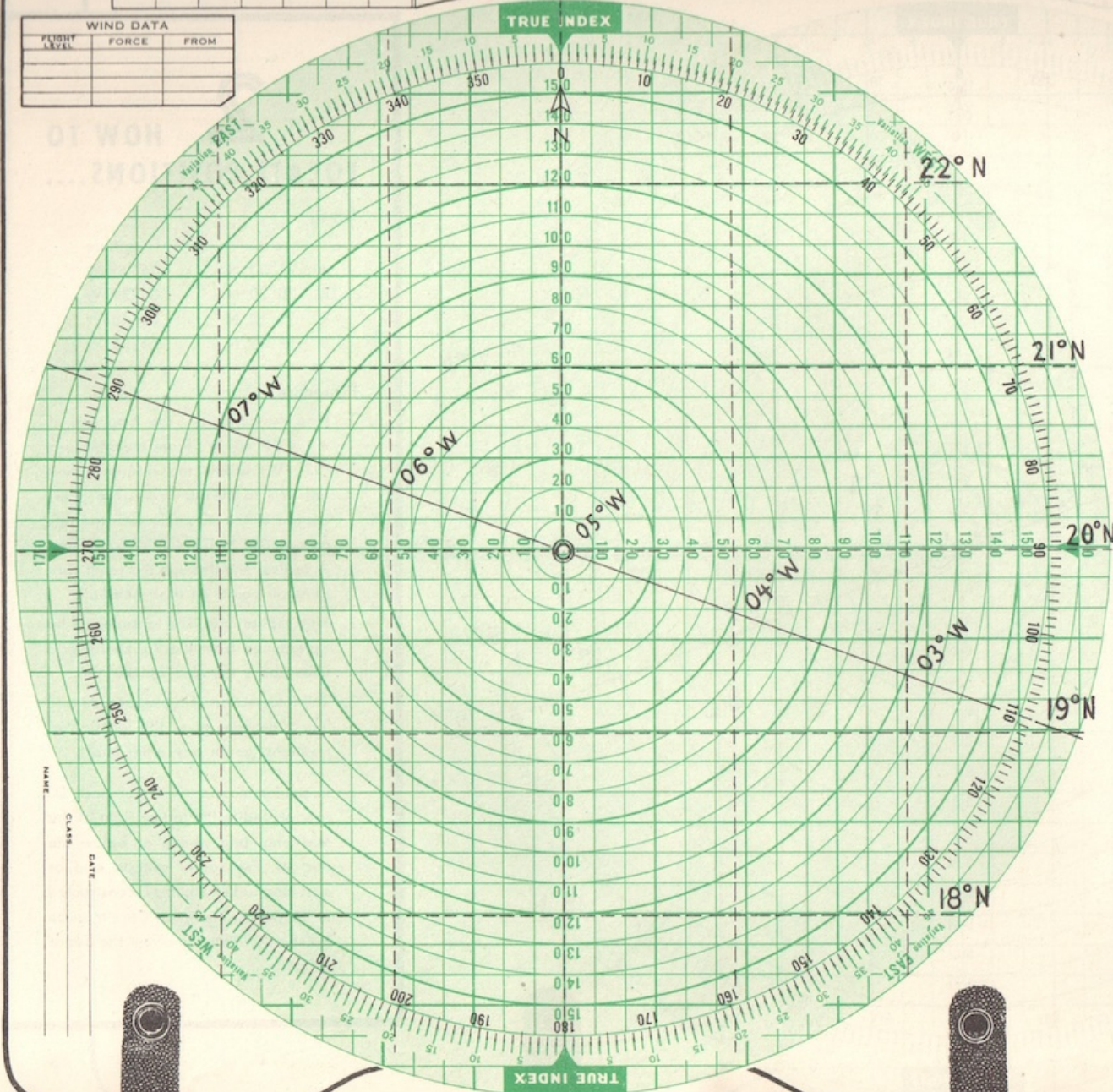
WIND STAR	TIME	DIR

SHIP DATA	NAME	TIME	CUB	SPEED	BEARSLAT	DIST. LONG	FROM

SQUARE SEARCH FOR VISIBILITY								MILES		
CUB	DRM	CH	SS	SRM	DIST.	MIN.	TYT	DIST.	MIN.	TYT
					2V			2V		
					2V			2V		
					2V			2V		
					2V			2V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						



1 (CONTINUED)

8. Reorient the disc to 0°.

The illustration shows the constructed chart, which is basically a mercator projection. The horizontal grid lines represent 10' of latitude, while the intersections of the circular grid lines with the reference line represent 10' of longitude. The dotted lines which are here shown are for illustration purposes only. Do not draw these lines on the board.

NAME _____

CLASS _____

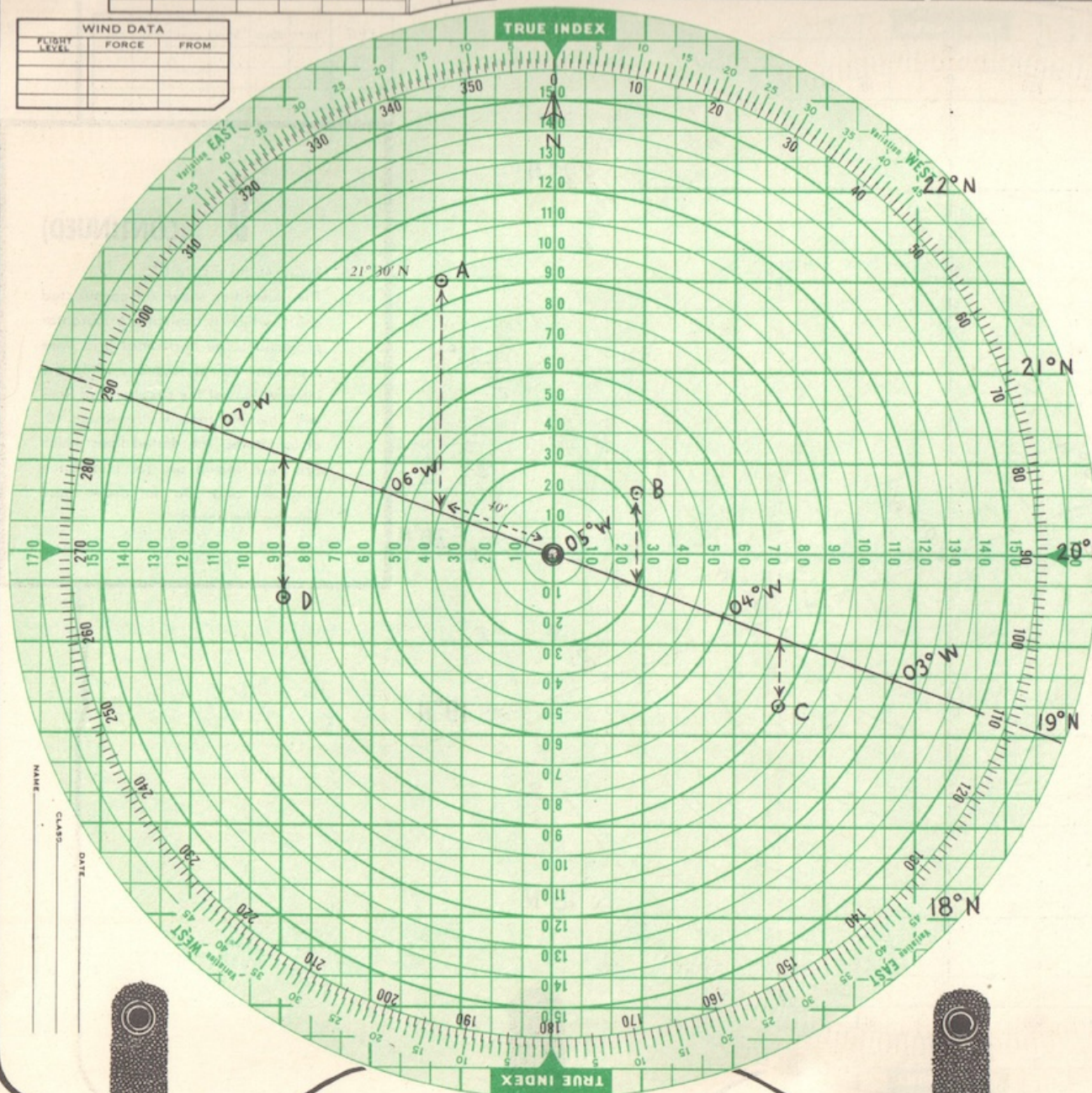
DATE _____

DRIFT SIGHTS						WIND STAR	
CH	MH	TH	DA	TAB	CAS	IAS	TIME DIR
							FORCE
							TIME DIR
							FORCE

SHIP DATA	NAME	TIME	CUS	SPEED	BEARSLAT	DIST LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	CH	SR	SRM	DIST	MIN	TYT	DIST	MIN	TYT			
				1V			1V					
				2V			2V					
				3V			3V					
				4V			4V					
				5V			5V					

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



2 HOW TO LOCATE POSITIONS....

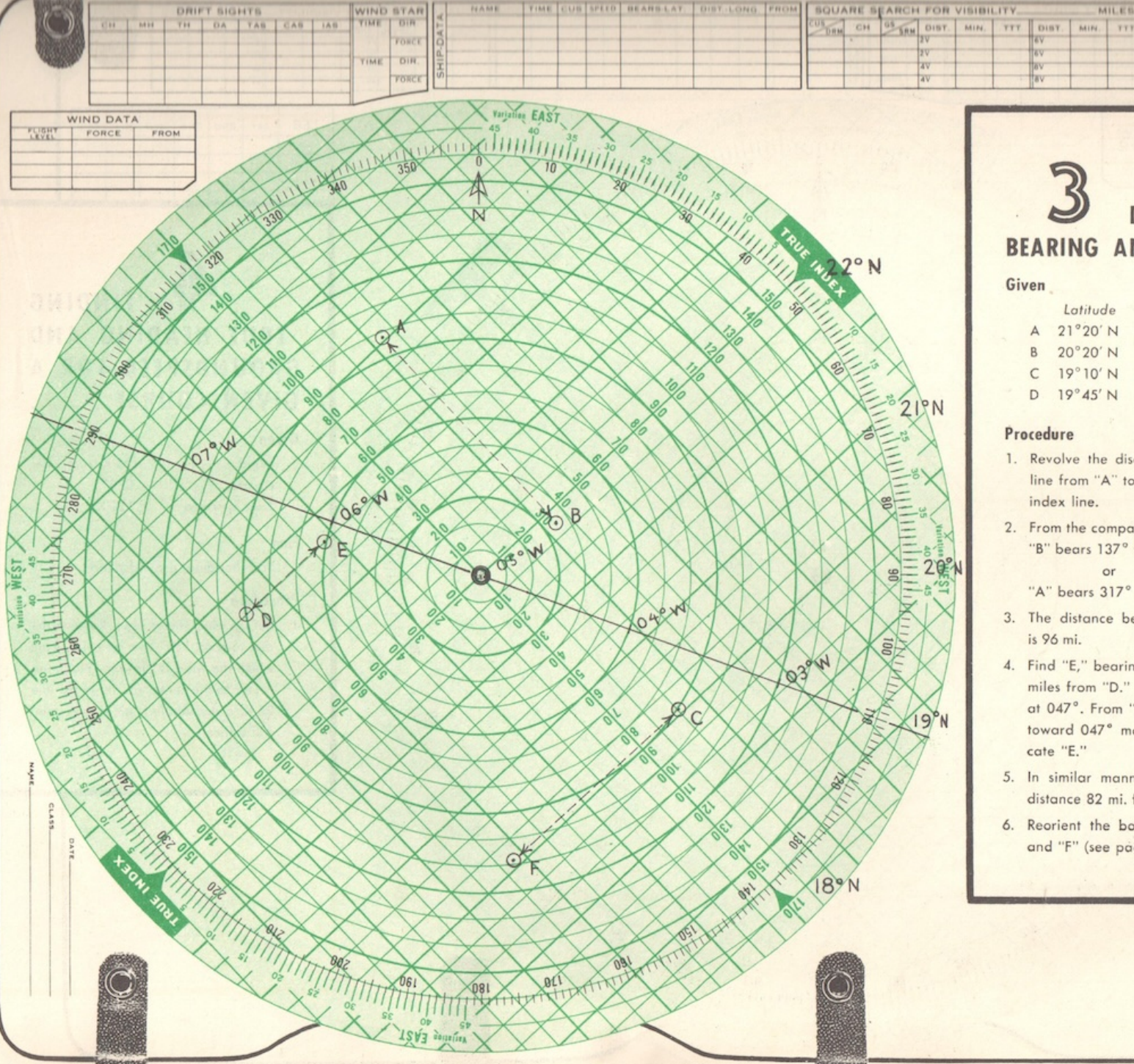
Given

	Latitude	Longitude
A	21°30' N	05°40' W
B	20°20' N	04°30' W
C	19°10' N	03°40' W
D	19°45' N	06°35' W

Procedure

1. Find the longitude. The longitude of "A" is 05°40' W. From the Mid-long. (05° W) follow the reference line left (W) to the 40 circle. The intersection of the 40 circle with the reference line is 05°40' W longitude. A vertical line through this point contains all points on that meridian.
2. Find the latitude. The latitude can be determined from the horizontal grid lines above the Mid-lat. (20° N).
3. The intersection of these latitude and longitude lines gives the location of positions, as on any other chart.

In similar manner "B," "C," and "D" are located to the left or right of the Mid-long. and above or below the Mid-lat. For south latitude and/or east longitude the chart is constructed in an identical manner. Care must be taken at all times to orient the board properly.



3 DETERMINING BEARING AND DISTANCE

Given

	Latitude	Longitude
A	21°20' N	05°40' W
B	20°20' N	04°30' W
C	19°10' N	03°40' W
D	19°45' N	06°35' W

Procedure

1. Revolve the disc until an imaginary line from "A" to "B" is parallel to an index line.
2. From the compass rose "B" bears 137° from "A"
or
"A" bears 317° from "B"
3. The distance between "A" and "B" is 96 mi.
4. Find "E," bearing 047°, distance 40 miles from "D." The true index is set at 047°. From "D" in a straight line toward 047° mark off 40 mi. to locate "E."
5. In similar manner "F" bears 227°, distance 82 mi. from "C."
6. Reorient the board and locate "E" and "F" (see page 6).

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	25	140

NAME _____
CLASS _____
DATE _____

DRIFT SIGHTS						
CH	MH	TH	DA	TAB	EAS	IAS

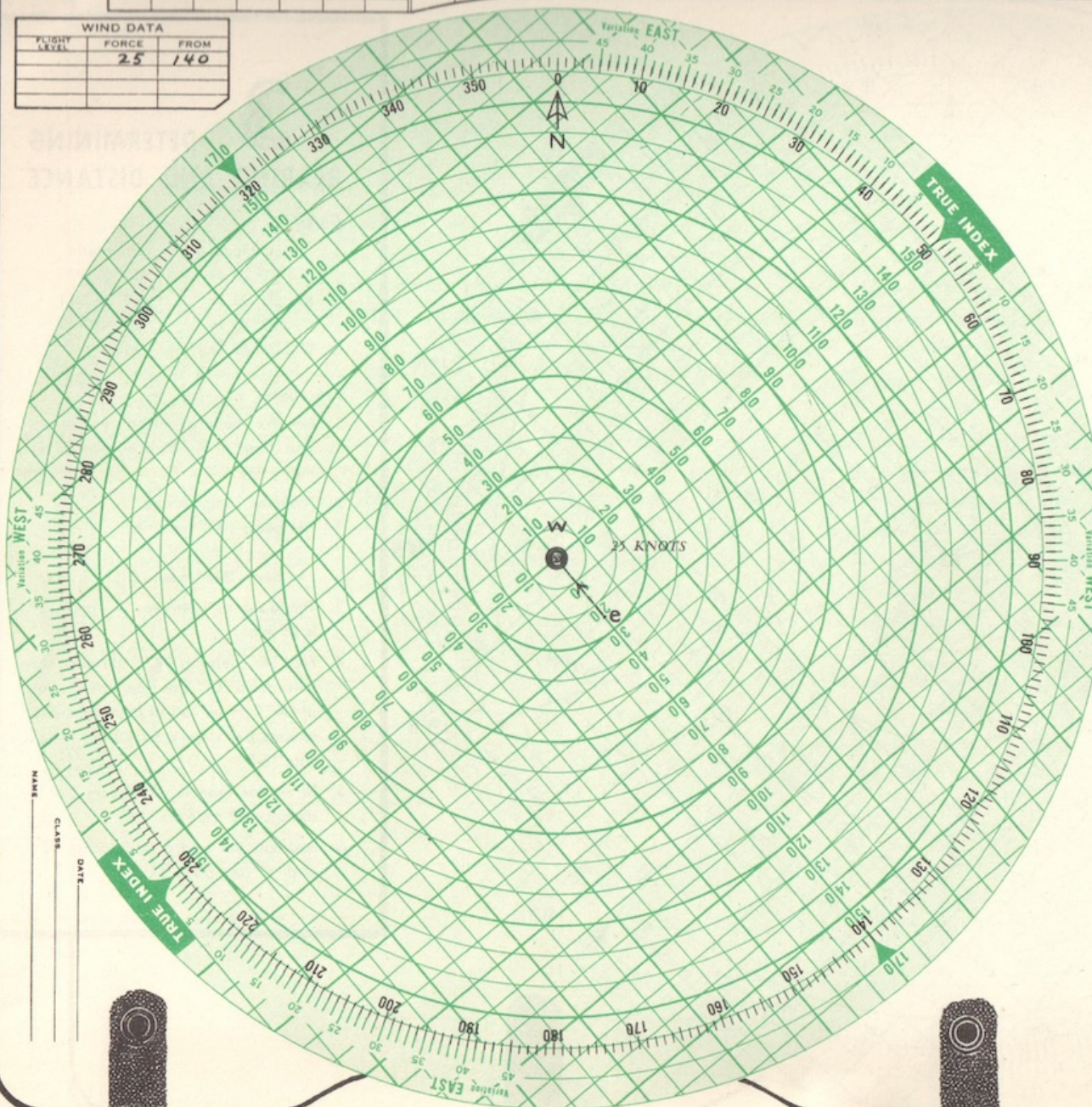
WIND STAR		
TIME	DIR	FORCE

SHEETS

NAME	TIME	CUB	SPEED	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUB	DRH	CH	SS	SRH	DIST	MIN.	TTT	DIST	MIN.	TTT		
					TV			SV				
					TV			SV				
					4V			SV				
					4V			SV				

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						



4 FINDING TRUE HEADING AND GROUNDSPED FOR A GIVEN COURSE

Given

Wind 25 K from 140°
Course 020°
True airspeed 120 K

Find

True heading; groundspeed

Procedure

1. Set up wind vector (ew). Revolve the disc to read 140°, the direction from which the wind is blowing. Plot wind vector to the center on the index line 25 K (a dot labeled "e" at that point will suffice).

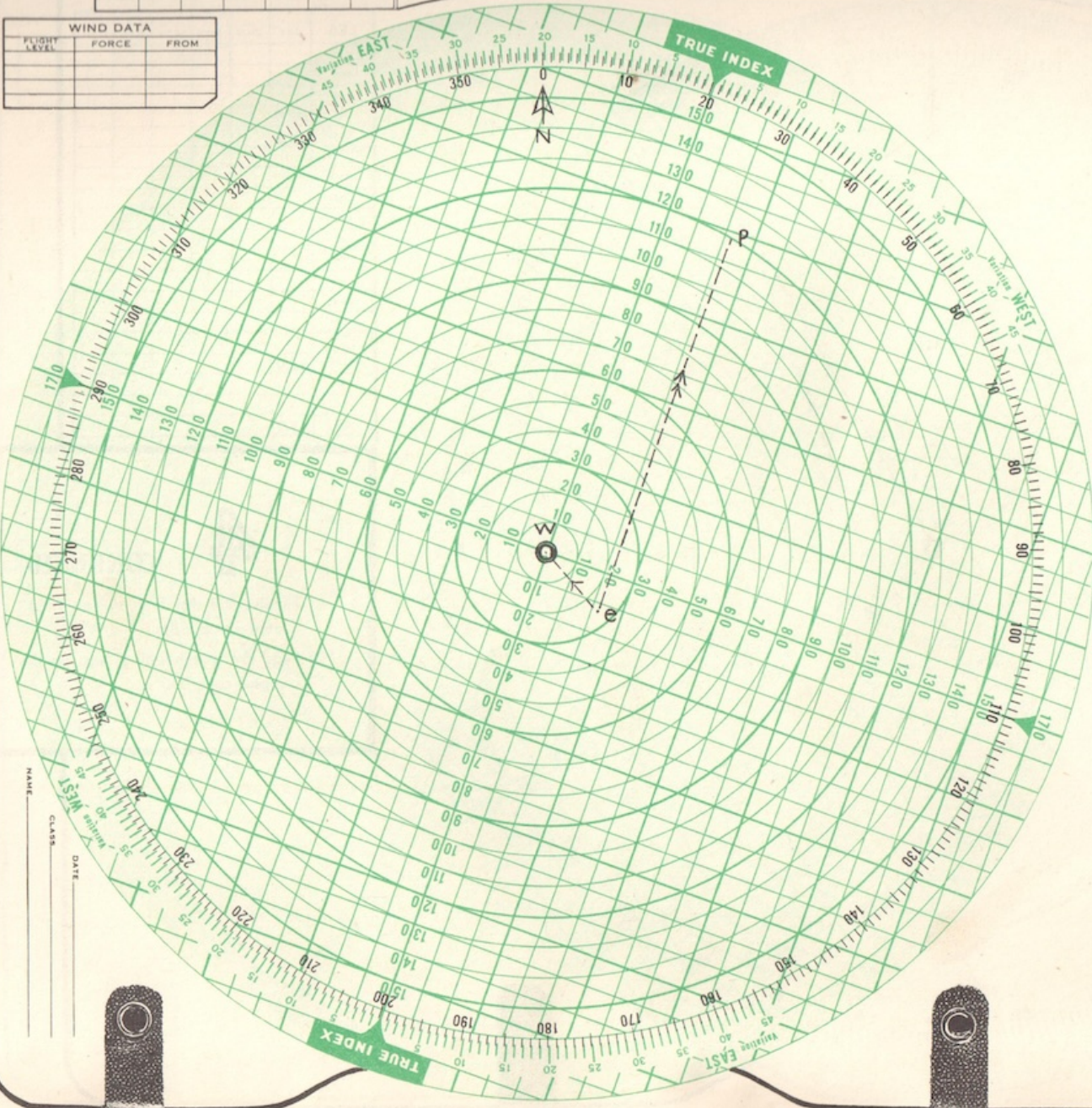
DRIFT SIGHTS						
CH	MH	TH	DA	TAS	CAS	IAS

WIND STAR	
TIME	DIR
TIME	DIR

SHIP DATA	NAME	TIME	CUS	SFS	BEAR	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES
CUS	DRM	CH	GS	SRM	DIST	MIN	TTT	DIST	MIN	TTT
					2V			2V		
					2V			2V		
					4V			4V		
					4V			4V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						
TAS	120					
PRESS ALT						
TEMP						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	020					
TR						
PGS						
GS	130					

4 (CONTINUED)

- Set the course. Revolve the disc until the true index reads 020°, the course. From the point "e" follow the rectangular grid lines parallel to the true index to the intersection with the 120 K TAS circle. Label this point "p."
- Find the groundspeed by determining the distance "ep" on the rectangular grid (130 K).

NAME _____
CLASS _____
DATE _____

DRIFT SIGHTS						
CH	MH	TH	DA	TAS	CAS	IAS

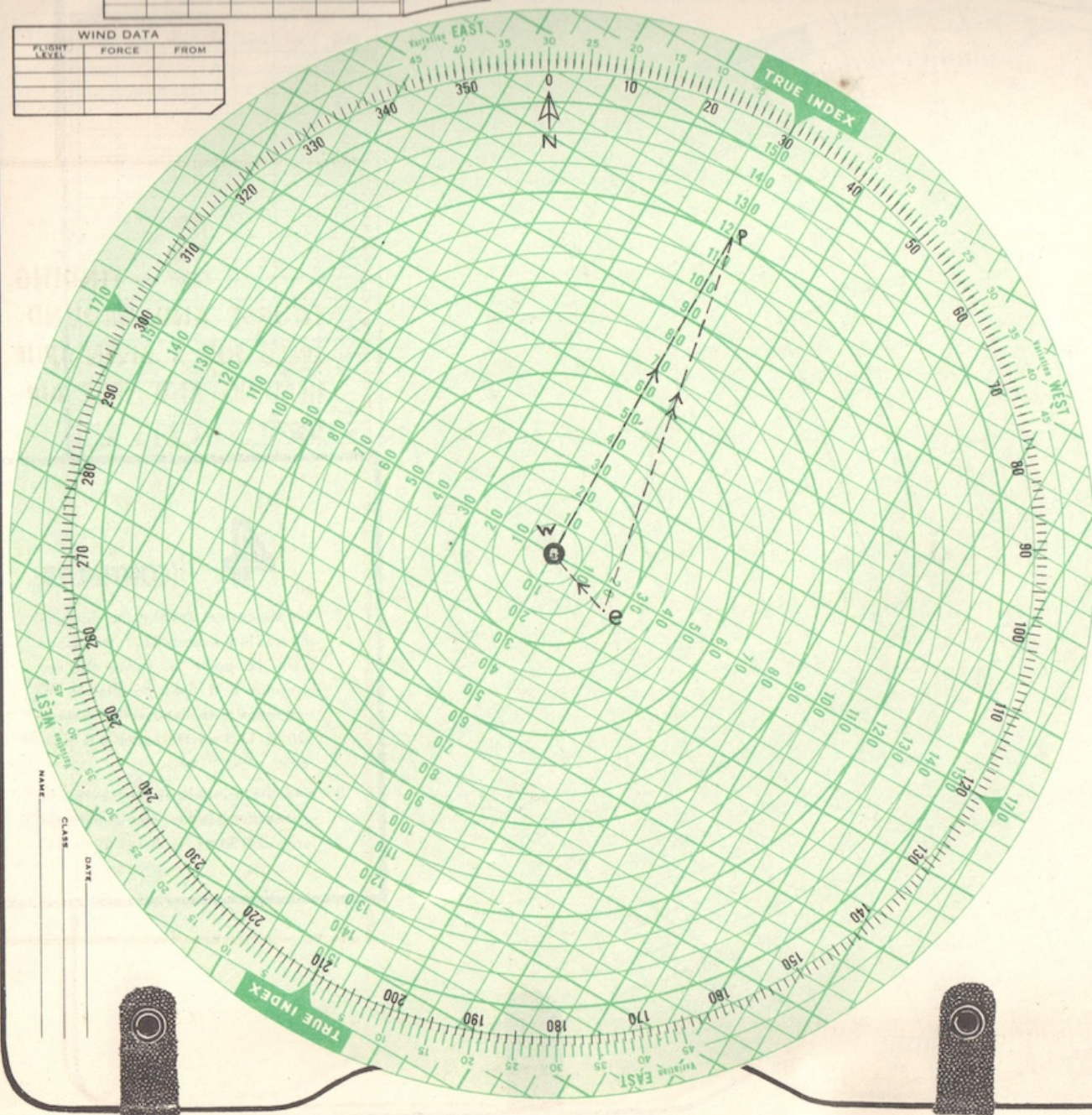
WIND STAR	
TIME	DIR
	FORCE
TIME	DIR
	FORCE

NAME	TIME	CUS	SPEED	BEARS	LAT	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	DRM	CH	GS	SRM	DIST	MIN	TTT	DIST	MIN	TTT		
					EV			EV				
					EV			EV				
					EV			EV				
					EV			EV				

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

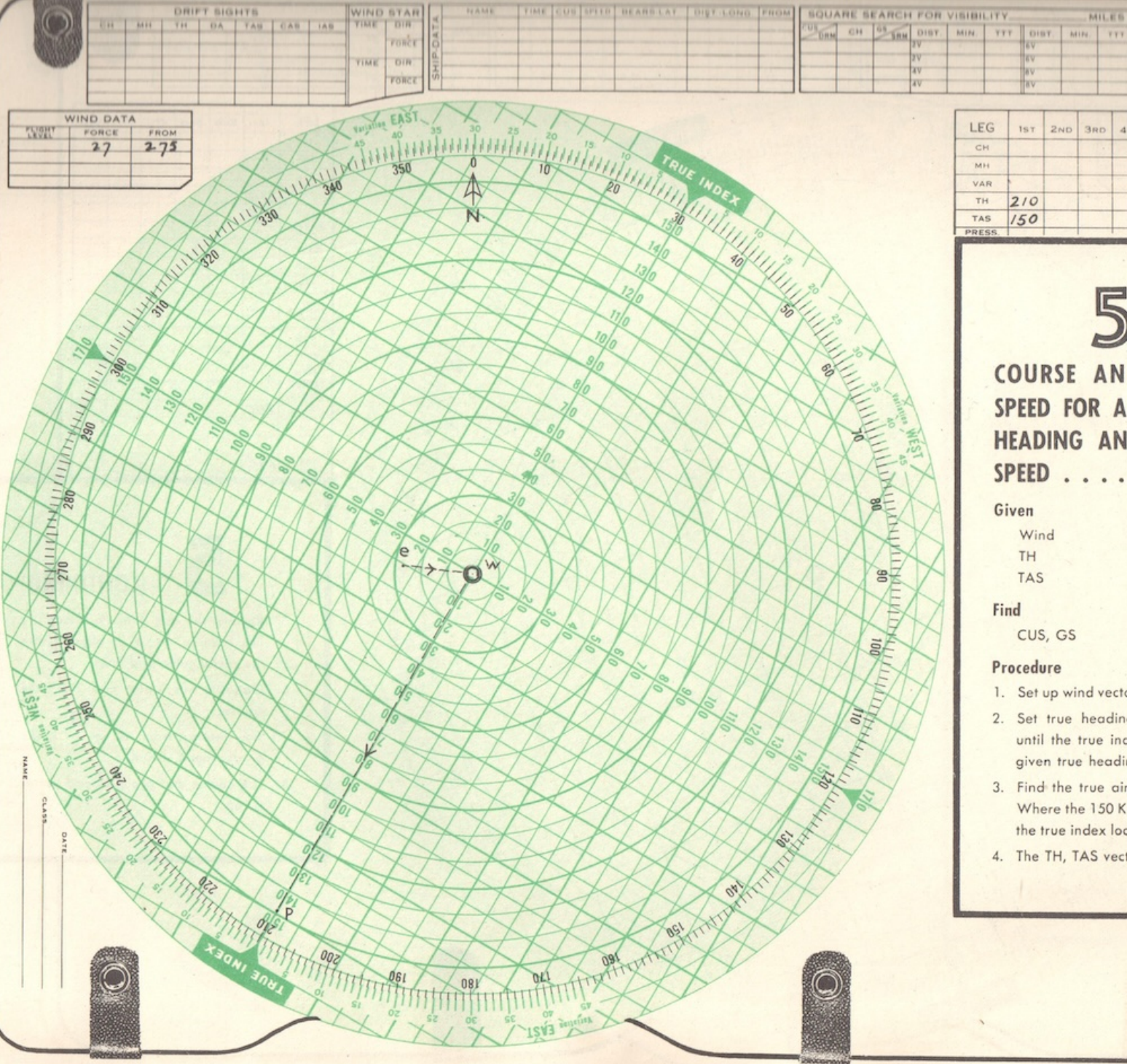
LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	030					
TAS	120					
PRESS ALT						
TEMP						
CAS						
IAS						
MI SAMPLE MIN						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	020					
TR						
PGS						
GS	130					



4

(CONTINUED)

- Revolve the disc until the point "p" is on the true index.
- Read the true heading (wp) on the compass rose, 030°.



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	210					
TAS	150					
PRESS						

5 FINDING COURSE AND GROUND-SPEED FOR A GIVEN TRUE HEADING AND TRUE AIR-SPEED

Given
 Wind 27 K from 275°
 TH 210°
 TAS 150 K

Find
 CUS, GS

- Procedure**
1. Set up wind vector (ew) as on page 8.
 2. Set true heading. Revolve the disc until the true index reads 210°, the given true heading.
 3. Find the true airspeed circle 150 K. Where the 150 K TAS circle intersects the true index locate the point "p."
 4. The TH, TAS vector is "wp."

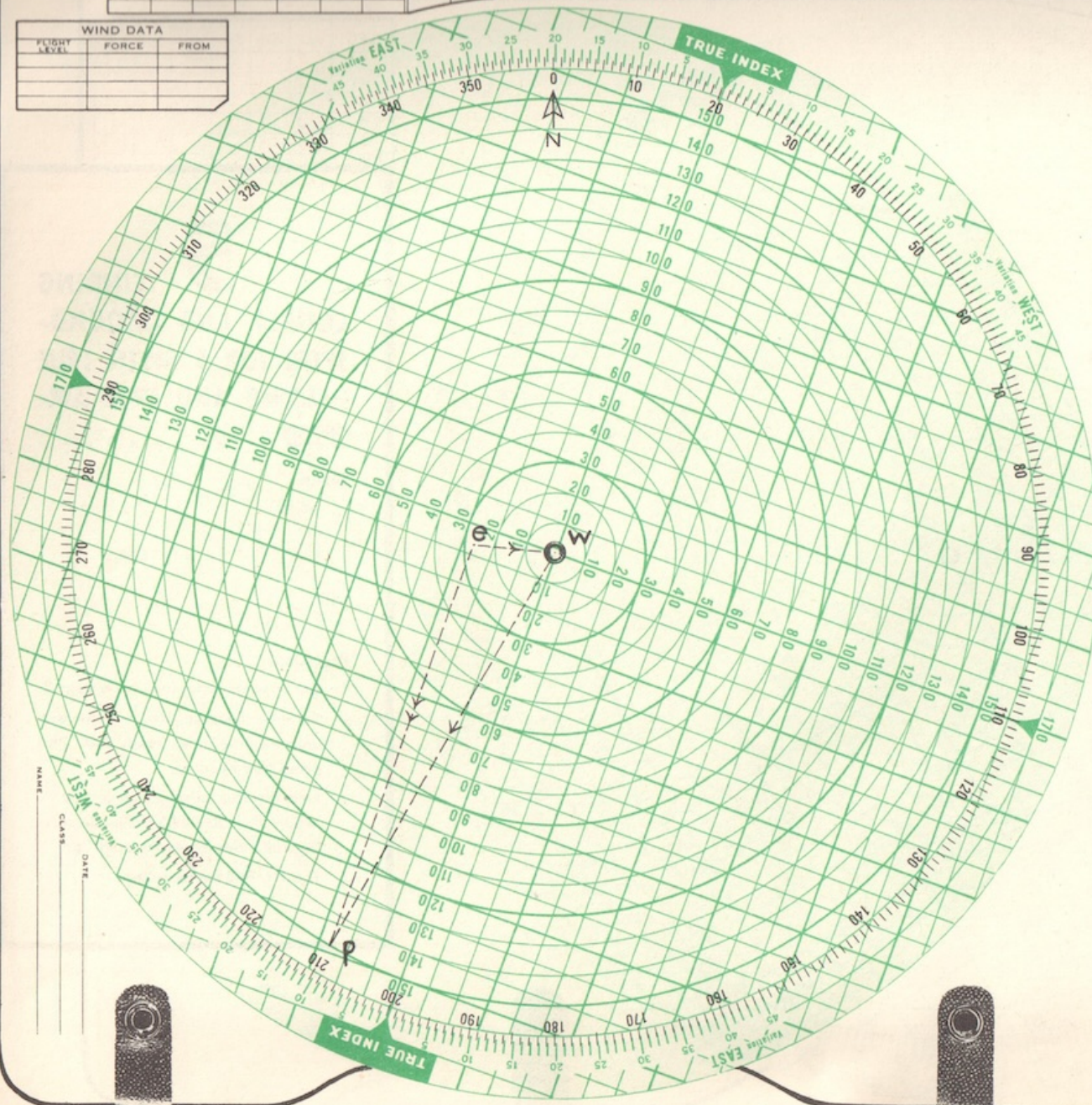
DRIFT SIGHTS						
CH	MH	TH	DA	TAS	CAS	IAS

WIND STAR		
TIME	DIR	FORCE

NAME	TIME	CUS	SPEED	BEARS/LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY									
CUS	CH	SS	SRM	DIST	MIN	TTT	DIST	MIN	TTT
				TV			TV		
				TV			TV		
				TV			TV		
				TV			TV		
				TV			TV		
				TV			TV		
				TV			TV		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	210					
TAS	150					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	200					
TR						
PGS						
GS	140					

5 (CONTINUED)

5. Revolve the disc until an imaginary line from "e" to "p" is aligned with the rectangular grid lines.
6. Opposite true index read 200°, the course.
7. The distance from "e" to "p" is the groundspeed, 140 K.
8. The course and groundspeed vector is "ep."

DRIFT SIGHTS					
CH	MH	TH	DA	TAS	CAS

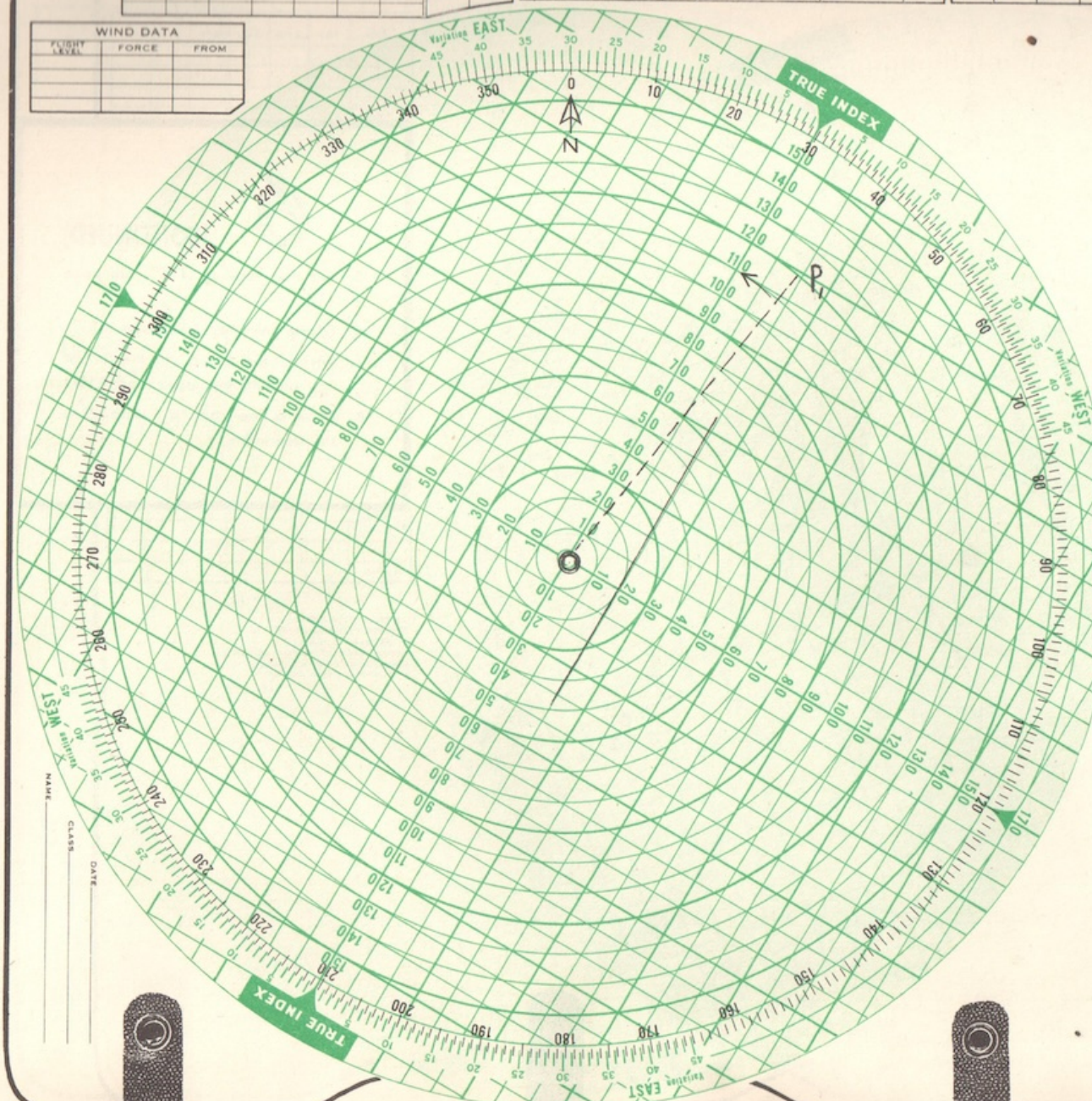
WIND STAR	
TIME	DIR

NAME	TIME	CUS	SPD	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES
CUS	DRM	CH	GS	SRM	DIST	MIN.	TYT	DIST	MIN.	TYT
					2V			6V		
					2V			6V		
					4V			8V		
					4V			8V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						
TAS	120					
PRESS						



6 HOW TO FIND WIND FROM DRIFT MEASUREMENTS

Given

TAS	120 K
True	
Heading	Drift
038°	8° L
116°	6° L
167°	3° R

Find

Wind

- Procedure**
1. Set the true heading, (wp₁) 038° (see page 11).
 2. With TAS 120 K, locate point "p₁" (see page 11).
 3. Revolve the disc in the direction of drift 8° to the left of "p₁" until the true index reads 030°.
 4. Draw a line from "p₁," parallel to the true index.

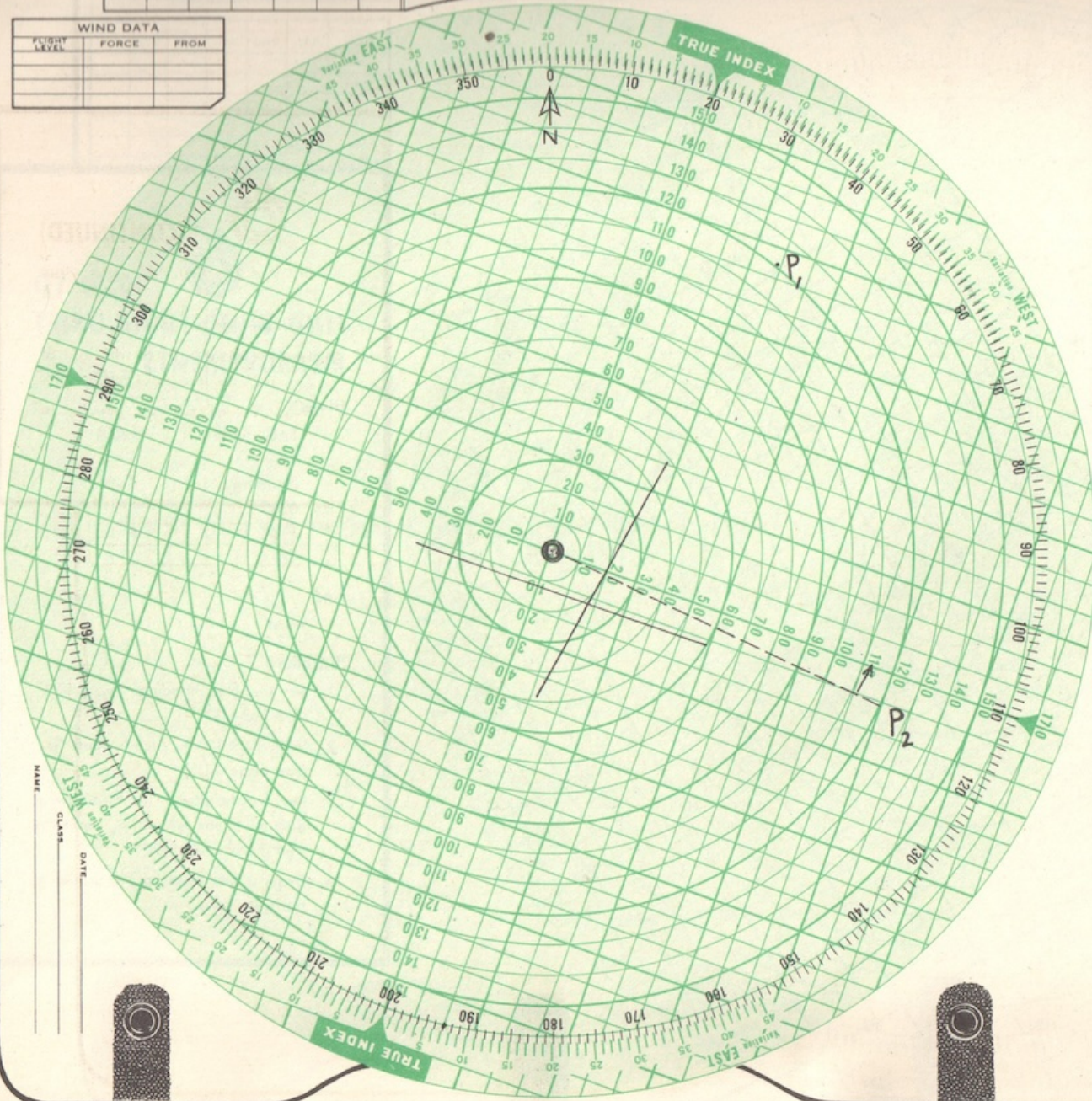
DRIFT SIGHTS						WIND STAR	
CH	MH	TH	DA	YAS	CAS	IAS	TIME
		038	84	120			DIR
		176	64	120			FORCE
							TIME
							DIR
							FORCE

NAME	TIME	CUS	SPEED	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	DRM	CH	SS	SRM	DIST	MIN.	TTT	DIST	MIN.	TTT		
					2V			6V				
					3V			6V				
					4V			6V				
					4V			6V				

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						



6 (CONTINUED)

- Set true heading, 116° (see page 11).
- Locate point "p₂" (see page 11).
- Revolve the disc 6° to the left of "p₂" until the true index reads 110°.
- Draw a line from "p₂" parallel to the true index.

TIME	ETA	ETI	LAT.	LONG.

SHEET, PLOTTING, FOR
TRAINING PLOTTING BOARD
BU. AERO. U. S. NAVY
STOCK NO. 888-5-425 CONTRACT NO. N00H3264
MANUFACTURER'S PART NO. FKA-35
G. FELSENTHAL & SONS, CHICAGO

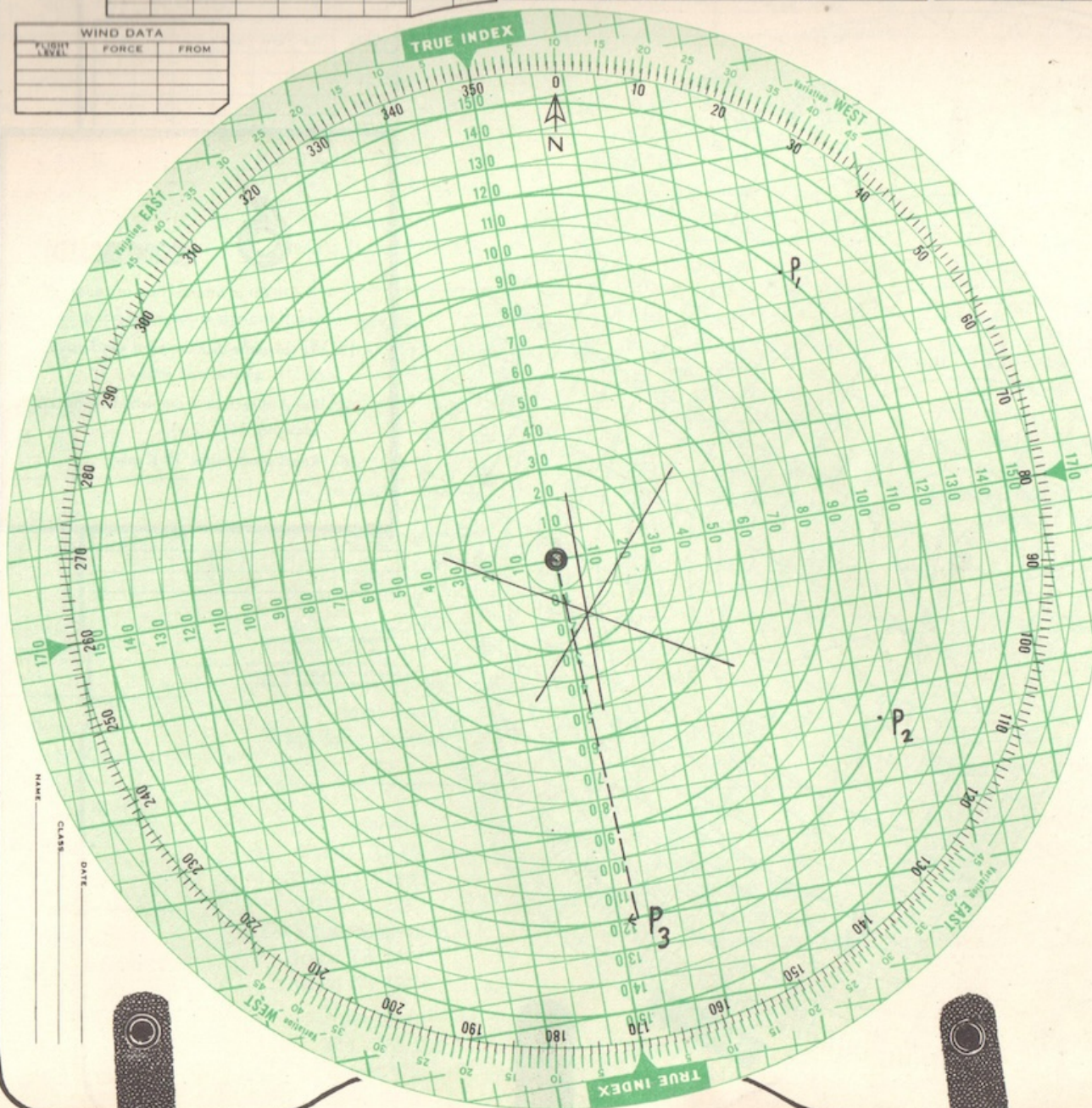
DRIFT				WIND STAR			
CH	MH	TH	ITS	CAS	IAS	TIME	DIR
		038	84	130			FORCE
		116	86	120			TIME DIR
		167	3R	120			FORCE

NAME	TIME	CUS	SPD	BEARD	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES
CUS	DRM	CH	SS	SRM	DIST	MIN.	TTT	DIST	MIN.	TTT
					1V			1V		
					2V			2V		
					3V			3V		
					4V			4V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						



6 (CONTINUED)

- Set true heading, 167° (see page 11).
- Locate point "p₃" (see page 11).
- Revolve the disc 3° to the right of "p₃" until the true index reads 170°.
- Draw a line from "p₃" parallel to the true index.

VIA	ETI				
LAT.					
LONG.					

SHEET, PLOTTING, FOR
TRAINING PLOTTING BOARD
DU. AERO. U. S. NAVY
STOCK NO. 888-5-625 CONTRACT NO. N0003284
MANUFACTURER'S PART NO. FRA-35
G. FELSENTHAL & SONS, CHICAGO

NAME _____
CLASS _____
DATE _____

DRIFT SIGHTS					
CH	MH	YH	DA	YAB	CAB
028	84	130			
116	64	130			
167	34	130			

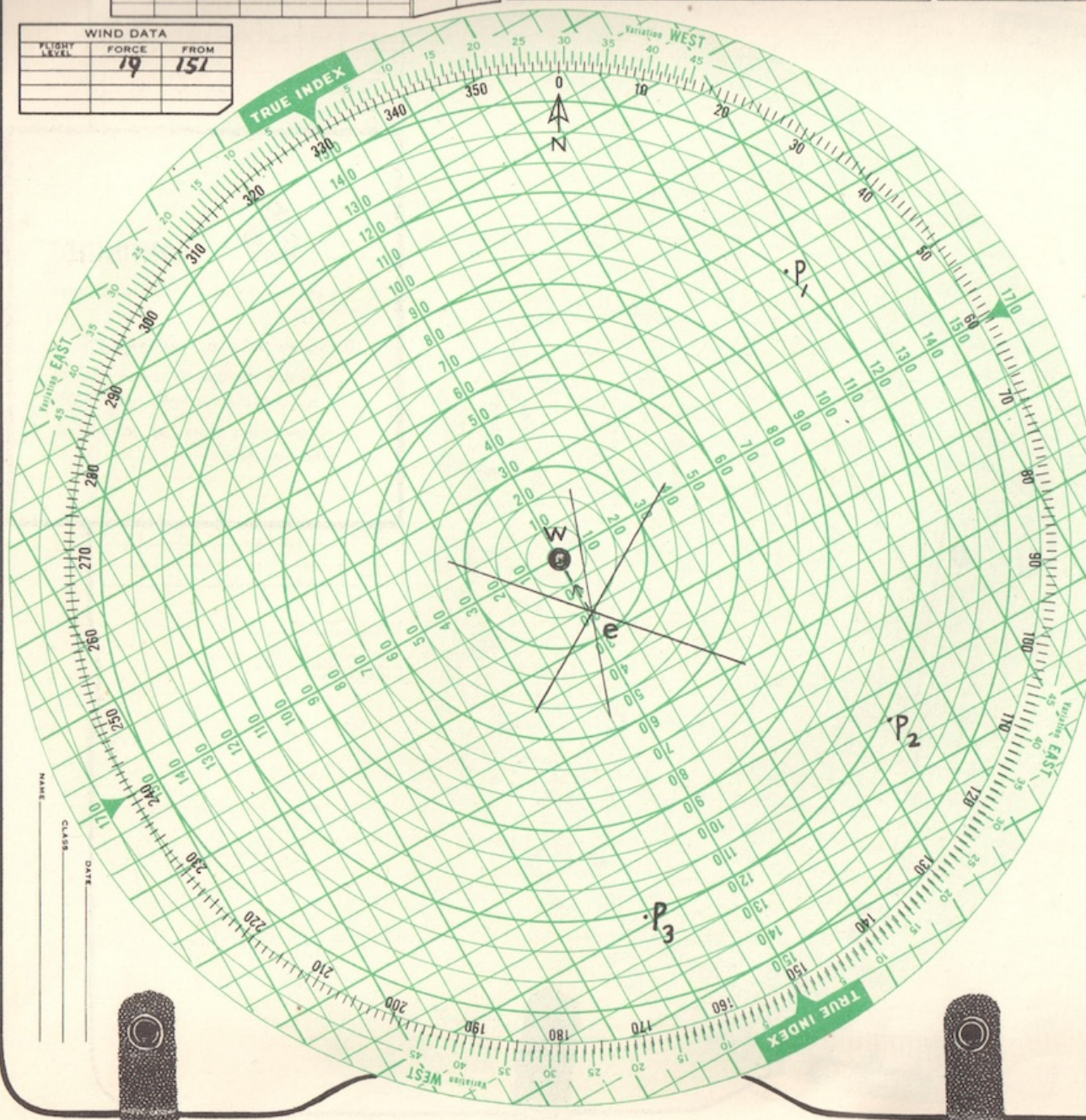
WIND STAR	
TIME	DIR
	151
TIME	DIR
FORCE	

NAME	TIME	CUS	SPEED	BEAR	LAT	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES
CUS	CH	SRM	DIST.	MIN.	TTT	DIST.	MIN.	TTT		
			2V			2V				
			2V			2V				
			2V			2V				
			2V			2V				
			2V			2V				

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	19	151

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						



6

(CONTINUED)

The point of intersection or center of small triangle is the wind point, "e."

- Revolve the disc until the wind point, "e," is on the true index.
- Read direction from which wind is blowing, 151° (ew).
- Read wind force, 19 K (ew).

ETA	ETI				
LAT.					
LONG.					

SHEET, PLOTTING, FOR
TRAINING PLOTTING BOARD
BU. AERO. U. S. NAVY
STOCK NO. 888-S-425, CONTRACT NO. N0003264
MANUFACTURER'S PART NO. FPA-35
G. FELSENTHAL & SONS, CHICAGO

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

1. GIVEN
Wind 25 K from 261°
CUS 142°
TAS 120 K
REQUIRED
TH, GS, DA

2. GIVEN
Wind 32 K from 040°
CUS 276°
TAS 135 K
REQUIRED
TH, GS, DA

3. GIVEN
Wind 18 K from 145°
CUS 122°
GS 102 K
REQUIRED
TH, TAS

4. GIVEN
Wind 24 K from 058°
CUS 116°
GS 113 K
REQUIRED
TH, DA

5. GIVEN
Wind 24 K from 217°
TH 153°
TAS 117 K
REQUIRED
CUS, GS, DA

6. GIVEN
Wind From 082°
TH 213°
TAS 126 K
DA 9° R
REQUIRED
Wind force, CUS, GS

7. GIVEN
TH 313°
TAS 138 K
CUS 305°
GS 117 K
REQUIRED
Wind force, direction

8. GIVEN
TH 020°
TAS 113 K
GS 92 K
DA 10° L
REQUIRED
Wind force, direction, CUS

9. GIVEN
Wind 24 K from 114°
TAS 106 K
CUS 221°
On actual observation
Actual TR 227°
Actual GS 102 K
REQUIRED
TH, GS, DA
Actual Wind

10. GIVEN
Wind 18 K from 012°
CUS 329°
TAS 125 K
REQUIRED
TH, GS, DA

11. GIVEN
Wind 31 K from 318°
CUS 324°
GS 112 K
REQUIRED
TH, TAS, DA

12. GIVEN
TH 036°
TAS 124 K
DA 14° L
TH 147°
TAS 132 K
DA 16° R
TH 237°
TAS 140 K
DA 5° R
REQUIRED
Wind

13. GIVEN
Mid-lat. 28°30' N
Mid-long. 84°00' W
Position of USS MISSISSIPPI
at 0700: 29°00' N Lat.
84°30' W Long.
Tampa, Fla.:
27°36' N Lat.
82°46' W Long.
Cape St. George:
29°35' N Lat.
85°03' W Long.

REQUIRED
Bearing and distance
from USS MISSIS-
SIPPI to Tampa
Bearing and distance
from USS MISSIS-
SIPPI to Cape St.
George

14. GIVEN
Mid-lat. 10°00' S
Mid-long. 160°00' E
Location of Guadalcanal:
09°25' S Lat.
160°05' E Long.
Location of Malaita Island:
08°47' S Lat.
160°43' E Long.
Position of USS McFARLAND:
10°21' S Lat.
161°34' E Long.
Position of enemy reported at:
09°10' S Lat.
159°22' E Long.

REQUIRED
Bearing and distance from
pilot to:
(a) Guadalcanal, (b) Malaita
Island, (c) enemy squadron.

15. GIVEN
P.A. 5,900 feet
T -20°
Var. 10° E
CH IAS Drift
319° 114 K 10° L
023° 114 K 5° L
077° 114 K 5° R

REQUIRED
Wind

16. GIVEN
P.A. 10,000 feet
T 0°
Var. 11° E
CH IAS Drift
021° 110 K 10° L
150° 110 K 4° R
313° 110 K 0

REQUIRED
Wind

17. GIVEN
P.A. 4,000 feet
T -5°
Var. 2° W
CH IAS Drift
159° 122 K 9.5° R
241° 122 K 9° R
327° 122 K 5° L

REQUIRED
Wind

18. GIVEN
P.A. 5,000 feet
T -10°
Var. 11° W
CH IAS Drift
347° 130 K 14° L
284° 130 K 11° L
050° 130 K 0

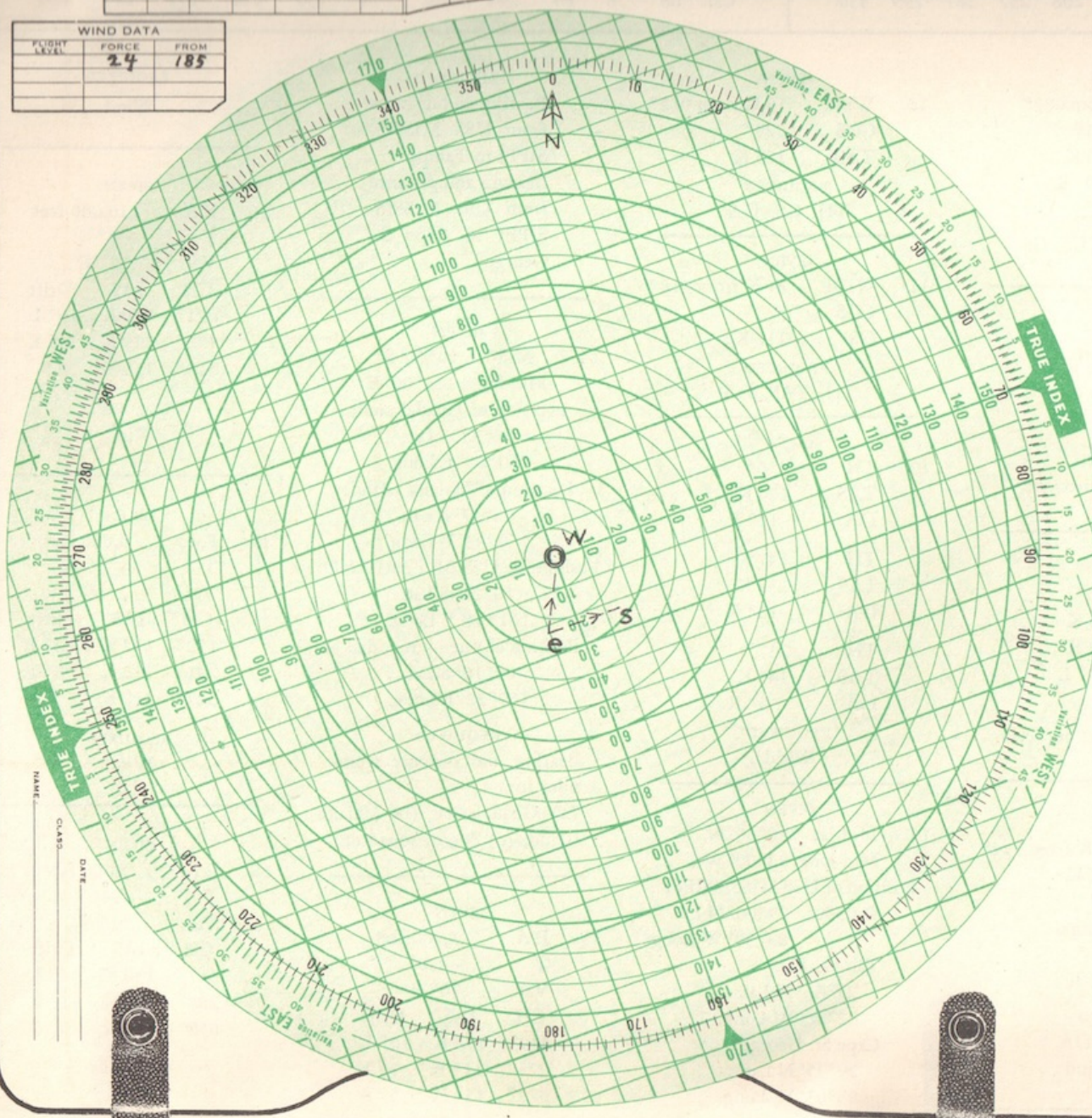
REQUIRED
Wind

DRIFT SIGHTS				WIND STAR			
CH	MH	TH	DA	TAS	CAS	TAS	TIME
							DIR
							FORCE
							TIME
							DIR
							FORCE

NAME	TIME	CUS	SPEED	BEAR-LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	CH	GS	SRM	DIST	MIN	TTT	DIST	MIN	TTT			
				2V			2V					
				3V			3V					
				4V			4V					
				5V			5V					

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	24	185



7 SIMPLE INTERCEPTION OF SHIP

Given

Wind 24 K from 185°
 Ship's Course 070°
 Ship's Speed 25 K
 TAS 130 K
 Bearing to ship, DRM
 (direction of relative movement, sp) 220°
 MRM (miles of relative movement) 150 nm

Find

TH (wp)
 SRM (speed of relative movement, sp)
 CUS (ep)
 GS (ep)
 Time to interception

Procedure

1. Set up wind vector (ew) as on page 8.
2. Set up ship vector (es). Set the ship's course, 070°, opposite true index. Locate the point "s" 25 K from point "e" parallel to the true index along the ship's course, 070°.

DRIFT SIGHTS					
CH	MH	TH	DA	TAS	CAS

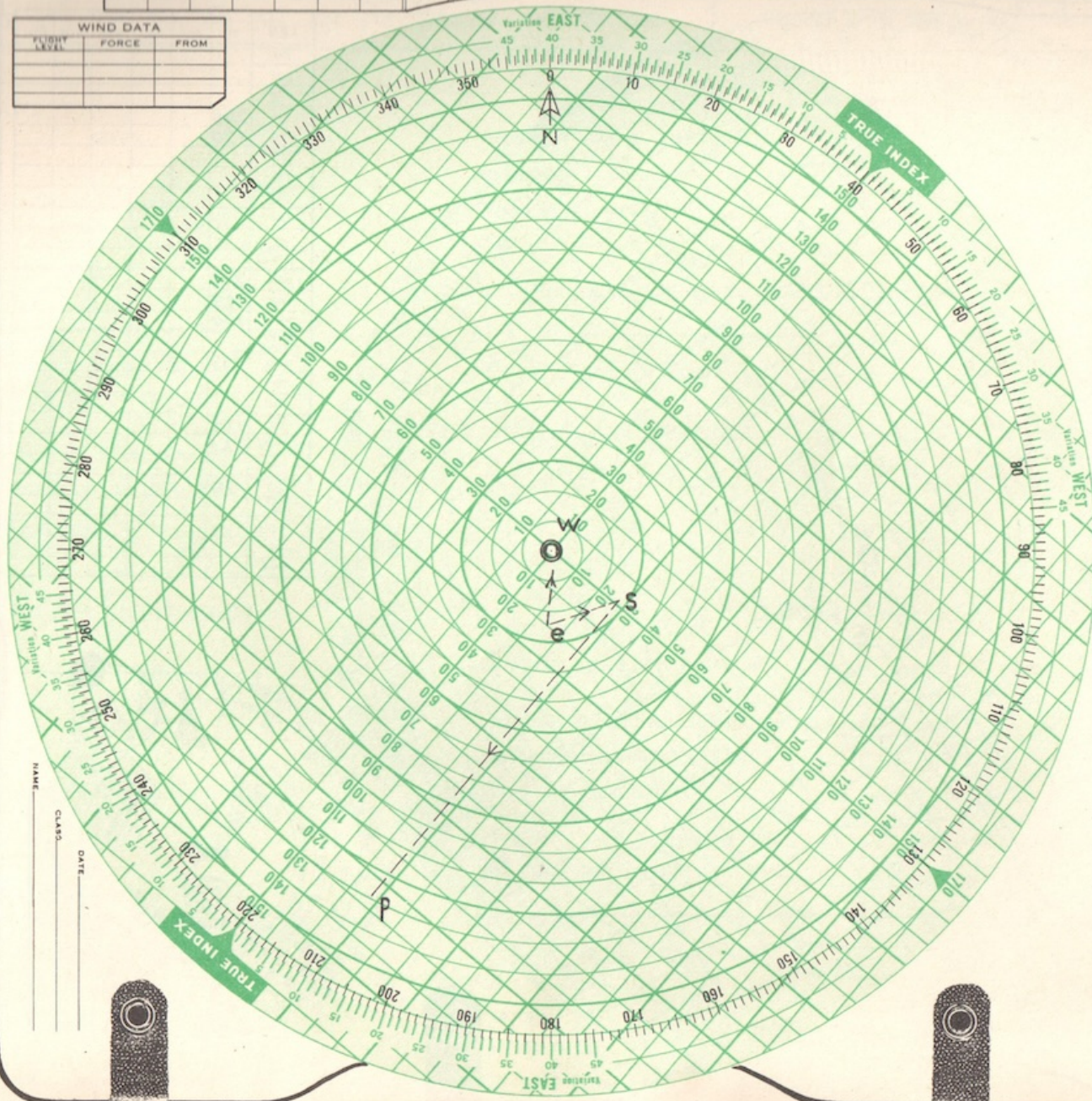
WIND STAR	TIME	DIR
		FORCE
		TIME
		DIR
		FORCE

SHIP DATA	NAME	TIME	CUS	SLD	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	DRM	CH	GS	SRM	DIST	MIN	TTT	DIST	MIN	TTT		
					1V			1V				
					2V			2V				
					3V			3V				
					4V			4V				
					5V			5V				
					6V			6V				
					7V			7V				
					8V			8V				
					9V			9V				

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						
TAS	130					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN						
DRM	220					
SRM	129					
MRM						



NAME _____
CLASS _____
DATE _____

7 (CONTINUED)

3. Set bearing to ship, DRM 220°, opposite true index.
4. Locate point "p." From point "s" follow the rectangular grid lines parallel to the true index to the 130 K TAS circle. Label "p."
5. The distance from "s" to "p" is the SRM (speed of relative movement), 129 K.

7

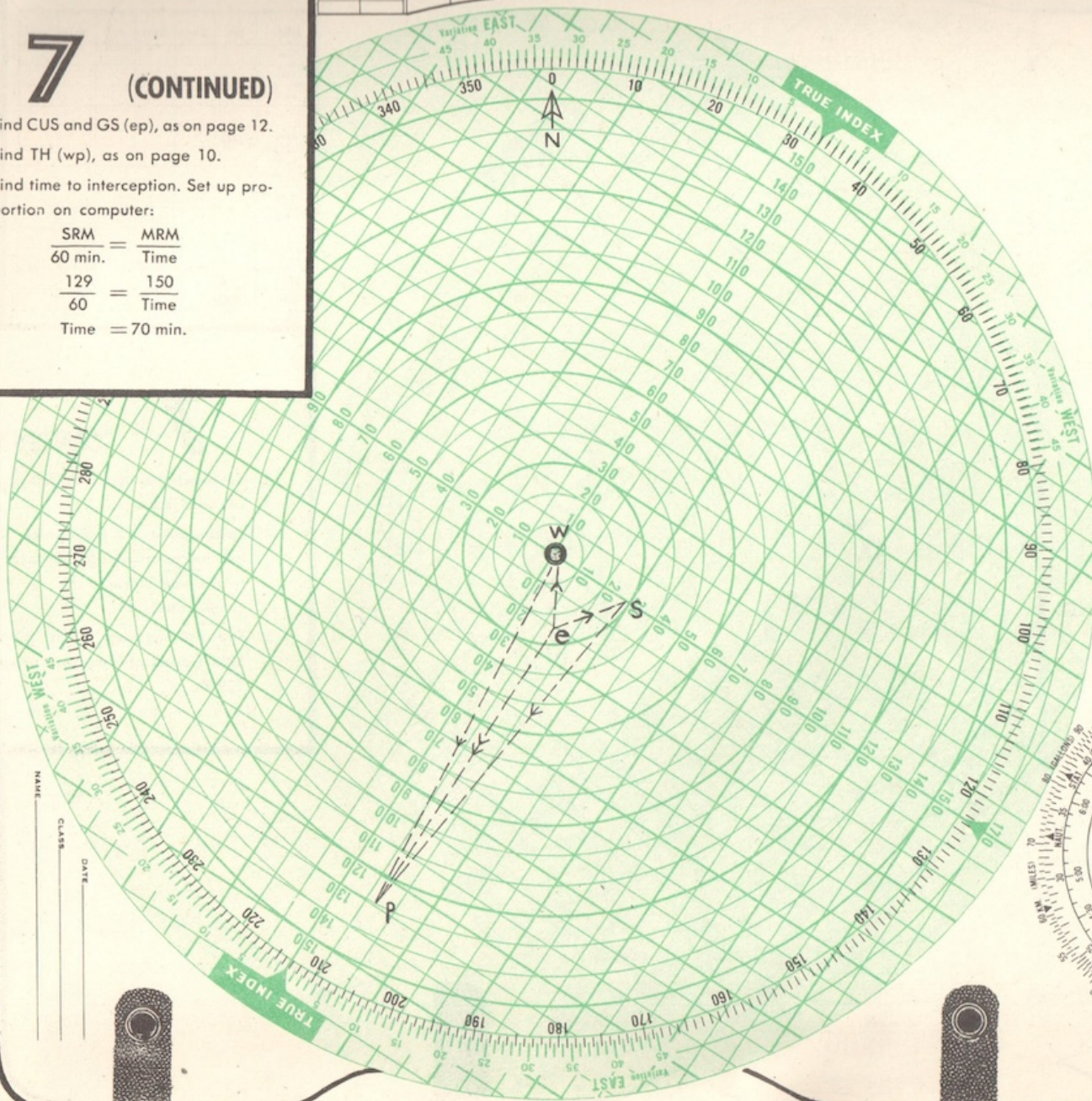
(CONTINUED)

6. Find CUS and GS (ep), as on page 12.
7. Find TH (wp), as on page 10.
8. Find time to interception. Set up proportion on computer:

$$\frac{\text{SRM}}{60 \text{ min.}} = \frac{\text{MRM}}{\text{Time}}$$

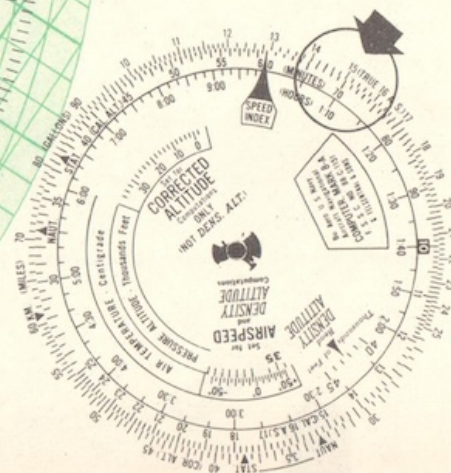
$$\frac{129}{60} = \frac{150}{\text{Time}}$$

$$\text{Time} = 70 \text{ min.}$$



SQUARE SEARCH FOR VISIBILITY										MILE		
CUS	CH	GS	SRM	DIST.	MIN.	TTT	DIST.	MIN.	TTT			
				2V			2V					
				2V			2V					
				4V			4V					
				4V			4V					

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	208					
TAS	130					
PRESS.						
ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM	220					
SRM	129					
MRM	150					
DRIFT ANGLE						
CUS	213					
TR						
PGS						
GS	108					
MI. ON CUS	126					
MI. ON TR						
MIN. ON LEG	70					
DEPART. TIME						
ETA						
ETI						
LAT.						
LONG.						



DEVIATION TABLE													AIRSPEED CALIBRATION TABLE											
Mag.	000	030	060	090	120	150	180	210	240	270	300	330	Ind.	70	80	90	100	110	120	130	140	150	160	170
Comp.	002	033	064	093	122	150	179	208	237	267	299	330	Cal.	68	76	84	94	106	118	130	142	155	166	176

GIVEN

Exercise

19 0720 position of Pt. Option:
32°05' N Lat.
120°43' W Long.
CUS 030°, speed 15 K

At same time your carrier bears
295°, 53 mi. from Pt. Option

Depart carrier at 0720, proceed to
Pt. Option at 1,000 ft., TAS 130 K,
Wind 18 K from 350°

REQUIRED

TH, DRM, CUS, GS, ETI, and EPI

GIVEN

Exercise

20 0700 position of Pt. Option:
25°14' N Lat.
165°51' W Long.
CUS 098°, speed 28 K

At same time your carrier bears
181°, 52 mi. from Pt. Option,
CUS 180°, speed 28 K

Depart your carrier at 0745 and

proceed at 5,000 ft., TAS 130 K,
to intercept Pt. Option,
Wind 34 K from 275°

REQUIRED

TH, DRM, SRM, CUS, GS, Mi. on CUS, ETI, and EPI

GIVEN

Exercise

21 0700 position of USS RANGER:
17°20' N Lat.
158°15' W Long.

0600 enemy position:
16°08' N Lat.
161°58' W Long.
CUS 168°, speed 26 K

Depart 0700 USS RANGER to intercept enemy
flight altitude 5,000 ft., TAS 140 K,
Wind 28 K from 190°

REQUIRED

TH, DRM, ETI, and EPI

GIVEN

Exercise

22 Panyop:
15°08' N Lat.
147°20' E Long.

0900 position USS BELLEAU WOOD:
17°40' N Lat.
148°40' E Long.
CUS 260°, speed 26 K

Depart Panyop 0900 to intercept USS
BELLEAU WOOD at TAS 130 K,
Wind 26 K from 065°

REQUIRED

DRM, MRM, TH, CUS, ETI, and EPI

GIVEN

Exercise

23 0900 position USS FRANKLIN:
20°00' N Lat.
172°30' E Long.

0800 enemy position:
18°20' N Lat.
169°19' E Long.
CUS 354°, speed 25 K

Depart 0900 USS FRANKLIN to intercept
enemy vessel at flight altitude 4,000 ft.,
TAS 150 K,
Wind 25 K from 300°

REQUIRED

TH, DRM, ETI, and EPI

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	25	035

DRIFT SIGNS						
CH	MH	TH	DA	TAS	CAS	IAS

WIND STAR	
TIME	DIR

SHIP DATA	
NAME	TIME

NAME	TIME	CUS	SPEED

8 RADIUS OF ACTION—FIXED BASE

Given

Wind 25 K from 035°
 Scouting course 280°
 TAS 130 K
 Total time (T) 3½ hrs.

Find

Scouting leg: TH, GS, S₁, Min. on leg (t₁)
 Return leg: TH, GS, S₂, Min. on leg (t₂)
 CUS

Procedure

- Set up wind vector (see page 8).
- Set scouting course, 280°, and locate "p₁" (see page 9). For radius of action from a fixed base, the course for the return leg is reciprocal of the scouting course, 100°.
- Locate "p₂" for return leg (see page 9).
- Find GS for scouting leg by determining the distance from "e" to "p₁," 138 K (S₁).
- Find the GS for the return leg by determining the distance from "e" to "p₂," 117 K (S₂).
- Find TH for scouting course (wp₁). Revolve the disc until "p₁" is on the true index, 290°

- Find TH for return leg (wp₂). Revolve the disc until "p₂" is on the true index, 090°.

- Solve radius of action formulas:

$$\frac{S_2}{t_1} = \frac{S_1 + S_2}{T} \text{ and } \frac{S_1}{t_2} = \frac{S_1 + S_2}{T}$$

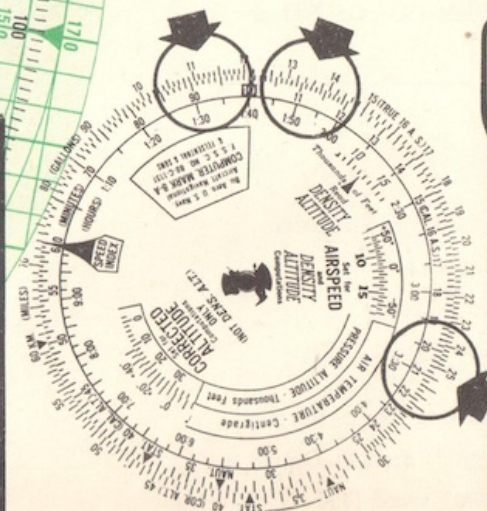
When:

$$\begin{aligned} S_1 &= \text{GS out} = 138 \text{ K} \\ S_2 &= \text{GS in} = 117 \text{ K} \\ T &= \text{Total time} = 210 \text{ min.} \\ t_1 &= \text{Time on leg out} \\ t_2 &= \text{Time on leg in} \\ S_1 + S_2 &= 138 + 117 = 255 \end{aligned}$$

- On computer set 255 (S₁ + S₂) on outside scale opposite 210 (T) on inside scale.
- Opposite 117 (S₂) on outside scale, read 96 min. (t₁) on inside scale.
- Opposite 138 (S₁) on outside scale, read 114 min. (t₂) on inside scale.
- t₁ + t₂ = T
96 + 114 = 210 min.

VISIBILITY		MILES	
MIN.	YFT	MIN.	YFT

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	290	090				
TAS	130					
PRESS.						
ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE						
MIN.						
DRM						
SRM						
MRM						
DRIFT						
ANGLE						
CUS	280	100				
TR						
PGS						
GS	138	117				
MI. ON CUS						
MI. ON TR						
MIN. ON LEG	96	114				
DEPART. TIME						
ETA						
ETI						
LAT.						
LONG.						



DRIFT SIGHTS						
CH	MH	TH	DA	TAS	CAS	IAS

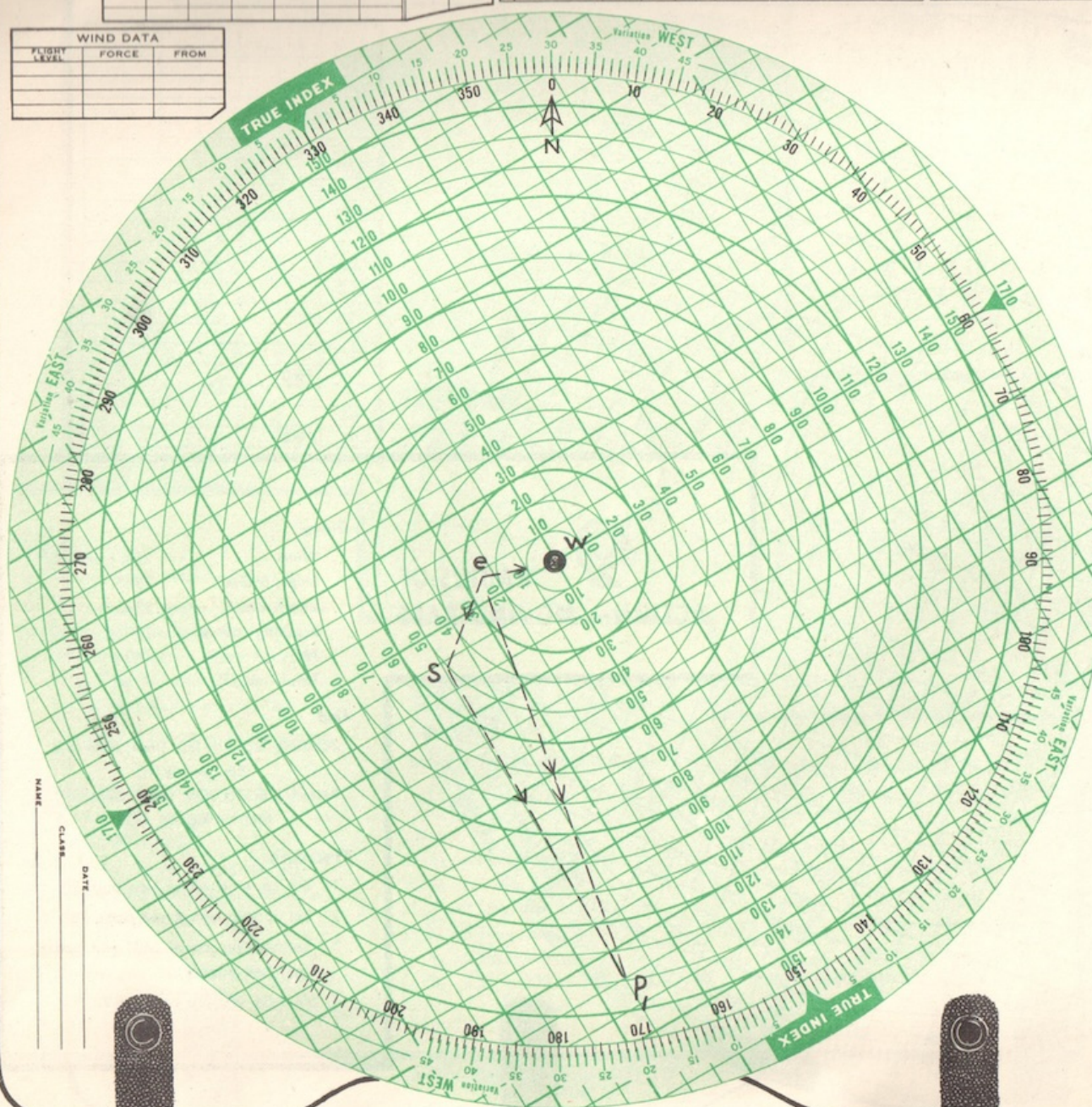
WIND STAR	TIME	DIR
		FORCE
		TIME DIR
		FORCE

SHIP DATA	NAME	TIME	CUS	SPEED	BEARS	LAT	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	DRM	CH	GS	SRM	DIST	MIN	TTT	DIST	MIN	TTT		
					1V			1V				
					2V			2V				
					3V			3V				
					4V			4V				

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CM						
MH						
VAR						
TH						
TAS	140					
PRESS ALT						
TEMP						
CAS						
IAS						
MI SAMPLE MIN						
DRM	150					
SRM	120					
MRM						
DRIFT ANGLE						
CUS	160					
TR						
PGS						
GS	142					



9

(CONTINUED)

- Find the DRM (direction of relative movement) for the scouting leg. Revolve the disc until an imaginary line from "s" to "p₁" is parallel to the true index. Read DRM, 150°, opposite true index on compass rose.
- The distance from "s" to "p₁" is SRM (S₁).

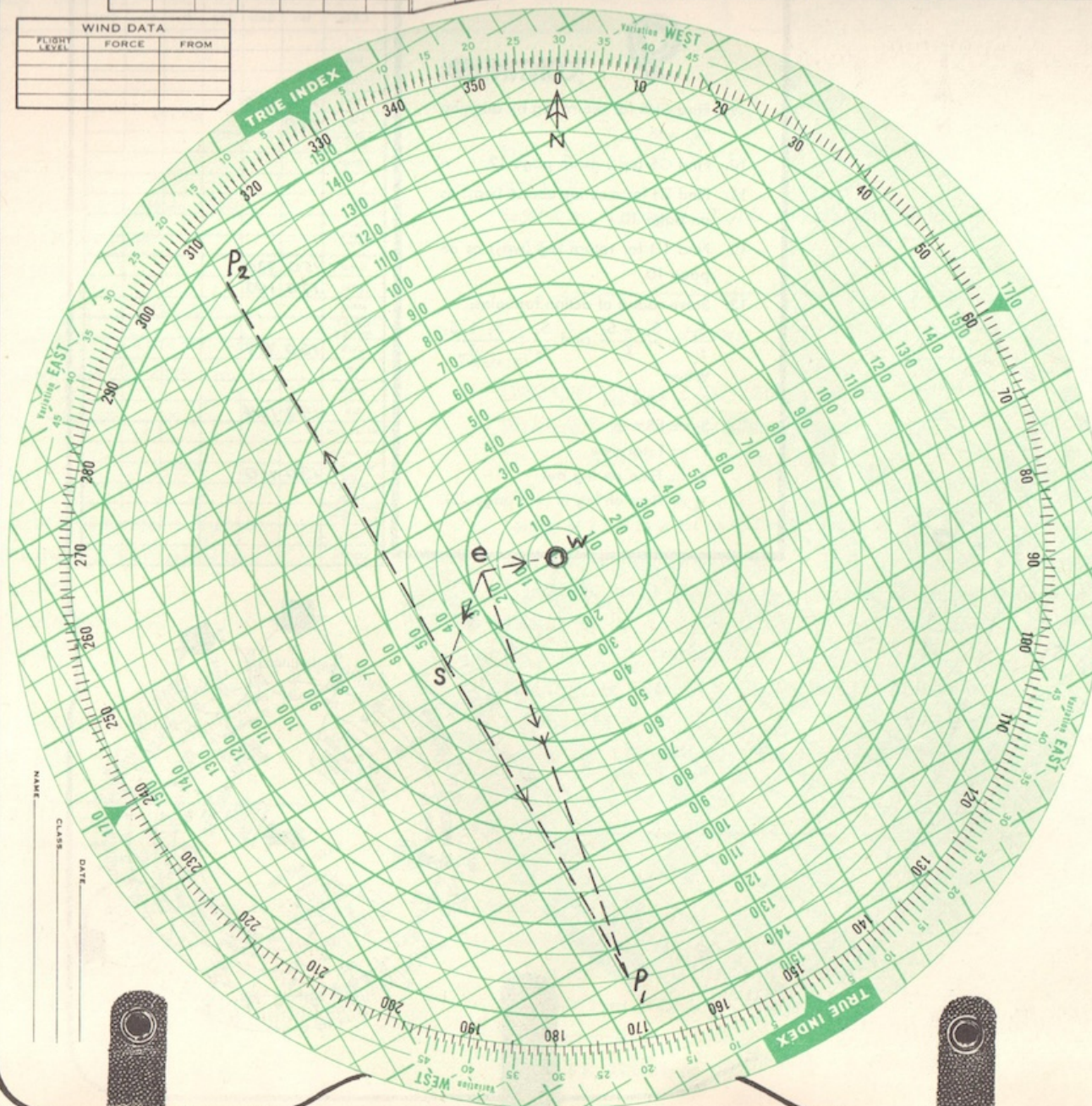
DRIFT SIGHTS					
CH	MH	TH	DA	TAS	IAS

WIND STAR	
TIME	DIR
	FORCE
	DIR
	FORCE

NAME	TIME	CUS	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY						MILES		
CUS	DRM	CH	SS	SRM	DIST	MIN.	YTT	
					2V			
					2V			
					4V			
					4V			

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						
TAS	140					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM	150	330				
SRM	120	142				
MRM						
DRIFT ANGLE						
CUS	160					
TR						
PGS						
GS	142					
MI. ON CUS						
MI. ON TR						
MIN. ON LEG						
DEPART. TIME						
ETA	ETI					
LAT.						
LONG.						

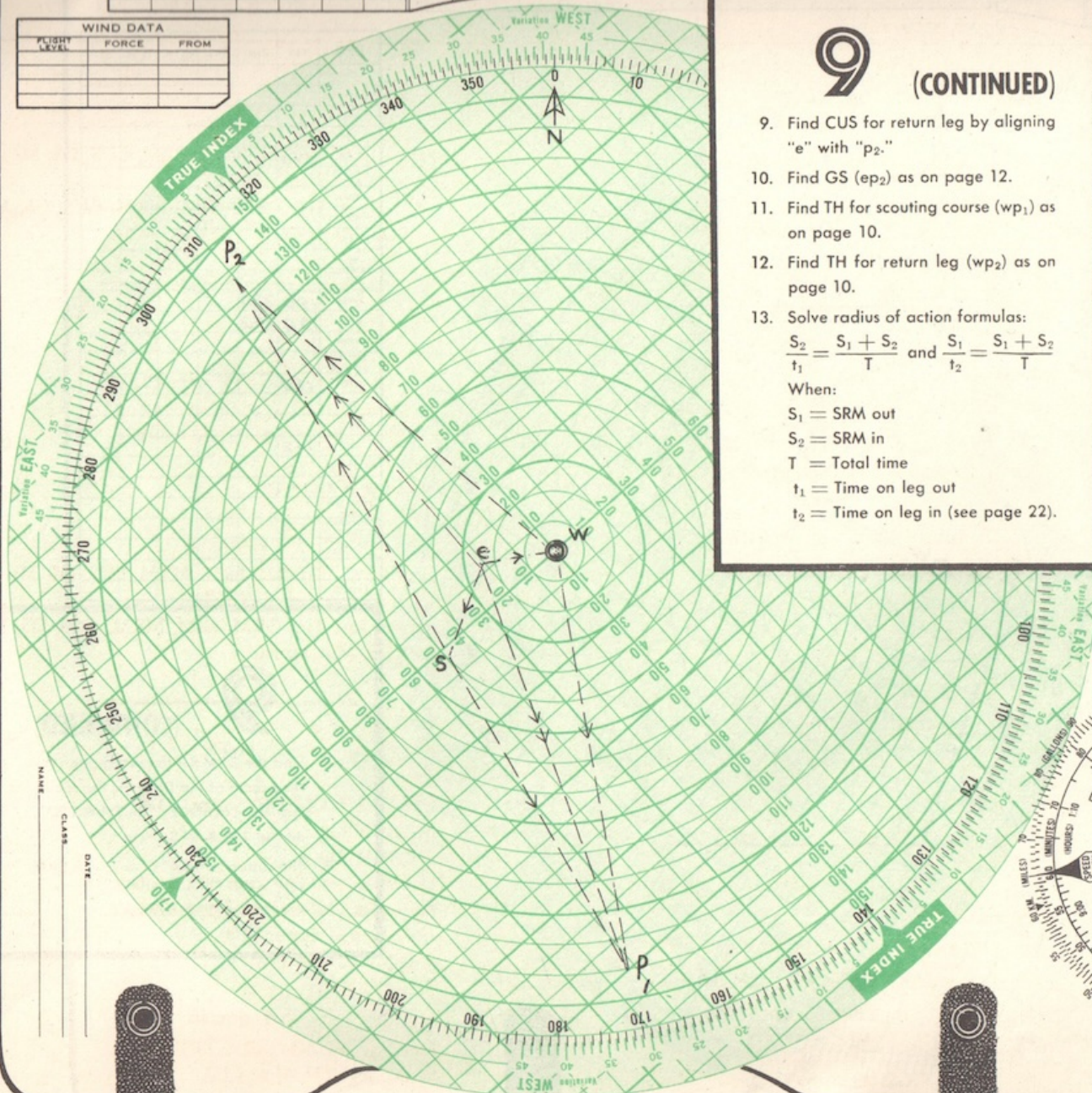
9 (CONTINUED)

- Find the DRM for the return leg (the reciprocal of the DRM for the scouting leg). Locate "p₂" for DRM, 330°, on the 140 K TAS circle.
- The distance from "s" to "p₂" is SRM (S₂).

[illegible][illegible]

CUS	CH	SS	DIST.	MIN.	TTT	DIST.	MIN.	TTT
			2V			6V		
			2V			6V		
						8V		
						8V		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



9

(CONTINUED)

9. Find CUS for return leg by aligning "e" with "p₂."
10. Find GS (ep₂) as on page 12.
11. Find TH for scouting course (wp₁) as on page 10.
12. Find TH for return leg (wp₂) as on page 10.
13. Solve radius of action formulas:

- $$\frac{S_2}{t_1} = \frac{S_1 + S_2}{T} \text{ and } \frac{S_1}{t_2} = \frac{S_1 + S_2}{T}$$

- When:
 S_1 = SRM out
 S_2 = SRM in
 T = Total time
 t_1 = Time on leg out
 t_2 = Time on leg in (see page 22).

- 100

-

When:

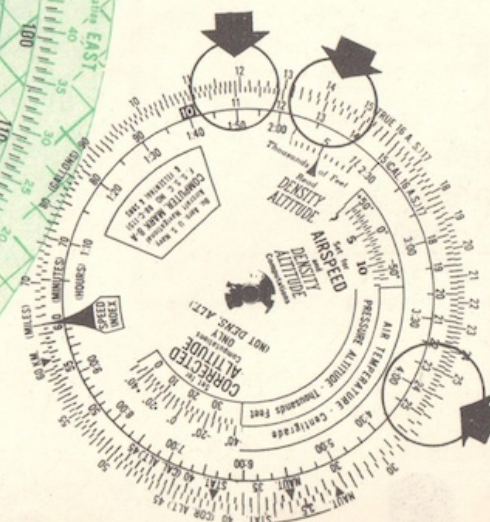
$$S_1 = \text{SRM out}$$
$$S_2 = \text{SRM in}$$

T = Total time

 t_1 = Time on leg out

t_2 = Time on leg in (see page 22).

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	170	310				
TAS	140					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM	150	330				
SRM	120	142				
MRM						
DRIFT ANGLE						
CUS	160	319				
TR						
PGS						
GS	142	124				
MI. ON CUS						
MI. ON TR						
MIN. ON LEG	130	110				
DEPART. TIME						
ETA						
ETI						
LAT.						
LONG.						



DEVIATION TABLE													AIRSPEED CALIBRATION TABLE											
Mag.	000	030	060	090	120	150	180	210	240	270	300	330	Ind.	70	80	90	100	110	120	130	140	150	160	170
Comp.	002	033	064	093	122	150	179	208	237	267	299	330	Cal.	68	76	84	94	106	118	130	142	155	166	176

GIVEN		REQUIRED	
Exercise			
24	Depart at 1700 to scout on a CUS 265° and return by 1930 Wind 23 K from 036° TAS 130 K		
GIVEN		REQUIRED	
	First leg: TH, GS, Time out, TTT Second leg: TH, GS, CUS, Time in		
GIVEN		REQUIRED	
Exercise			
25	Depart at 0700 on routine flight to scout a course of 165° and be back to base at 1000 Wind 26 K from 082° TAS 140 K		
GIVEN		REQUIRED	
	First leg: TH, GS, Time out, TTT Second leg: TH, GS, CUS, Time in		
GIVEN		REQUIRED	
Exercise			
26	USS TEXAS, CUS 134°, speed 18 K Depart the USS TEXAS at 1030, scout on course 016°, and be back at the end of 2 hrs. 45 min. Wind 34 K from 275° TAS 105 K		

GIVEN		REQUIRED	
Exercise			
27	USS PORTSMOUTH, CUS 080°, speed 25 K. Wreckage is reported by a fishing boat. The Commanding Officer orders a plane to investigate. Depart at 1200 to scout on CUS 002° and return to ship in 2 hrs. 18 min. Wind 26 K from 130° TAS 95		
GIVEN		REQUIRED	
	First leg: TH, SRM, GS, Mi. on CUS, Min. on leg, and TTT Second leg: TH, SRM, CUS, GS, Mi. on CUS, Min. on leg		
GIVEN		REQUIRED	
Exercise			
28	USS SARATOGA, CUS 145°, speed 20 K Depart SARATOGA at 1400, scout along CUS 080° for a distance of 135 miles and return to ship. TAS 115 K. There is no wind.		

GIVEN		REQUIRED	
Exercise			
29	USS QUINCY, CUS 235°, speed 22 K Depart QUINCY at 0540, scout along CUS 085° for 140 miles, and return to ship. Wind 18 K from 350° TAS 125 K		
GIVEN		REQUIRED	
	First leg: TH, DRM, SRM, MRM, CUS, GS, Mi. on CUS, Min. on leg, TTT, ETI Second leg: TH, DRM, SRM, MRM, CUS, GS, Mi. on CUS, Min. on leg.		
GIVEN		REQUIRED	
Exercise			
30	USS CARD, CUS 060°, speed 24 K 30°20' N Lat. 27°20' W Long. Depart at 1030 and scout on a constant bearing of 140° to a maximum distance, and return to ship at 1300. Wind 26 K from 190° TAS 125 K		
GIVEN		REQUIRED	
	First leg: TH, Min., CUS, EPT Second leg: TH, Min., CUS		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	33	187

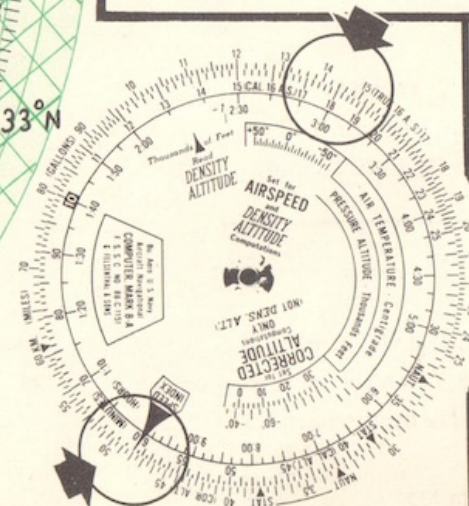


Wind	33 K from 187°
Scouting course	170°
TAS	130 K
Total time (T)	3 hrs.
Time of departure	0730
Departure position "A"	36°05' N Lat. 58°24' W Long.
Destination "B"	34°32' N Lat. 60°37' W Long.
Mid-lat.	34° N
Mid-long.	60° W

Fictitious ship: CUS, speed
Scouting leg: TH, GS, DRM, SRM(S_1), t_1 ,
distance
Return leg: TH, GS, DRM, SRM(S_2), t_2 ,
distance, CUS
Time to turn (TTT), estimated position of
turn (EPT).

1. Set up chart (see page 3).
2. Locate "A" and "B" (see page 6).
3. Find course of fictitious ship. Revolve the disc until "A" and "B" are aligned. The "ship" is moving from "A" to "B," a course of 230° .
4. Find the speed of fictitious ship. Set up proportion on computer with the total distance from "A" to "B" over the total time (T).

$$\frac{144 \text{ mi.}}{180 \text{ min.}} = \frac{48 \text{ K}}{60 \text{ min.}}$$



WIND DATA		
FLIGHT LEVEL	FORCE	FROM

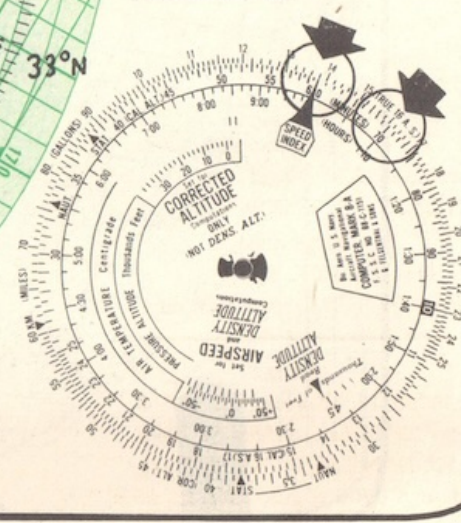
DRIFT SIGNS							WIND STAR	
CH	MH	TH	DA	TAB	CAS	IAS	TIME	DIR
								FORCE
								TIME
								DIR
								FORCE

NAME	TIME	CUS	SPEED	VAR	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY												MILES		
CUS	DRM	CH	GS	SRM	DIST	MIN.	TYT	DIST	MIN.	TYT				

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	174	286				
TAS	130					
PRESS ALT.						
TEMP.						
CAS						
IAS						
MI SAMPLE MIN.						
DRM	140	320				
SRM	84	130				
MRRM						
DRIFT ANGLE						
CUS	170	300				
TR						
PGS						
GS	97	138				
MI ON CUS	176	163				
MI ON TR						
MIN ON LEG	109	71				
DEPART TIME	0730	0919				
ETA	0919	1030				
LAT						
LONG.						

SHEET, PLOTTING, FOR
TRAINING PLOTTING BOARD
DU. AERO. U. S. NAVY
STOCK NO. 880-5-635 CONTRACT NO. 100H03224
MANUFACTURER'S PART NO. FNA-35
G. FELSENTHAL & SONS, CHICAGO



10 (CONTINUED)

8. Find the distance on return leg.
 - (a) Set speed index of Mark VIII opposite GS, 138 K, on outside scale.
 - (b) Opposite t_2 , 71 min., read distance 163 mi. (A shorter way is to align "EPT" and "B" and determine distance. These two methods may be used as a means of checking.)

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

Exercise GIVEN
31 At 0800 depart Base A,
01°07' S Lat. 43°03' E Long.
TAS 136 K
Scout a maximum distance on CUS
105°, returning at 1030 to Base B,
01°22' S Lat. 42°12' E Long.
Wind 24 K from 225°

REQUIRED
TH out, GS out, TTT, EPT, TH in,
DRM in, SRM in, Mi. on CUS in

Exercise GIVEN
32 At 1030 depart Point Mike,
21°20' S Lat. 46°08' W Long.
TAS 128 K
Wind 20 K from 186°
Scout a maximum distance on CUS 065°,
returning at 1350 to Base B,
23°32' S Lat. 43°56' W Long.

REQUIRED
TH out, TTT, TH in, EPT

Exercise GIVEN
33 At 1030 depart Base A,
46°40' N Lat. 124°24' W Long.
TAS 113 K
Wind 27 K from 320°
Scout on CUS 260° maximum distance,
ending search at 1330 at Base B,
44°28' N Lat. 123°52' W Long.

REQUIRED
First leg: TH, GS, TTT, EPT
Second leg: TH, DRM, SRM, Mi. on CUS

Exercise GIVEN
34 Mid-lat. 53°00' N, Mid-long. 01°00' W
Base A: 54°27' N Lat., 02°56' W Long.
Base B: 52°00' N Lat., 01°40' W Long.
Depart Base A 0700 at Alt. 2000 ft., IAS

110 K. Scout maximum distance on CUS
080°. End search over Base B at 1000.
Wind 20 K from 110°
T + 5°, Var. 12° W, Vis. 10 mi.

REQUIRED
First leg: TAS, CH, GS, TTT, EPT
Second leg: CH, DRM, SRM, Mi. on CUS

Exercise GIVEN
35 USS HORNET 1120 position:

41°14' N Lat. 178°26' W Long.

CUS 010°, speed 24 K

USS WASP 1130 position:

40°19' N Lat. 177°24' W Long.

CUS 178°, speed 20 K

Depart HORNET at 1130 to scout as far
as possible on CUS 260° and return to
WASP at 1430

Wind 30 K from 295°, pressure altitude
4000 ft., T + 6°, IAS 123K, Var. 7° E

REQUIRED
TAS, CH out, TTT, EPT

Exercise GIVEN
36 USS IOWA 0800 position:

48°22' N Lat. 03°54' W Long.

CUS 082°, speed 30 K

(Use appropriate wind for given
altitude; 2000 ft., Wind 22 K from
060°; 3000 ft., Wind 26 K from 130°)

At 0817 you depart from the
ship and track your section leader
as follows:

Time	CH	IAS	Altitude	Var.	T.
0817	084°	124 K	2000 ft.	14° W	+14°
0955	200°	118 K	3000 ft.	12° W	+13°
1042	152°	127 K	2000 ft.	12° W	+12°

REQUIRED
First leg: TH, CUS Second leg: TH, CUS
Third leg: TH, CUS

1129 position of leader; bearing and distance from
ship

Exercise GIVEN
37 USS QUINCY 1233 position:
32°36' N Lat. 73°30' W Long.
CUS 300°, speed 30 K.

(Use appropriate wind for flight
altitude: 5000 ft. Wind 34 K
from 275°; 4000 ft., 30 K from
205°, 3000 ft., 26 K from 130°)

At 1303 depart USS QUINCY tracking
your section leader as follows:

Time	CH	IAS	Altitude	Var.	T.
1303	325°	138 K	5000 ft.	7° E	+3°
1415	078°	135 K	4000 ft.	8° E	+9°
1505	162°	131 K	3000 ft.	9° E	+6°

REQUIRED
First leg: TH, CUS Second leg: TH, CUS
Third leg: TH, CUS
1543 position of leader; his bearing and distance
from ship

Exercise GIVEN
38 Mid-lat. 36° S, Mid-long. 179° E
USS SOUTH CAROLINA: 1400 DR position
36°32' S Lat. 177°17' E Long.
CUS 025°, speed 27 K.

(Use appropriate wind for flight
altitude: 2000 ft., Wind 22 K from
060°; 3000 ft., Wind 26 K from 130°;
4000 ft., Wind 30 K from 205°)

At 1420 you depart from the ship and
track your squadron leader as follows:

Time	CH	IAS	Altitude	Var.	T.
1420	118°	135 K	2000 ft.	14° E	+11°
1536	040°	126 K	3000 ft.	13° E	+7°
1644	273°	122 K	4000 ft.	12° E	+2°

At 1709 you are ordered by your
squadron leader to take over.

REQUIRED
First leg: TH, CUS Second leg: TH, CUS
Third leg: TH, CUS
1709 DR position; your bearing and distance from
ship

11

GEOGRAPHIC SECTOR SEARCH—FIXED BASE

READY ROOM DATA BOARD

BULLETIN BOARD	DATE	ZONE			VAR	S.D.O.	PLANES		READY		STATUS		PILOTS					
	Recognition Approaches	Wind	Kts.	From	DISPOSITIONS			1	2	3	4	5	6	7	8	9	PLANE SPOT	
	Brgs.	Surf.			Own Forces			A	B	A	B	A	B	A	B	A	B	Flight Deck
	Brgs.	1000	20	090			Alert											ISLAND
	P10 ₁ P10 ₂ Enemy	2000					Air Bm											
	Time 0800	3000					Standby											
	Lat. 28-10N	4000					Time											
	Long. 111-10W	5000					Mission											
	Cus	7000					Land											
	Speed	10000					Landing Order											
	Dist						Substitutions											
	Brg				Enemy Forces											Hangar Deck		
	From															ISLAND		
	Nearest Field at						Freq.	Freq.		Freq.								
	Lat.	YE Ident					Plane Assignments											
	Long.	Dial						1	2	3	4	5	6	7	8		9	
	Nearest Land at	YE Voice					A											WEATHER FORECAST
	Lat.	Dial					B											
	Long.						Availability											
							Alert Schedule		Sleep in									
	RADIO DATA						Planes	Yes	No	Time	Flight	Flights						
	Freq. Dial	YE Ident					Pilots											
	Calls VF Base	Dial					Flights											
	VS VB	YE Voice																
	VT AGC	Dial																

Mid-lat. 30° N
Mid-long. 110° W

DRIFT SIGHTS							WIND STAR	
CH	MH	TH	DA	TAS	CAS	IAS	TIME	DIR.
								FORCE
							TIME	DIR.
								FORCE

NAME	TIME	CUS	SPEED	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	DRM	CH	SRM	DIST.	MIN.	TIME	DIST.	MIN.	TIME			

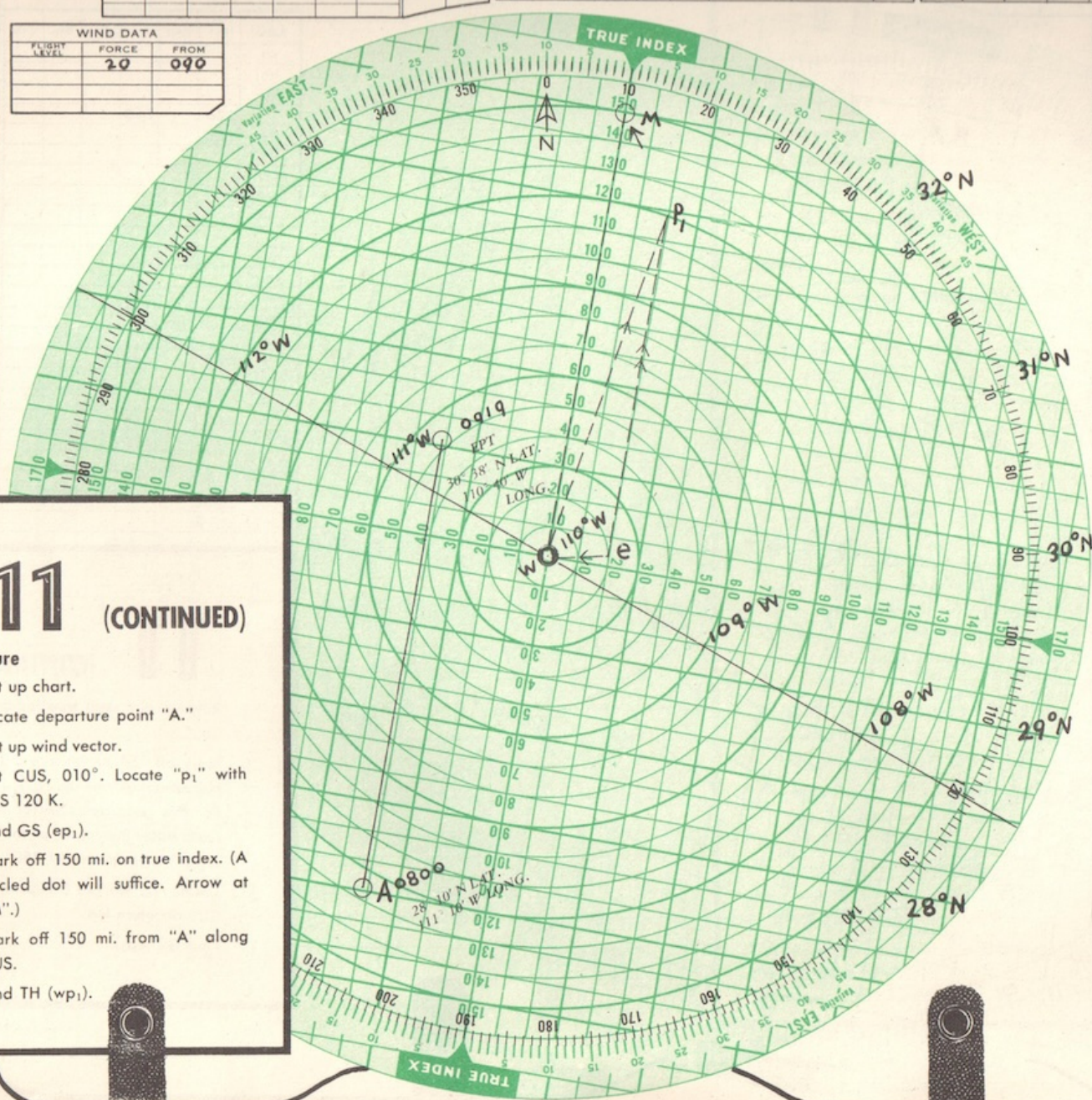
WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	20	090

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	020					
TAS	120					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	010					
TR						
PGS						
GS	114					
MI ON CUS	150					
MI ON TR						
MIN. ON LEG	79					
DEPART. TIME	0800					
ETA	0919					
LAT						
LONG.						

11 (CONTINUED)

Procedure

1. Set up chart.
2. Locate departure point "A."
3. Set up wind vector.
4. Set CUS, 010°. Locate "P₁" with TAS 120 K.
5. Find GS (ep₁).
6. Mark off 150 mi. on true index. (A circled dot will suffice. Arrow at "M".)
7. Mark off 150 mi. from "A" along CUS.
8. Find TH (wp₁).



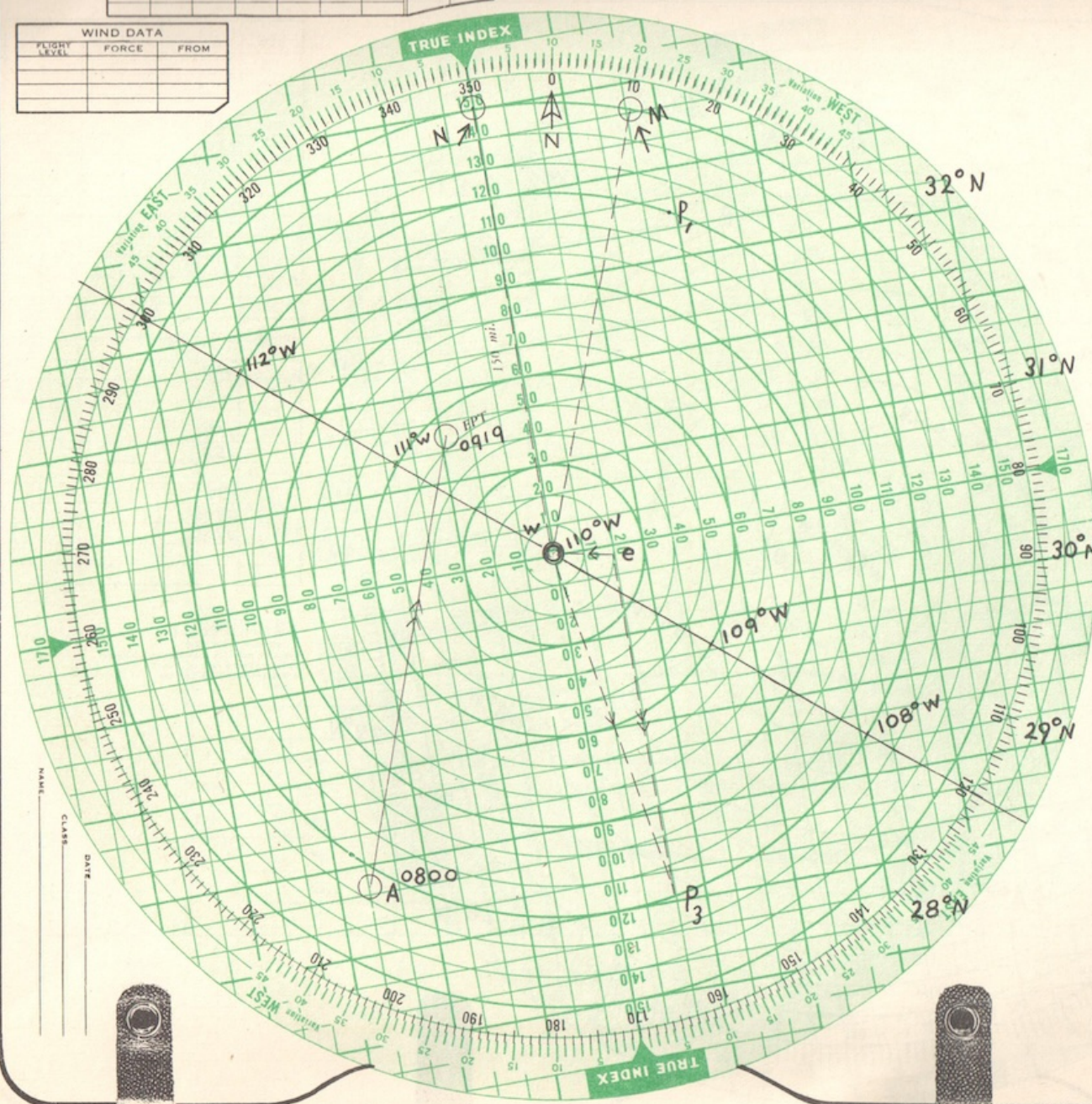
SHEET, PLOTTING, FOR
TRAINING PLOTTING BOARD
DU. AERO. U. S. NAVY
STOCK NO. 886-5-625 CONTRACT NO. N04H3264
MANUFACTURE'S PART NO. FNA-35
G. FELSETHAL & SONS, CHICAGO

DRIFT SIGHTS							WIND STAR	
CH	MH	TH	DA	TAS	CAS	IAS	TIME	DIR.
								FORCE
								TIME DIR.
								FORCE

SHIP DATA	NAME	TIME	CUS	SPEED	BEAR	LAT	LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	DRM	CH	GS	SRM	DIST	MIN.	TTT	DIST	MIN.	TTT		
					1V							
					2V							
					4V							
					4V							

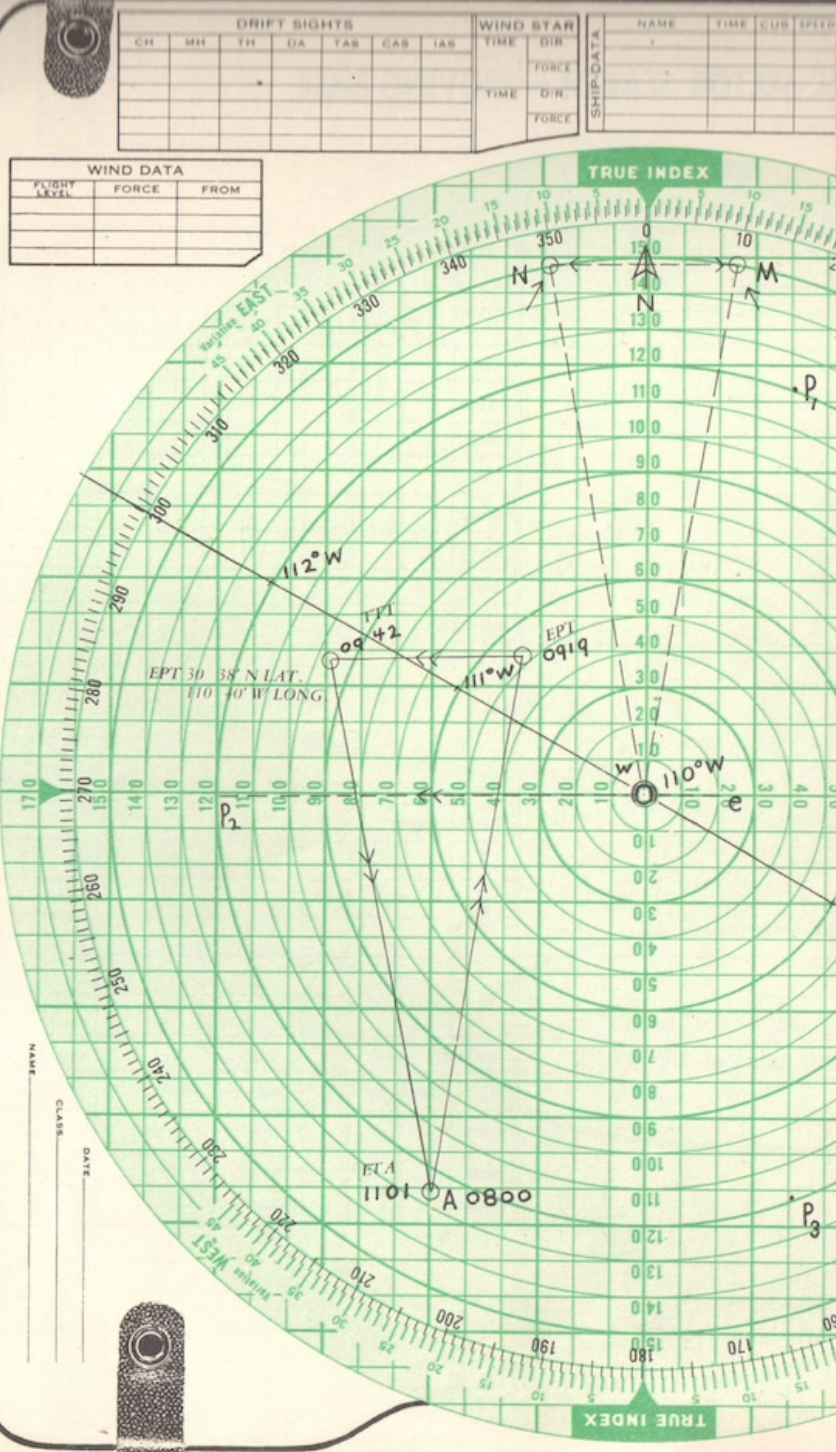
WIND DATA		
FLIGHT LEVEL	FORCE	FROM



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	020		160			
TAS	120					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	010		170			
TR						
PGS						
GS	114		114			
MI. ON CUS	150		150			
MI. ON TR						
MIN. ON LEG	79		79			
DEPART. TIME	0800					
ETA	0919					
ETI						

11 (CONTINUED)

- Revolve disc until true index is on 350°.
- Mark off 150 mi. on true index. (A circled dot. Arrow at "N".)
For this geographic sector from a fixed base, the course of the return leg is the reciprocal of 350°.
- Locate "p₃" on 120 K TAS circle for CUS of return leg.
- Find GS (ep₃).



11 (CONTINUED)

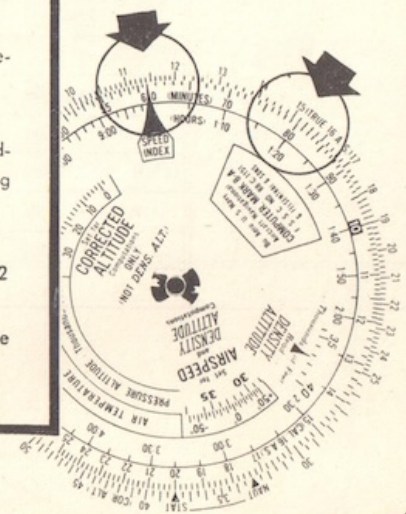
- Align "M" and "N." True index will be at 000°, the bisector of the given sector.
- Read the CUS of the cross leg opposite the cross index on the compass rose, 270°.
- Locate "p₂" on 120 K TAS circle for CUS of cross leg.
- Find GS (ep₂).
- Find the distance between "M" and "N," 53 mi.
- Mark off 53 mi. from the end of the first leg.
- Mark off 150 mi. from the end of the second leg along the CUS of the third leg (back to base).
- Find TH (wp₂).
- On computer find minutes on first leg.
 - Set speed index of Mark VIII computer opposite GS, 114 K, on outside scale.
 - Opposite 150 mi. on outside scale read 79 min. on inside scale.
- Find TTT by adding 79 min. to departure time.
0800 + 79 = 0919 TTT.
- Repeat 22 + 23 for cross leg, adding 23 min. to 0919, TTT, giving 0942 TTT.
- Repeat 22 for return leg.
- Find ETA by adding 79 min. to 0942 TTT giving 1101.
- Reorient the board and locate the positions of turn.

STABILITY

MIN	FTT	DIST	MIN	FTT

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	020	270	160			
TAS	120					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI SAMPLE MIN.						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	010	270	170			
TR						
PGS						
GS	114	140	114			
MI ON CUS	150	53	150			
MI ON TR						
MIN ON LEG	79	23	79			
DEPART TIME	0800	0919	0942			
ETA	0919	0942	1101			
LAT						
LONG						

SHEET, PLOTTING FOR
TRAINING PLOTTING BOARD
DU. AERO. U. S. NAVY



12

GEOGRAPHIC SECTOR SEARCH — MOVING BASE

CARRIER DATA BOARD

BULLETIN BOARD	DATE	ZONE	VAR	S.D.O.	PLANES	READY	STATUS	PILOTS	PLANE SPOT						
Recognition Approaches	Wind	Kts.	From	DISPOSITIONS	1	2	3	4	5	6	7	8	9	PLANE SPOT	
Brgs.	Surf.			Own Forces	A	B	A	B	A	B	A	B	A	B	Flight Deck
Brgs.	1000	2.5	330		Alert										ISLAND
PtO ₁	PtO ₂	Enemy	2000		Air Bm										
Time	0600		3000		Standby										
Lat.	11-06N		4000		Time										
Long.	149-58W		5000		Mission										
Cus	060		7000		Land										
Speed	18 k		10000		Landing Order										
Dist					Substitutions										
Brg				Enemy Forces											
From															
Nearest Field at					Freq.		Freq.		Freq.						ISLAND
Lat.				YE Ident	Plane Assignments										
Long.				Dial		1	2	3	4	5	6	7	8	9	
Nearest Land at				YE Voice	A										
Lat.				Dial	B										
Long.															
RADIO DATA				Our Mission	Availability	Yes	No		Alert Schedule	Sleep in					WEATHER FORECAST
Freq.	Dial			Scout Geographic Sector 170° to 210° to a distance of 150 miles at TAS 140 k.	Planes				Time -	Flight -					
Calls VF	Base				Pilots										
VS	VB				Flights										
VT	AGC														

Mid-lat. 30° N
Mid-long. 110° W

SIGHTS					
CH	MH	TH	DA	TAS	CAS

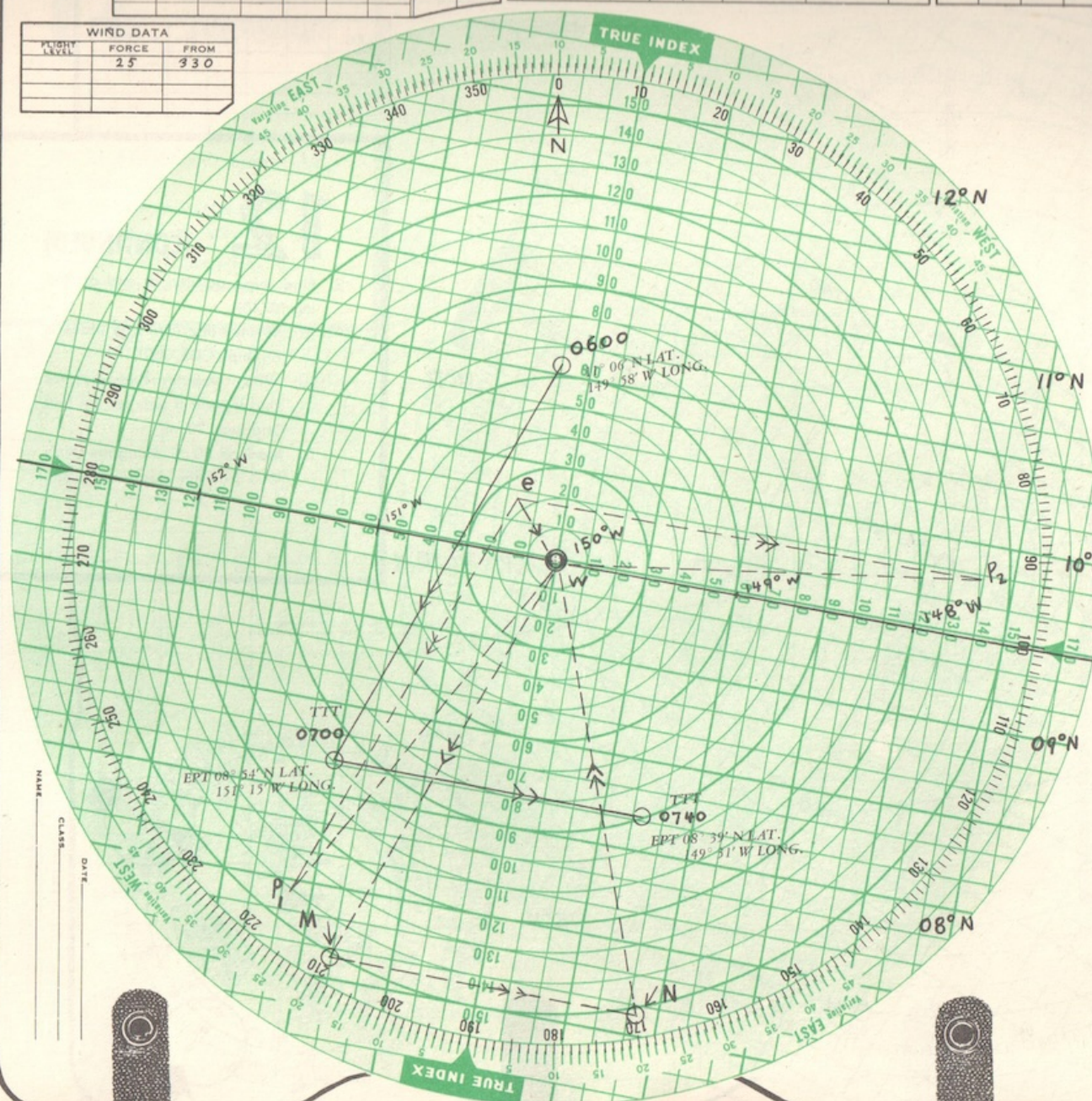
WIND STAR	
TIME	DIR
TIME	DIR
TIME	DIR

SHIP DATA

NAME	TIME	SPEED	BEARS LAT.	DIST. LONG.	FROM

SQUARE SEARCH FOR VISIBILITY									
					MILES				
CUS	CH	GS	SRM	DIST.	MIN.	YET	DIST.	MIN.	YET

WIND DATA		
WIND LEVEL	FORCE	FROM
	25	330



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	219	092				
TAS	140					
PRESS.						
ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM						
SRM						
MRM						
DRIFT ANGLE						
CUS	210	100				
TR						
PGS						
GS	150	154				
MI ON CUS	150	103				
MI ON TR						
MIN. ON LEG	60	40				
DEPART TIME	0600	0700				
ETA	0700	0740				
LAT.						
LONG.						

12 (CONTINUED)

Procedure

1. For 1st and 2nd legs solve as geographic sector search from fixed base (see pages 32-35).

NAME

CLASS

DATE

DRIFT SIGHTS						
CH	MH	TH	DA	YAS	CAS	IAB

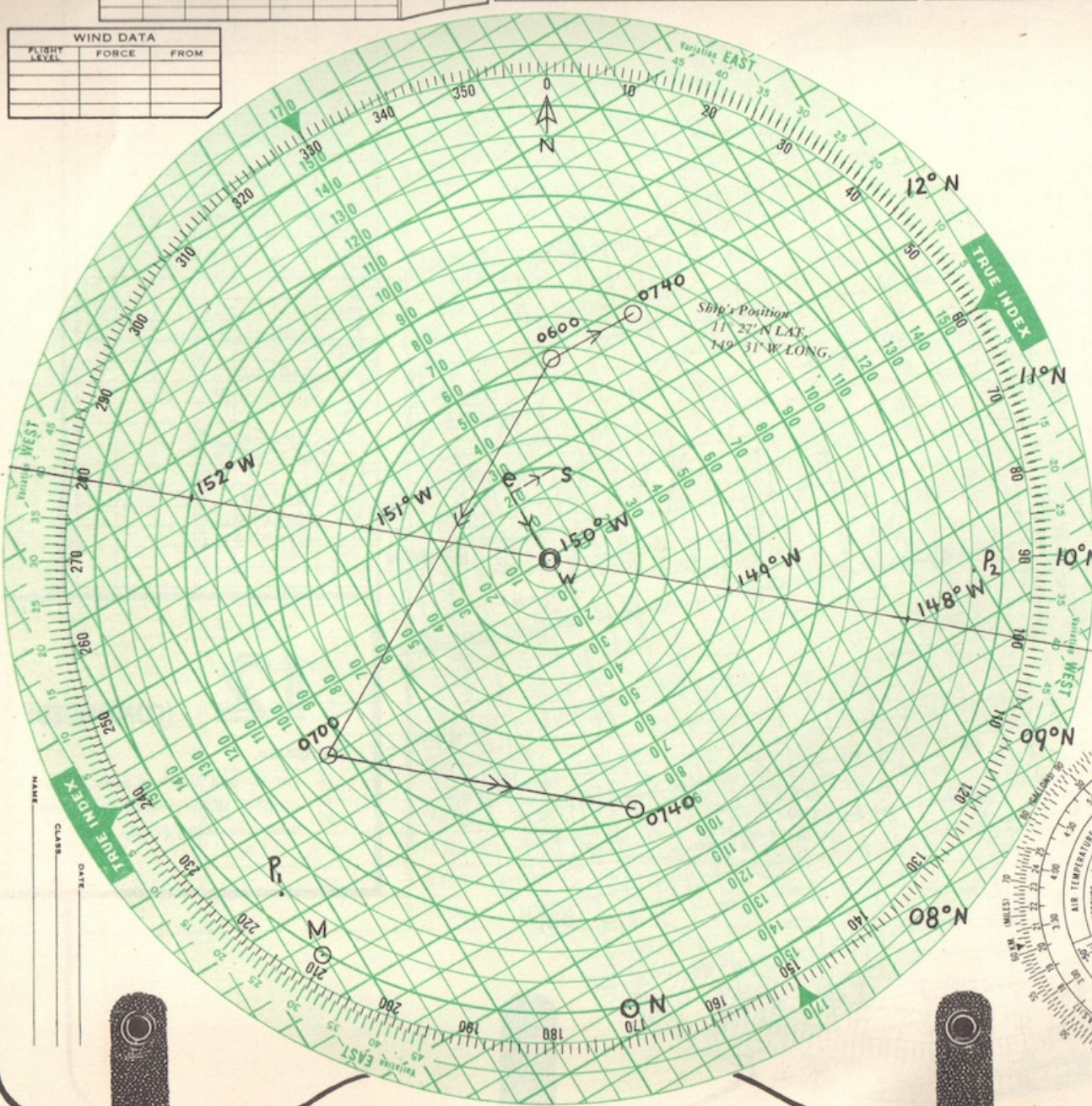
WIND STAR
TIME DIR
FORCE
TIME DIR
FORCE

SHIP DATA	NAME	TIME	CUS	SPEED	BEARS	LAT	DIS	LONG	FROM

SQUARE SEARCH FOR VISIBILITY											
CUS	CH	SS	SRM	DIST	MIN	YTY	DIST	MIN	YTY	MILES	
										SV	
										SV	
										SV	
										SV	

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

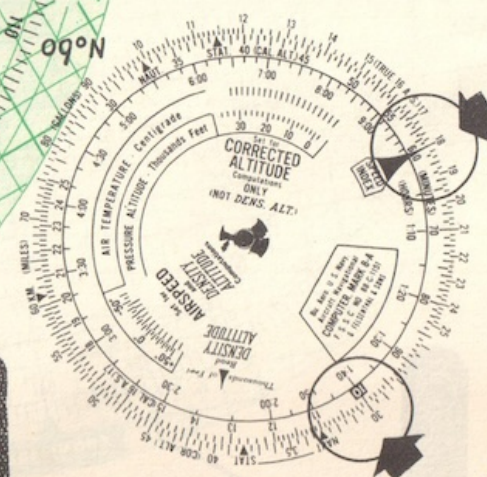
LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						



12 (CONTINUED)

2. Find ship's position at end of 2nd leg (0740).
 - (a) Revolve disc until true index is on ship's CUS, 060°.
 - (b) With computer find distance ship travels in time for 1st and 2nd legs, 30 mi.
 - (c) Mark off 30 mi. along the ship's CUS from the departure point.

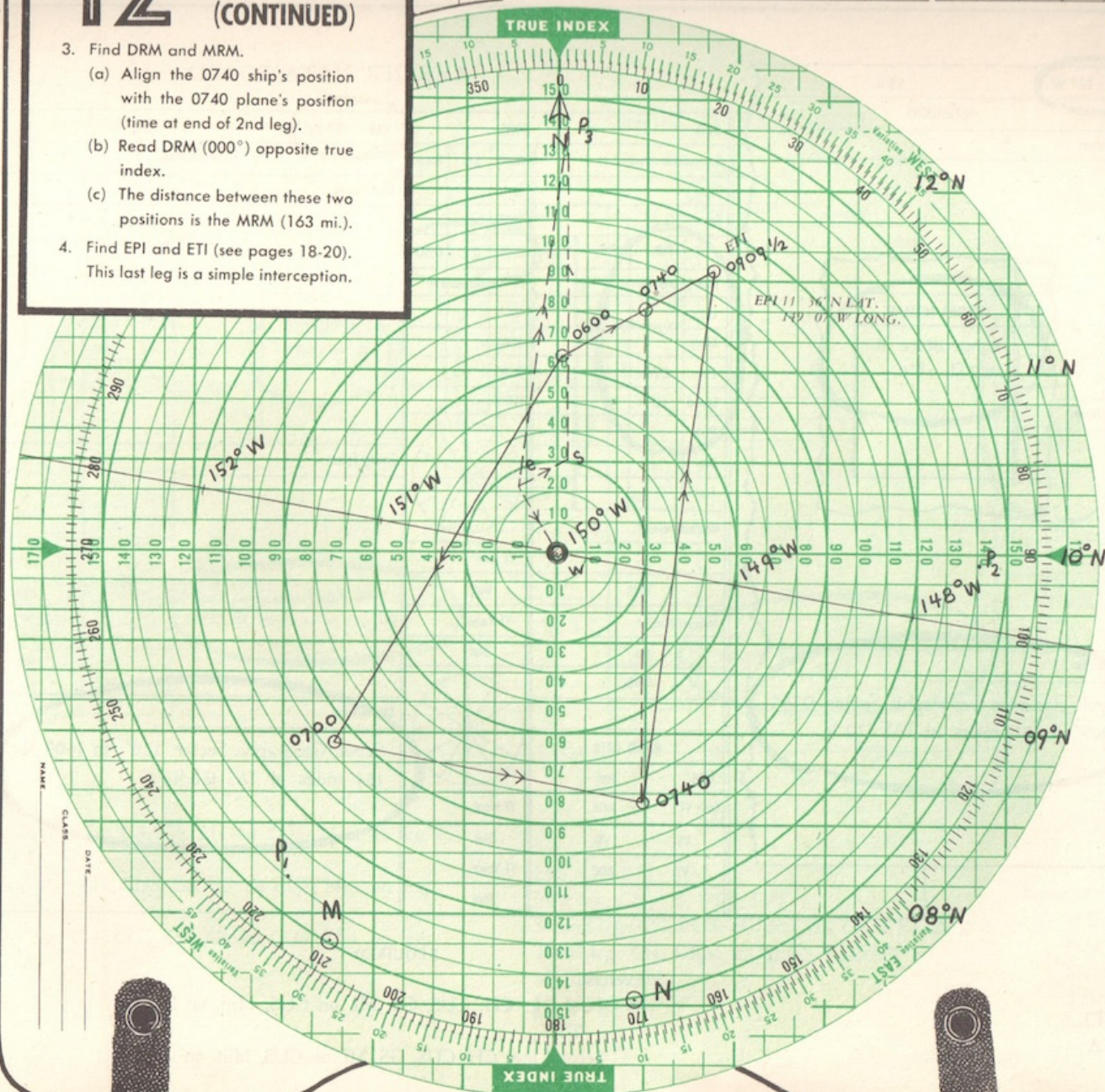
SHEET, PLOTTING, FOR
WINDING, PLOTTING, BOARD



12 (CONTINUED)

3. Find DRM and MRM.
 - (a) Align the 0740 ship's position with the 0740 plane's position (time at end of 2nd leg).
 - (b) Read DRM (000°) opposite true index.
 - (c) The distance between these two positions is the MRM (163 mi.).
4. Find EPI and ETI (see pages 18-20).

This last leg is a simple interception.



SQUARE SEARCH FOR VISIBILITY						MILES		
EUS	CH	SS	DIST	MIN	TTT	DIST	MIN	TTT
DRM		SRM	2V			2V		
			2V			2V		
			2V			2V		
			2V			2V		

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	219	092	001			
TAS	140					
PRESS ALT						
TEMP.						
CAS						
IAS						
MI SAMPLE MIN						
DRM			000			
SRM			109			
MRRM			163			
DRIFT ANGLE						
CUS	210	100	007 1/2			
TR						
PGS						
GS	150	154	119			
MI ON CUS	150	103	177			
MI ON TR						
MIN ON LEG	60	40	89 1/2			
DEPART TIME	0600	0700	0740			
ETA	0700	0740	0709 1/2			
ETI						
LAT						
LONG.						

Point Option:

Point Option is usually the plane's own carrier. A new position of Point Option is given in bearing and distance from Point Option 1 at a specific time with changes in course and speed.

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

DATE		ZONE		VAR 12° W		S.D.O.	
Recognition Approaches		Wind	Kts.	From	DISPOSITIONS		
Brgs.		Surf.	Own Forces				
Brgs.		1000	18	350			
PtO ₁	PtO ₂	Enemy	2000				
Time	1000		3000				
Lat.	40-35 N		4000				
Long.	73-51 W		5000				
Cus			7000				
Speed			10000				
Dist							
Brg							
From							
Nearest Field at							
Lat.		YE Ident					
Long.		Dial					
Nearest Land at		YE Voice					
Lat.		Dial					
Long.							
RADIO DATA							
Freq.	Dial						
Calls VF	Base	YE Ident					
VS	VB	Dial					
VT	AGC	YE Voice					
		Dial					

WEATHER FORECAST
 Temperature at 1000 Ft. -4°C.

Our Mission
 Search clockwise Geographic Sector 075° to 105° for 115 miles at TAS 120 k.

REQUIRED

Exercise

39 IAS

First leg: CH, TTT

Second leg: CH, CUS, TTT

Third leg: CH, CUS, ETA

CARRIER DATA BOARD

DATE		ZONE		VAR 9° W		S.D.O.	
Recognition Approaches		Wind	Kts.	From	DISPOSITIONS		
Brgs.		Surf.	Own Forces				
Brgs.		1000					
PtO ₁	PtO ₂	Enemy	2000	2.2	030		
Time	0845		3000				
Lat.			4000				
Long.			5000				
Cus	276		7000				
Speed	18 k		10000				
Dist							
Brg							
From							
Nearest Field at							
Lat.		YE Ident					
Long.		Dial					
Nearest Land at		YE Voice					
Lat.		Dial					
Long.							
RADIO DATA							
Freq.	Dial						
Calls VF	Base	YE Ident					
VS	VB	Dial					
VT	AGC	YE Voice					
		Dial					

Our Mission
 Scout Geographic Sector 120° to 140° for 134 miles at TAS 122 k.

REQUIRED

Exercise

40 First leg: CH, CUS, GS, Mi. on CUS, Min. on leg, TTT

Second leg: CH, CUS, GS, Mi. on CUS, Min. on leg, TTT

Third leg: CH, CUS, GS, Mi. on CUS, Min. on leg, ETA

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

CARRIER DATA BOARD

DATE

ZONE

VAR 8° E

S.D.O.

Recognition Approaches

Wind

Kts.

From

DISPOSITIONS

Brigs.

Surf.

Own Forces

Brigs.

1000

2000

32

060

PtO₁

PtO₂

Enemy

Time

1250

Lat.

4000

Long.

5000

Cus

156"

7000

Speed

2.0 k

10000

Dist

54

Brig

350

From

PtO₁

Nearest Field at

Lat.

YE Ident

Long.

Dial

Nearest Land at

Lat.

YE Voice

Long.

Dial

RADIO DATA

Freq.

Dial

Cells VF

Base

YE Ident

VS

VB

Dial

VT

AGC

YE Voice

Dial

Weather Forecast

Temperature at 2000 Ft. -10°C.

Scout Geographic Sector from 230° to 250° for 145 miles at IAS 126 k.

DATE

ZONE

VAR 15° E

S.D.O.

Recognition Approaches

Wind

Kts.

From

DISPOSITIONS

Brigs.

Surf.

Own Forces

Brigs.

1000

2000

2.6

130

PtO₁

PtO₂

Enemy

Time

0645

Lat.

30-20N

Long.

165-30W

Cus

2.00

2.00

7000

Speed

2.0 k

2.0 k

10000

Dist

54

Brig

350

From

PtO₁

Nearest Field at

Lat.

YE Ident

Long.

Dial

Nearest Land at

Lat.

YE Voice

Long.

Dial

RADIO DATA

Freq.

Dial

Cells VF

Base

YE Ident

VS

VB

Dial

VT

AGC

YE Voice

Dial

Depart own CV at 0730; proceed to PtO₂ then search Geographic Sector 090° to 120° for 150 miles at TAS 130 k.

DATE

ZONE

VAR 16° E

S.D.O.

Recognition Approaches

Wind

Kts.

From

DISPOSITIONS

Brigs.

Surf.

Own Forces

Brigs.

1000

25

300

PtO₁

PtO₂

Enemy

Time

0720

Lat.

32-05N

Long.

120-43W

Cus

030

7000

Speed

15 k

10000

Dist

53

Brig

295

From

PtO₂

Nearest Field at

Lat.

YE Ident

Long.

Dial

Nearest Land at

Lat.

YE Voice

Long.

Dial

RADIO DATA

Freq.

Dial

Cells VF

Base

YE Ident

VS

VB

Dial

VT

AGC

YE Voice

Dial

Proceed to PtO₂ at TAS 130 k, then search Geographic Sector 060° to 090° for 150 miles.

REQUIRED

Exercise

- 41 First leg: CH, CUS, GS, Mi. on CUS, Min. on leg, TTT
Second leg: CH, CUS, GS, Mi. on CUS, Min. on leg, TTT
Third leg: CH, CUS, GS, Mi. on CUS, Min. on leg, ETA

REQUIRED

Exercise

- 42 IAS, CH, ETI
First leg: CH, GS, TTT, EPT
Second leg: CH, CUS, Mi. on CUS, GS, TTT, EPT
Third leg: CH, DRM, CUS, GS, ETI, EPI
Mid-lat. 30° N
Mid-long. 164° W

REQUIRED

Exercise

- 43 IAS, CH, DRM, CUS, GS, ETI, EPI
First leg: CH, GS, TTT, EPT
Second leg: CH, CUS, Mi. on CUS, GS, TTT, EPT
Third leg: CH, DRM, CUS, GS, ETI, EPI
Mid-lat. 33° N
Mid-long. 120° W

13 RELATIVE SECTOR SEARCH

DEVIATION TABLE												
Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

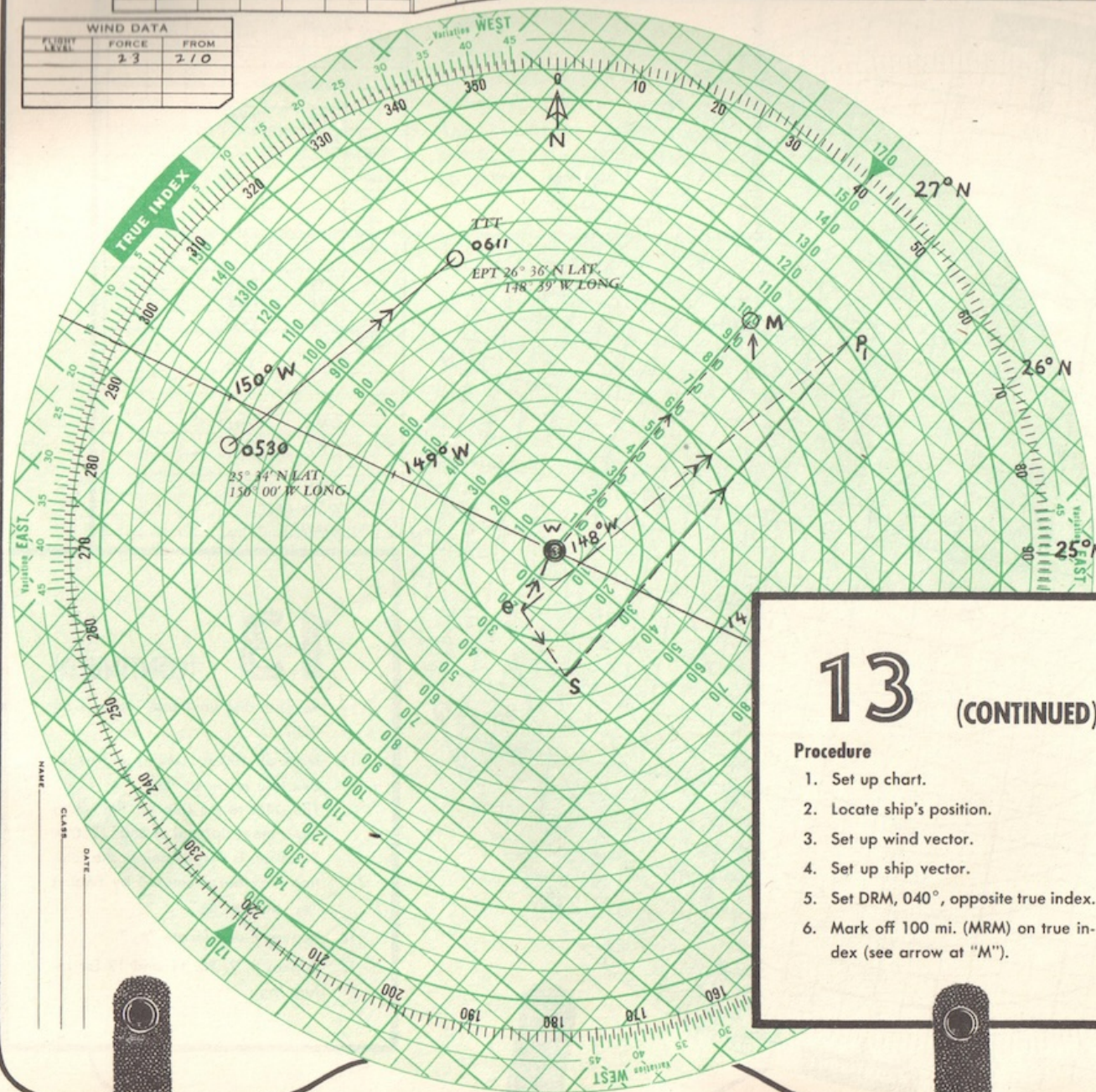
CARRIER DATA BOARD

[illegible]

Mid-lat, 25° N

Mid-long. 148° W

In a relative sector search directions given are for DRM and MRM.

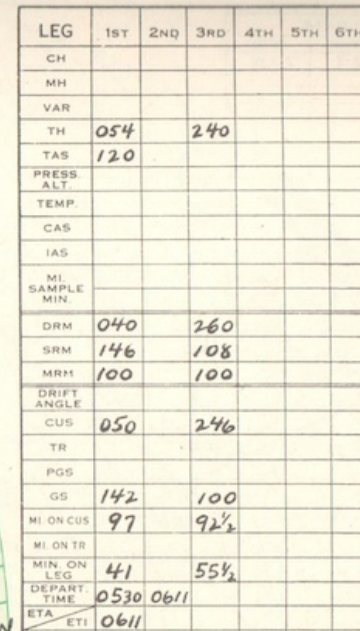
[illegible]

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	054					
TAS	120					
PRESS ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN.						
DRM	040					
SRM	146					
MRM	100					
DRIFT ANGLE						
CUS	050					
TR						
PGS						
GS	142					
MI ON CUS	97					
MI ON TR						
MIN ON LEG	41					
DEPART. TIME	0530					
ETA	0611					
ETI						
LAT.						
LQNG.						

13 (CONTINUED)

1. Set up chart.
2. Locate ship's position.
3. Set up wind vector.
4. Set up ship vector.
5. Set DRM, 040° , opposite true index.
6. Mark off 100 mi. (MRM) on true index (see arrow at "M").
7. Draw line from "s" to " p_1 ."
8. Find TTT, 0611.
9. Find TH.
10. Find CUS and GS.
11. Find miles on CUS.
12. Find EPT by marking off 97 mi. on CUS from departure point.

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



13 (CONTINUED)

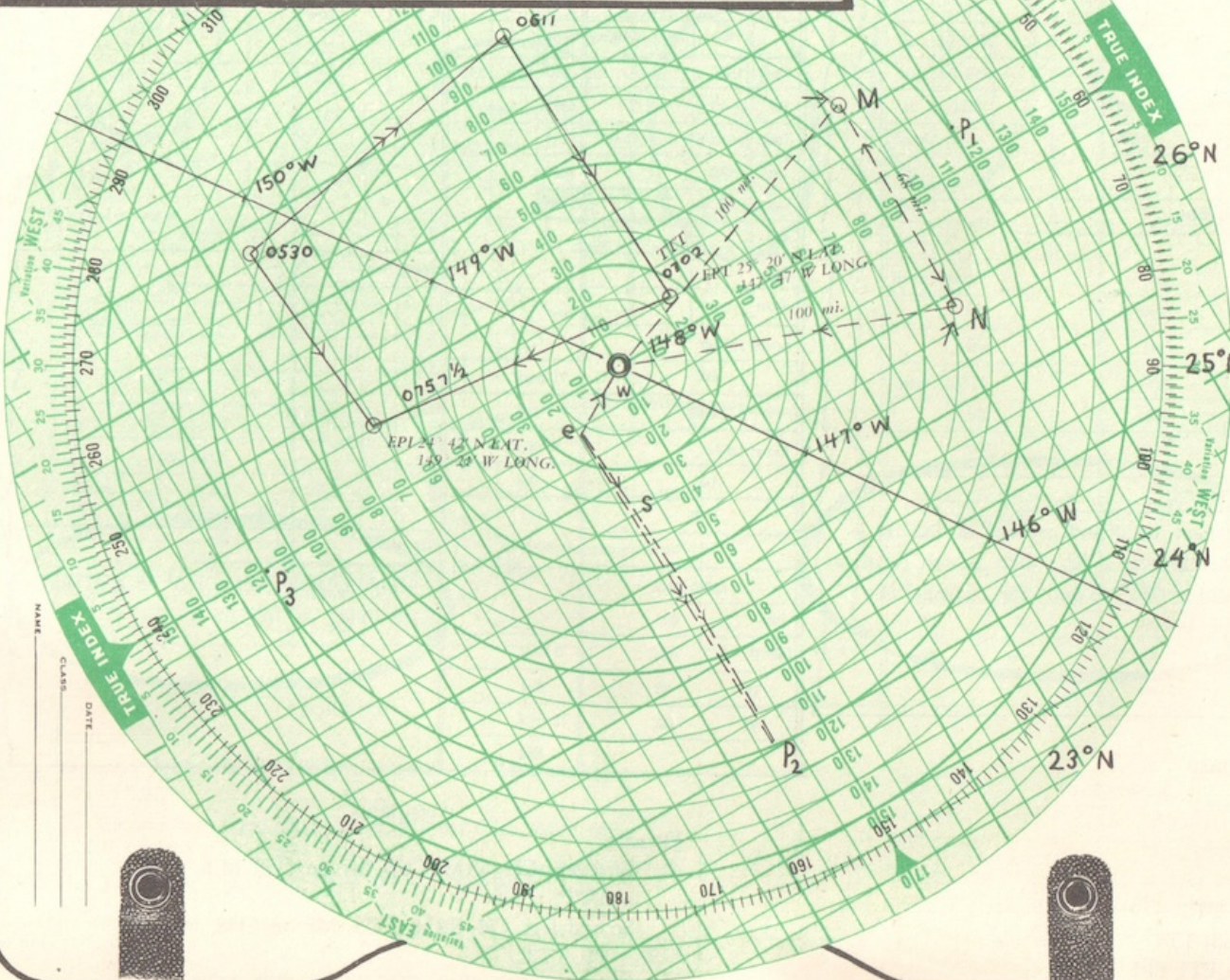
14. Revolve disc until true index is on 080° .
15. Mark off 100 mi. (MRM) on true index (see arrow at "N").
The DRM to the ship for the return leg is the reciprocal of 080° (260°). Since this is true, a step in the solution may be eliminated by finding " p_3 " before " p_2 ."
16. Repeat 7 and locate " p_3 ."
17. Repeat 8, 9, 10, 11 and 12 for return leg.

13

(CONTINUED)

18. Align "M" and "N" to find DRM and MRM for cross leg. (True index will be at 060° bisector of the sector.) Read DRM, 150° , opposite the cross index. The distance (68 mi.) from "M" to "N" is MRM.

19. Repeat 7 and locate "p₂."
20. Repeat 8, 9, 10, 11, 12 and 13 for cross leg.
21. Set CUS, 246°, for return leg and mark off 92½ mi. from end of second leg to find EPI.
22. Add 55½ min. (min. on return leg) to 0702 (TTT of second leg) to find ETI (0757½).



LAT	DIST. LONG	FROM	SQUARE SEARCH FOR VISIBILITY							MILES		
			CUS	CH	GS	SRM	DIST	MIN.	TYT	DIST.	MIN.	TYT
							2V					2V
							2V					2V
							4V					4V
							4V					4V

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	054	159	240			
TAS	120					
PRESS.						
ALT.						
TEMP.						
CAS						
IAS						
MI.						
SAMPLE						
MIN.						
DRM	040	150	260			
SRM	146	80	108			
MRM	100	68	100			
DRIFT						
ANGLE						
CUS	050	148	246			
TR						
PGS						
GS	142	106	100			
MI. ON CUS	97	90	92½			
MI. ON TR						
MIN. ON	41	51	55½			
LEG.						
DEPART.	0530	0611	0702			
TIME						
ETA	0611	0702	0752			
ETI						
LAT.						
LONG.						

CHECK

Find distance ship travels in total time. Set true index on ship's CUS, 145° . Mark off distance ship travels from departure point. This should be EPI. If not, recheck all calculations.

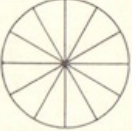

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

CARRIER DATA BOARD

DATE		ZONE		VAR 15° E		S.D.O.	
Recognition Approaches		Wind	Kts.	From	DISPOSITIONS		
Brgs.		Surf.	Own Forces				
Brgs.		1000	15	360			
PtO ₁	PtO ₂	Enemy	2000				
Time	0420	0400	3000				
Lat.	30-30N		4000				
Long.	119-30W		5000				
Cus	125		7000				
Speed	15		10000				
Dist	9						
Brg	340						
From	0420 PtO ₂						
Nearest Field at		Lat.		YE Ident			
		Long.		Dial			
Nearest Land at		Lat.		YE Voice			
		Long.		Dial			
RADIO DATA		Freq.		Dial		Our Mission	
Calls VF		Base		YE Ident		Depart 0420 and proceed at TAS 110 k to intercept PtO ₂ ; then search Relative Sector 040° to 060° for distance of 110 miles.	
VS		VB		Dial			
VT		AGC		YE Voice			
				Dial			

REQUIRED

Exercise

44 IAS

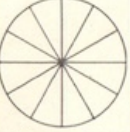

To Pt. Option: CH, ETI

On Search

First leg: CH, CUS, GS, TTT

Second leg: CH, CUS, GS, TTT

Third leg: CH, CUS, GS, ETI, EPI

DATE		ZONE		VAR 13° W		S.D.O.	
Recognition Approaches		Wind	Kts.	From	DISPOSITIONS		
Brgs.		Surf.	Own Forces				
Brgs.		1000					
PtO ₁	PtO ₂	Enemy	2000				
Time	1515		3000	26	130		
Lat.	33-10 S		4000				
Long.	166-20E		5000				
Cus	070		7000				
Speed	2.2 k		10000				
Dist							
Brg							
From							
Nearest Field at		Lat.		YE Ident			
		Long.		Dial			
Nearest Land at		Lat.		YE Voice			
		Long.		Dial			
RADIO DATA		Freq.		Dial		Our Mission	
Calls VF		Base		YE Ident		Scout Relative Sector 190° to 220° for 115 miles at TAS 115 k.	
VS		VB		Dial			
VT		AGC		YE Voice			
				Dial			


REQUIRED

Exercise

45 First leg: CH, SRM, CUS, Mi. on CUS, Min. on leg, TTT


Second leg: CH, SRM, CUS, Mi. on CUS, Min. on leg, TTT

Third leg: CH, SRM, CUS, Mi. on CUS, Min. on leg, ETA



WEATHER FORECAST

Temperature at
3000 ft. -10°C .



WEATHER FORECAST
Temperature at
5000 Ft. $+10^{\circ}\text{C}$.

14

GEOGRAPHIC SECTOR RADIUS OF ACTION

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

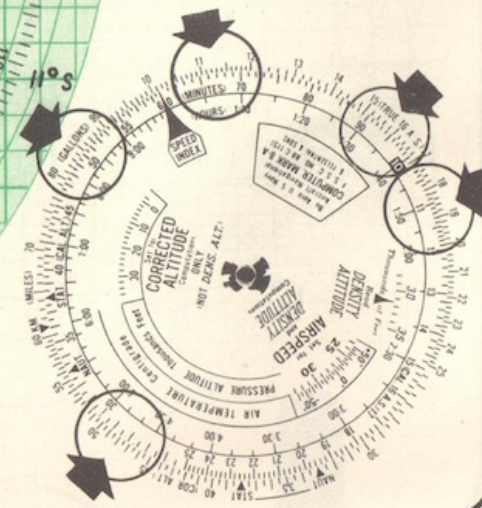
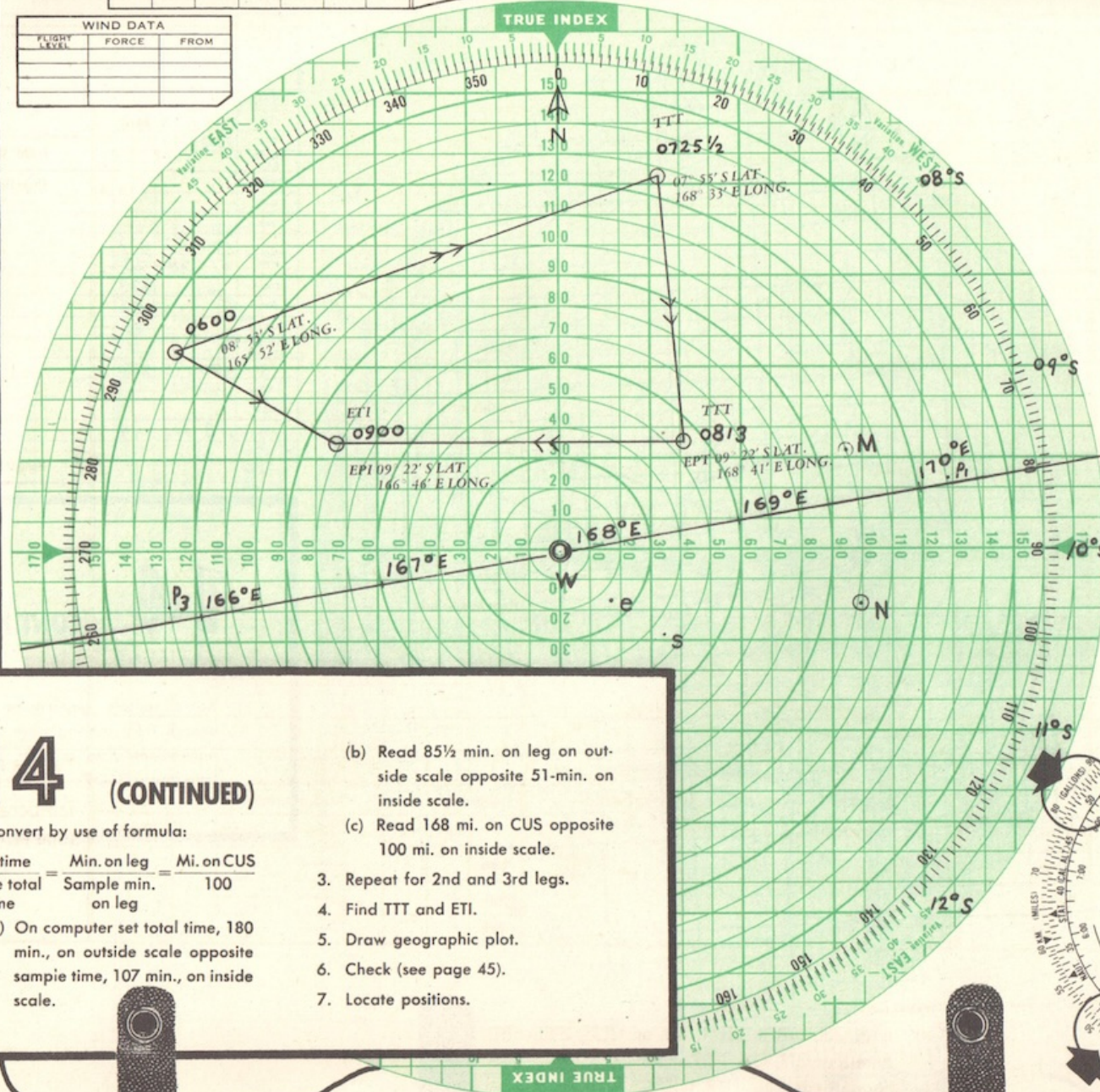
CARRIER DATA BOARD

BULLETIN BOARD	DATE	ZONE	VAR	S.D.O.	PLANES	READY	STATUS	PILOTS	PLANE SPOT					
Recognition Approaches	Wind	Kts.	From	DISPOSITIONS	1	2	3	4	5	6	7	8	9	PLANE SPOT
Brgs.	Surf	1000	2.2	135	Own Forces	A	B	A	B	A	B	A	B	Flight Deck
Brgs.	Surf	1000	2.2	135	Own Forces	A	B	A	B	A	B	A	B	Flight Deck
P10 ₁	P10 ₂	Enemy	2000		Alert									ISLAND
Time	0600		3000		Air Bm									
Lat.	08-53S		4000		Standby									
Long.	165-52E		5000		Time									
Cus	120		7000		Mission									
Speed	20 k		10000		Land									
Dist					Landing Order									
Brg					Substitutions									
From														
Nearest Field at														
Lat.		YE Ident												
Long.		Dial												
Nearest Land at		YE Voice												
Lat.		Dial												
Long.														
RADIO DATA					Our Mission									WEATHER FORECAST
Freq.	Dial				Scout Geographic Sector 070° to 100° at TAS 130 k and return at 0900.									
Calls VF	Base	YE Ident												
VS	VB	Dial												
VT	AGC	YE Voice												
		Dial												

49

SQUARE SEARCH FOR VISIBILITY										MILE	
CUS	CH	GS	SRM	DIST.	MIN.	TTY	DIST.	MIN.	TTY		
				3V			6V				
				2V			6V				
				4V			8V				
				4V			8V				

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	079	168	262			
TAS	130					
PRESS. ALT.						
TEMP.						
CAS						
IAS						
MI. SAMPLE MIN	100 51-	52 28+	67+ 28			
DRM			273			
SRM			162			
MRM			128			
DRIFT ANGLE						
CUS	070	175	270			
TR						
PGS						
GS	118	111	144			
MI. ON CUS	168	87½	113½			
MI. ON TR						
MIN. ON LEG	85½	47½	47			
DEPART TIME	0600	0725½	0813			
ETA	0725½	0813	0900			
ETI						
LAT.	07-55	09-22	09-22			
LONG.	168-33	168-41	168-46			



- (a) On computer set total time, 180 min., on outside scale opposite sample time, 107 min., on inside scale.

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

BULLETIN BOARD			DATE 30 June, 1944	ZONE	VAR 10° E	S.D.O. Lt.Cmdr. Courtts	PLANES	READY	STATUS	PILOTS	PLANE SPOT							
Recognition Approaches			Wind	Kts.	From	DISPOSITIONS	1	2	3	4	5	6	7	8	9	PLANE SPOT		
Brgs.			Surf.			Own Forces	A	B	A	B	A	B	A	B	A	B	Flight Deck	
Brgs.			1000			Alert											ISLAND	
Pt0 ₁ Pt0 ₂ Enemy			2000															
Time 0700 0700			3000															
Lat. 25-14 N			4000															
Long. 165-51 W			5000	34	275													
Cus 180 098			7000															
Speed 28 20			10000															
Dist 52																		
Brg 181																		
From Pt0 ₂																		
Nearest Field at						Enemy Forces	Landing Order									Hangar Deck		
Lat.			YE Ident			Substitutions												
Long.			Dial			Freq. Freq. Freq.												
Nearest Land at			YE Voice			Plane Assignments									ISLAND			
Lat.			Dial			1 2 3 4 5 6 7 8 9												
Long.						A												
RADIO DATA						Our Mission	B									WEATHER FORECAST		
Freq. Dial						Depart at 0745 to intercept Pt0 ₂ , then for 3 hours search Geographic Sector 030° to 060° at TAS 130 k.	Availability Alert Schedule Sleep in											
Calls VF Base			YE Ident				Yes	No	- Time -	Flight -	Flights	Temperature at 5000 Ft. +10° C.						
VS VB			Dial				Planes											
VT AGC			YE Voice				Pilots											
			Dial				Flights											

48 IAS, CH, DRM, SRM, Mi, on CUS, ETI, EPI
First leg: CH, GS, TTT
Second leg: CH, CUS, GS, TTT
Third leg: CH, CUS, GS, Mi. on CUS, EPI

DATE 5 October, 1944				ZONE		VAR 10° E		S.D.O. Lt. Burks		PLANES	
Recognition Approaches				Wind	Kts.	From	DISPOSITIONS				
Brgs.				Surf.			Own Forces				
Brgs.				1000							
PtO ₁ PtO ₂ Enemy				2000							
Time 0800 0700				3000							
Lat. 32-20N				4000							
Long. 157-30W				5000	20	170					
Cus 260 270				7000							
Speed 20 20				10000							
Dist 30											
Brg 160											
From 0700 PtO ₂											
Nearest Field at											
Lat.				YE Ident							
Long.				Dial							
Nearest Land at				YE Voice							
Lat.				Dial							
Long.											
RADIO DATA											
Freq. Dial											
Calls VF Base				YE Ident							
VS VB				Dial							
VT AGC				YE Voice							
				Dial							
Our Mission				Depart at 0900 and proceed to PtO ₂ at TAS 140 k. Search Geographic Sector 310° to 340° for 3 hours.							
Alert											
Air Bm											
Standby											
Time											
Mission											
Land											
Landing Order											
Substitutions											
Freq.											
Plane Assign											
1											
A											
B											
Availability											
Yes											
Planes											
Pilots											
Flights											

CARRIER DATA BOARD

DATE 5 Dec. 1943				ZONE		VAR 10° W		S.D.O. Lt. (jg) Anderson	
Recognition Approaches				Wind	Kts.	From	DISPOSITIONS		
Brgs.				Surf.			Own Forces		
Brgs.				1000					
PtO ₁ PtO ₂ Enemy				2000	20	340			
Time 0700 0700				3000					
Lat. 36-37N				4000					
Long. 76-18W				5000					
Cus 095				7000					
Speed 18				10000					
Dist 100									
Brg 060									
From PtO ₁									
Nearest Field at									
Lat.				YE Ident					
Long.				Dial					
Nearest Land at				YE Voice					
Lat.				Dial					
Long.									
RADIO DATA									
Freq. Dial									
Calls VF Base				YE Ident					
VS VB				Dial					
VT AGC				YE Voice					
				Dial					
Our Mission				Depart 0800. Scout Geographic Sector 160° to 130° for maximum distance. TAS 130 k. Start to intercept PtO ₂ at end of cross leg and arrive at 1200.					
Alert									
Air Bm									
Standby									
Time									
Mission									
Land									
Landing Order									
Substitutions									
Freq.									
Plane Assign									
1									
A									
B									
Availability									
Yes									
Planes									
Pilots									
Flights									

WEATHER FORECAST
Temperature at
2000 ft. +15°C

REQUIRED

Exercise

- 50 IAS, CH, DRM, SRM, MRM, EPI
First leg: CH, GS, TTT
Second leg: CH, CUS, GS, TTT
Third leg: CH, CUS, GS, Mi. on CUS, EPI

REQUIRED

Exercise

- 51 IAS
First leg: CH, GS, TTT
Second leg: CH, CUS, GS, TTT
Third leg: CH, CUS, GS, EPI

15

RELATIVE SECTOR RADIUS OF ACTION

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

CARRIER DATA BOARD

DATE	ZONE			VAR	S.D.O.	PLANES		READY		STATUS		PILOTS						
BULLETIN BOARD	Recognition Approaches			Wind	Kts.	From	DISPOSITIONS		1	2	3	4	5	6	7	8	9	PLANE SPOT
Brgs.				Surf.			Own Forces	A	B	A	B	A	B	A	B	A	B	Flight Deck
Brgs.				1000	20	125		Alert										ISLAND
PtO ₁	PtO ₂	Enemy	2000				Air Bm											
Time	0700			3000			Standby											
Lat.	08-11 S			4000			Time											
Long.	168-46 E			5000			Mission											
Cus	070			7000			Land											
Speed	21			10000			Landing Order											
Dist							Substitutions											
Brg																		
From																		
Nearest Field at									Freq.		Freq.		Freq.				ISLAND	
Lat.				YE Ident					Plane Assignments		1		2		3			
Long.				Dial					A		4		5		6			
Nearest Land at				YE Voice					B		7		8		9			
Lat.				Dial													WEATHER FORECAST	
Long.																		
RADIO DATA																		
Freq.				Dial														
Calls VF				Base			YE Ident		Availability		Alert Schedule		Sleep in					
VS				VB			Dial		Yes		No		Time		Flight		Flights	
VT				AGC			YE Voice		Planes									
				Dial					Pilots									
									Flights									

Our Mission

Scout Relative Sector 180° to 220° at TAS
120 k and return at 1030.

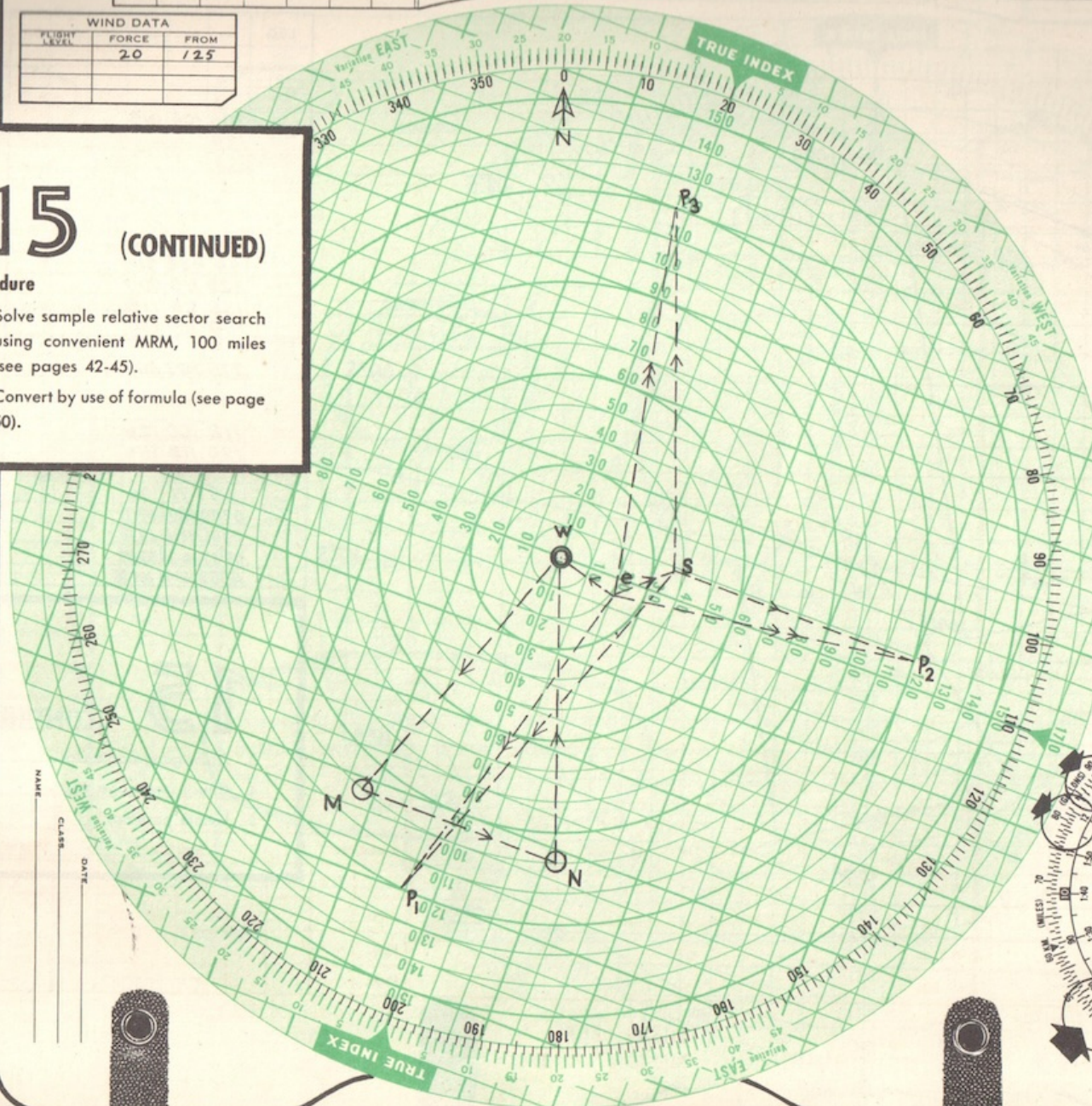
Mid-lat. 08° S
Mid-long. 170° E

15 (CONTINUED)

Procedure

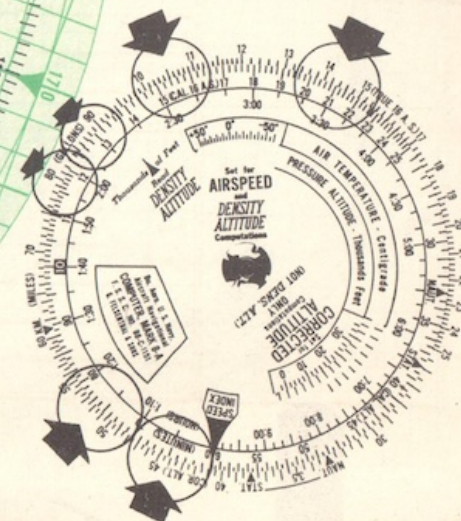
1. Solve sample relative sector search using convenient MRM, 100 miles (see pages 42-45).
2. Convert by use of formula (see page 50).

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	20	125



SQUARE SEARCH FOR VISIBILITY									
CUS	DRM	CH	GS	SRM	DIST	MIN	FT	DIST	MIN
					1V			1V	
					2V			2V	
					3V			3V	
					4V			4V	
					5V			5V	

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	206	106	018			
TAS	120					
PRESS ALT						
TEMP						
CAS						
IAS						
MI SAMPLE	87-	81	106+			
MIN	44	48½	51-			
DRM	220	110	000			
SRM	136	84	118			
MRM	100	68	100			
DRIFT ANGLE						
CUS	215	103	009			
TR						
PGS						
GS	118	100	126			
MI ON CUS	127	118	156			
MI ON TR						
MIN ON LEG	65	71	74			
DEPART TIME	0700	0805	0916			
ETA	ETI	0805	0916	1030		
LAT						
LONG						



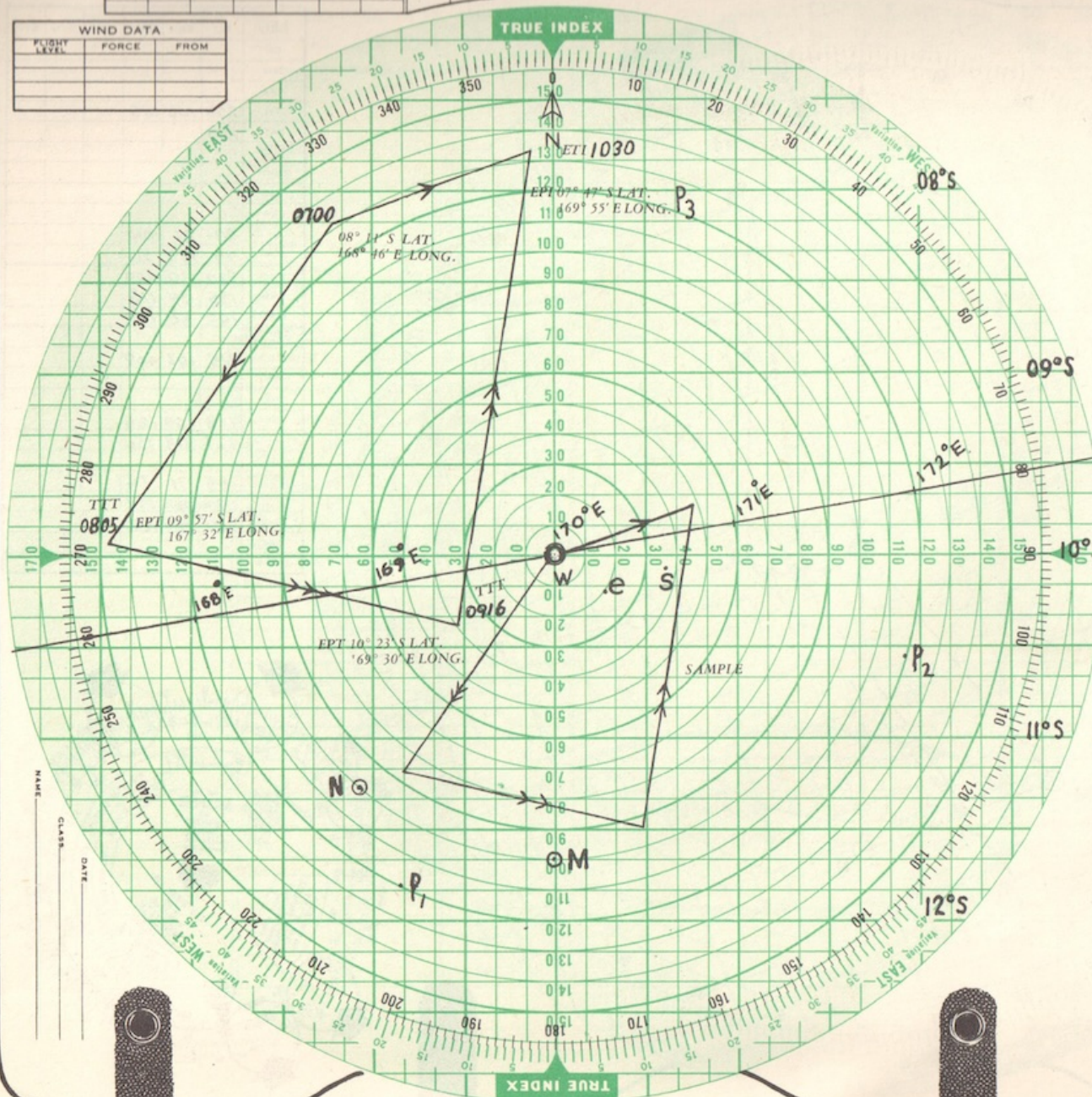
CH	MH	TH	DA	TAS	CAS	IAS

WIND STAR	TIME	DIR

SHIP DATA	NAME	TIME	CUS	SPEED	BEARS	LAT	DIST	LONG	FROM

SQUARE SEARCH FOR VISIBILITY	MILES

WIND DATA	FLIGHT LEVEL	FORCE	FROM



LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH	206	106	018			
TAS	120					
PRESS ALT						
TEMP						
CAS						
IAS						
MI SAMPLE	87-81	106+				
MIN	44	48	51-			
DRM	220	110	000			
SRM	136	84	118			
MRM	100	68	100			
DRIFT ANGLE						
CUS	215	103	009			
TR						
PGS						
GS	118	100	126			
MI ON CUS	127	118	156			
MI ON TR						
MIN ON LEG	65	71	74			
DEPART TIME	0700	0805	0916			
ETA	0805	0916	1030			
ETI						
LAT.	09° 57' 10-23	07-47				
LONG.	16732	16930	16955			

15 (CONTINUED)

3. Draw geographic plot.
4. Check (see page 45).
5. Locate positions.

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

CARRIER DATA BOARD

DATE 30 May, 1944				ZONE		VAR 10° E		S.D.O. Lt. Cmdr. King	
Recognition Approaches				Wind	Kts.	From	DISPOSITIONS		
Brgs.				Surf.			Own Forces		
Brgs.				1000					
Pt0 ₁	Pt0 ₂	Enemy	2000	20	170				
Time	0400	0400	3000						
Lat.		30-20 N	4000						
Long.		170-20 W	5000						
Cus		060	7000						
Speed		20	10000						
Dist	30								
Brg	340								
From	Pt0 ₂								
Nearest Field at				YE Ident					
Lat.				= Dial					
Long.				Dial					
Nearest Land at				YE Voice					
Lat.				Dial					
Long.				Dial					
RADIO DATA				Dial					
Freq.	Dial								
Calls VF	Base								
VS	VB								
VT	AGC								
Our Mission				Proceed to Pt0 ₂ at TAS 130 k; then search Relative Sector 020° to 050°, allowing 3 hours for search.					

REQUIRED

Exercise

52 IAS, CH, ETI

First leg: CH, CUS, TTT

Second leg: CH, CUS, TTT

Third leg: CH, CUS, ETI, EPI

DATE 29 July, 1944				ZONE		VAR 15° E		S.D.O. Lt. L. Brown	
Recognition Approaches				Wind	Kts.	From	DISPOSITIONS		
Brgs.				Surf.			Own Forces		
Brgs.				1000					
Pt0 ₁	Pt0 ₂	Enemy	2000	25	060				
Time	1030	1000	3000						
Lat.		38-10 N	4000						
Long.		167-15 W	5000						
Cus	160	150	7000						
Speed	20	20	10000						
Dist	50								
Brg	220								
From	1000 Pt0 ₂								
Nearest Field at				YE Ident					
Lat.				Dial					
Long.				Dial					
Nearest Land at				YE Voice					
Lat.				Dial					
Long.				Dial					
RADIO DATA				Dial					
Freq.	Dial								
Calls VF	Base								
VS	VB								
VT	AGC								
Our Mission				Depart 1100 and proceed to Pt0 ₂ at TAS 135 k. For 3 hours search Relative Sector 050° to 080°.					

REQUIRED

Exercise

53 IAS, CH, ETI

First leg: CH, CUS, TTT

Second leg: CH, CUS, TTT

Third leg: CH, CUS, ETI, EPI

CH	MH	TH

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	20	110

16 FIXED SQUARE SEARCH

Given
 Wind 20 K from 110°
 ETA 1032
 TAS 130 K
 Visibility 12 mi.

Find
 First through fourth legs CUS, TH, GS, Dist., Min., TTT.

SQUARE SEARCH FOR VISIBILITY 12 MILES											
CUS	TH	GS	SRM	DIST	MIN	TTT	CUS	TH	GS	SRM	TTT
110	110	110	24	13	1045	72	39	1217			
020	039	128	24	11.2	1056.2	72	33.6	1250.6			
290	290	150	48	19.2	1115.4	96	38.4	1329			
200	191	128	48	22.5	1138	96	45	1414			

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						
TAS	130					

Procedure

1. Set up wind vector.
2. Locate "p1" with TAS 130 K and CUS into the wind.
3. Locate "p2" 90° to left of "ep1" using cross index and TAS 130 K.
4. Locate "p3" 90° to left of "ep2", CUS with the wind and same TAS.
5. Locate "p4" 90° to left of "ep3", using cross index and same TAS.
6. Find GS for all four legs.
7. Adjust disc to find all TH's.
8. Find min. on leg and TTT for each leg.

PRACTICE PROBLEM SQUARE SEARCH

Exercise 54.

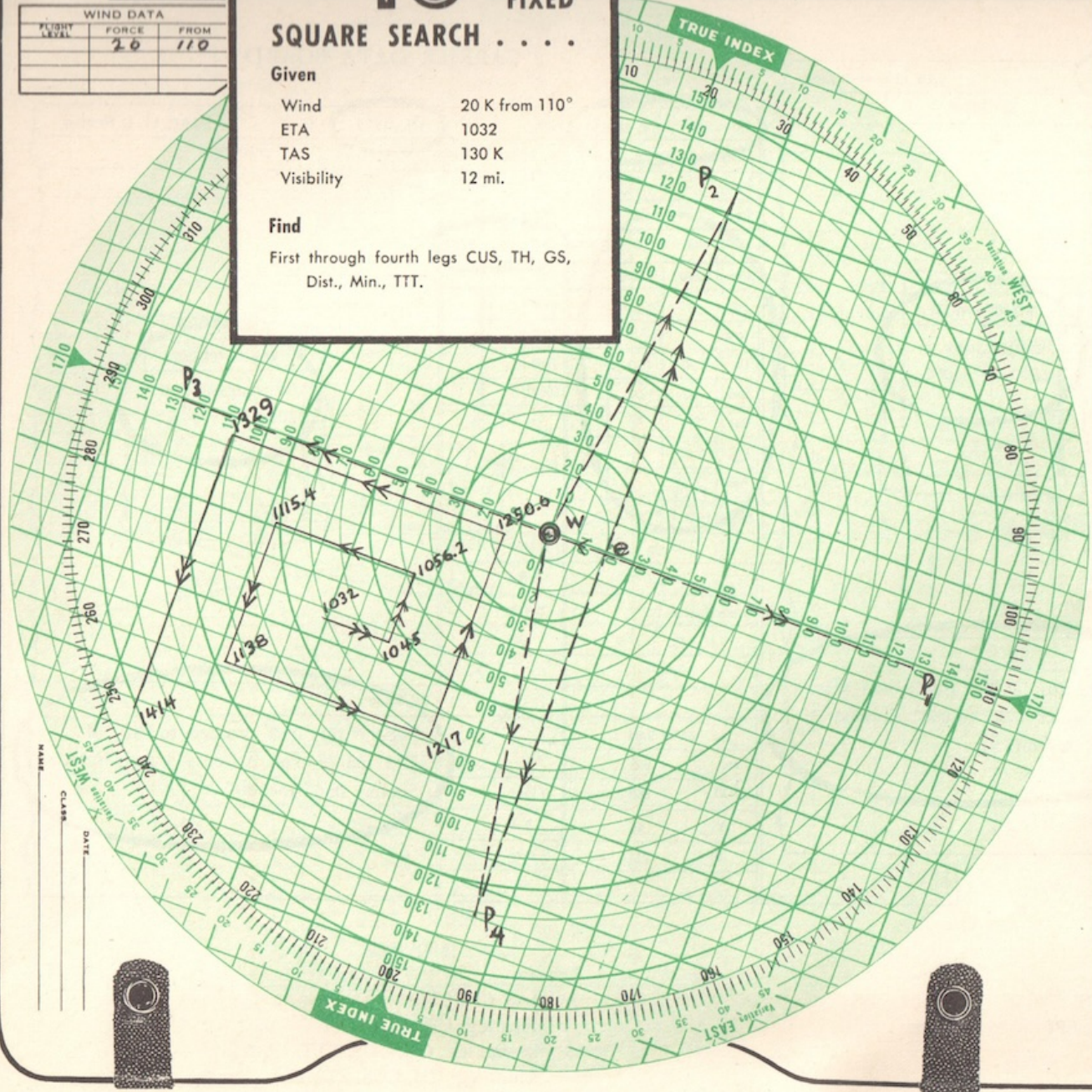
Given

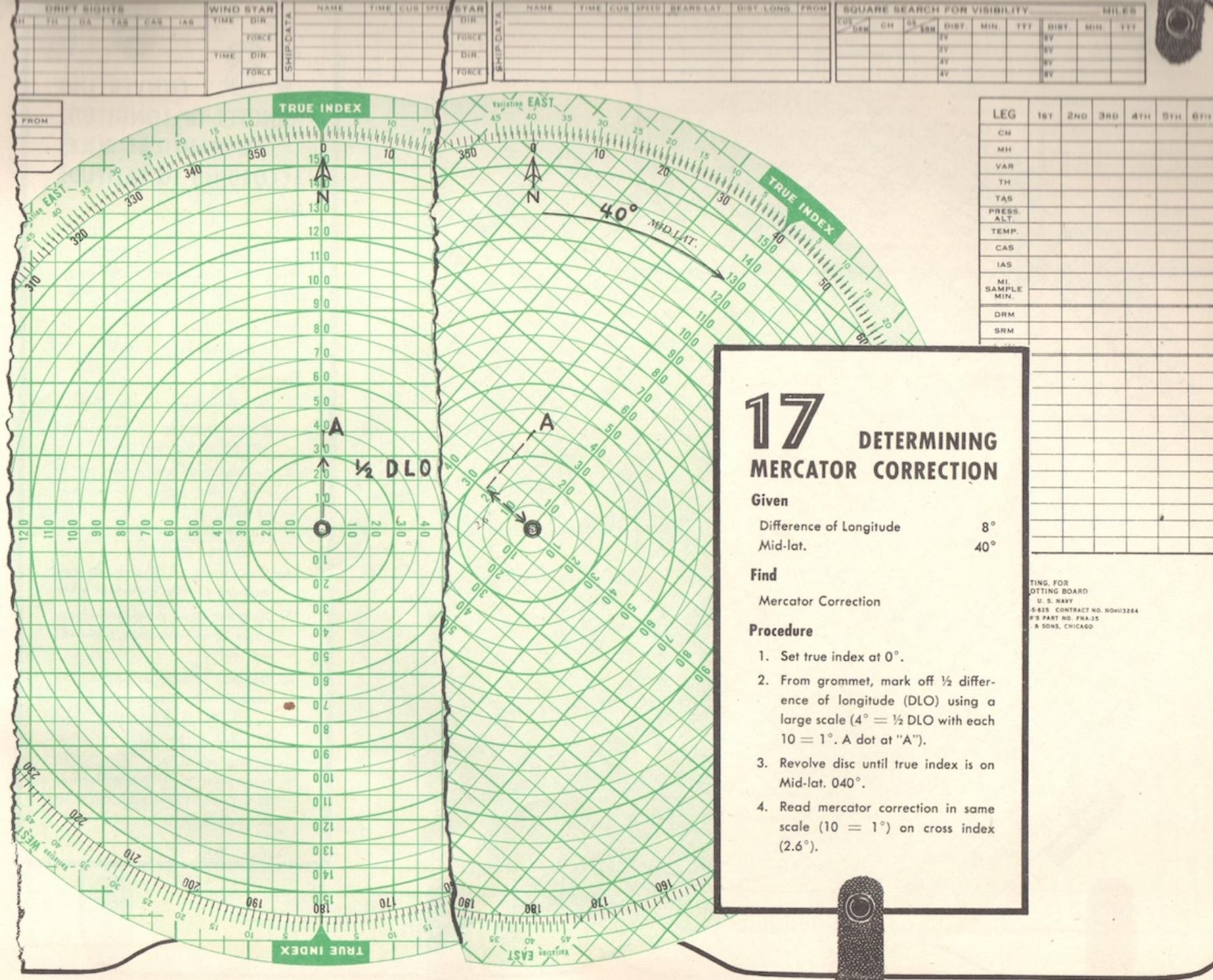
Depart on CUS 245°, TAS 125 K, for 44°15' N, Lat., 150°10' W, Long. and conduct a geographic square search for a plane reported disabled at that position. At 1620 arrived over station and commenced search.

Wind 25 K from 305°, Visibility 12 mi.
 At 1807 disabled plane sighted directly below.

Required

First through fifth legs CUS, TH, GS, Mi. on CUS, Min. on leg, TTT.
 1807 Position of Plane.





17 DETERMINING MERCATOR CORRECTION

Given

Difference of Longitude 8°
Mid-lat. 40°

Find

Mercator Correction

Procedure

1. Set true index at 0° .
2. From grommet, mark off $\frac{1}{2}$ difference of longitude (DLO) using a large scale ($4^{\circ} = \frac{1}{2}$ DLO with each $10 = 1^{\circ}$). A dot at "A".
3. Revolve disc until true index is on Mid-lat. 040° .
4. Read mercator correction in same scale ($10 = 1^{\circ}$) on cross index (2.6°).

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						
TH						
TAB						
PRESS.						
ALT.						
TEMP.						
CAS						
IAS						
MI.						
SAMPLE						
MIN.						
DRM						
SRM						

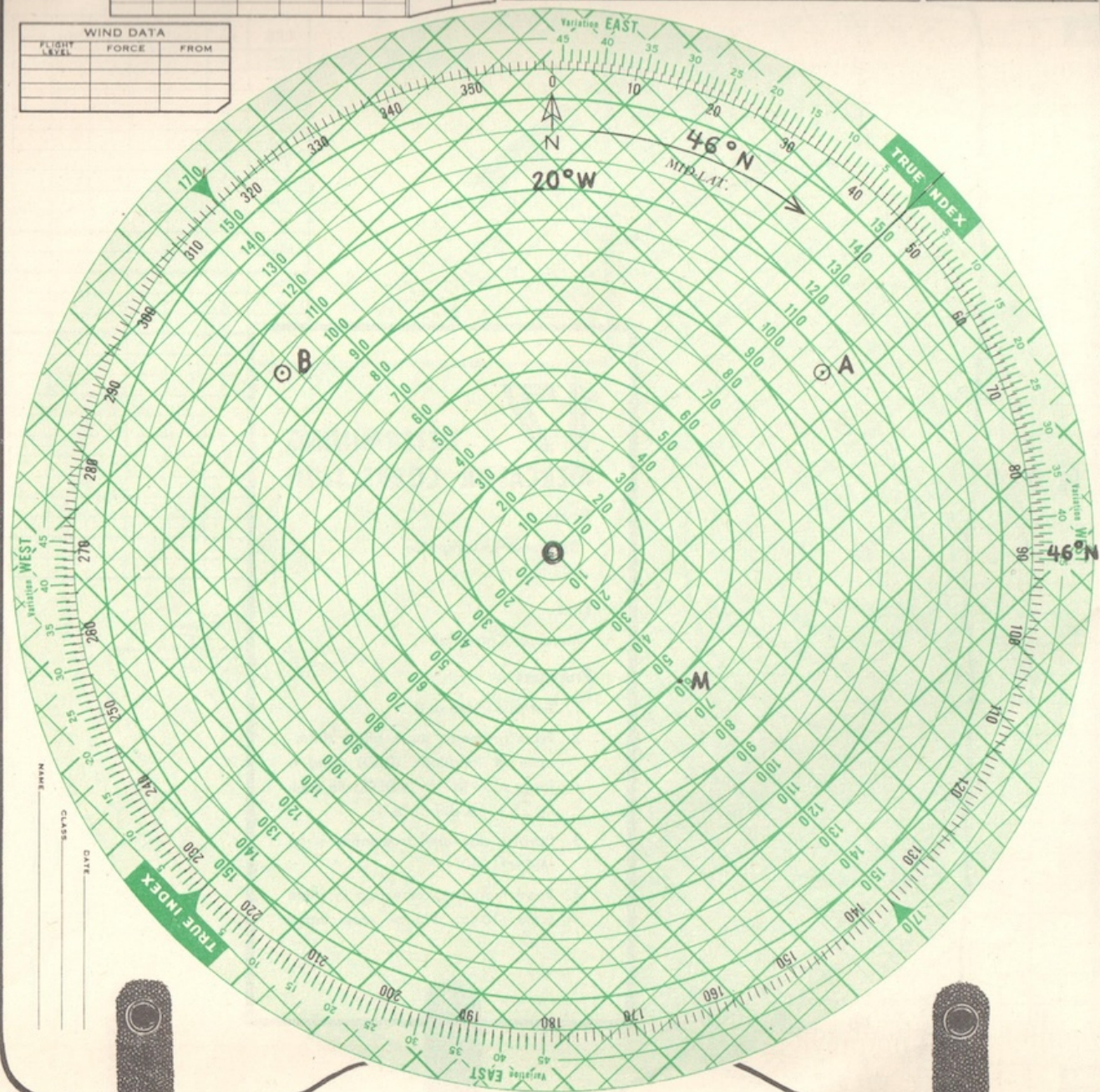
TING, FOR
OTTING BOARD
U. S. NAVY
5-625 CONTRACT NO. N0003264
P'S PART NO. 7NA-35
8 SONS, CHICAGO

DRIFT SIGHTS						WIND STAR	
CH	RM	TH	DA	TAB	CAB	IAB	TIME DIR
							FORCE
							TIME DIR
							FORCE

NAME	TIME	CUR	SPEED	BEARS	DIST	LONG	FROM

SQUARE SEARCH FOR					
CUL	SRM	CH	SS	SRM	DIST
					1V
					2V
					3V
					4V

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



18

CONVERTING MINUTES OF LONGITUDE TO NAUTICAL MILES ACCORDING TO LATITUDE

Given

Mid-lat. 46° N.
Mid-long. 20° W

Point "A," 90 miles east of Mid-long.

Point "B," 90 miles west of Mid-long.

Find

Longitude of "A" and "B"

Procedure

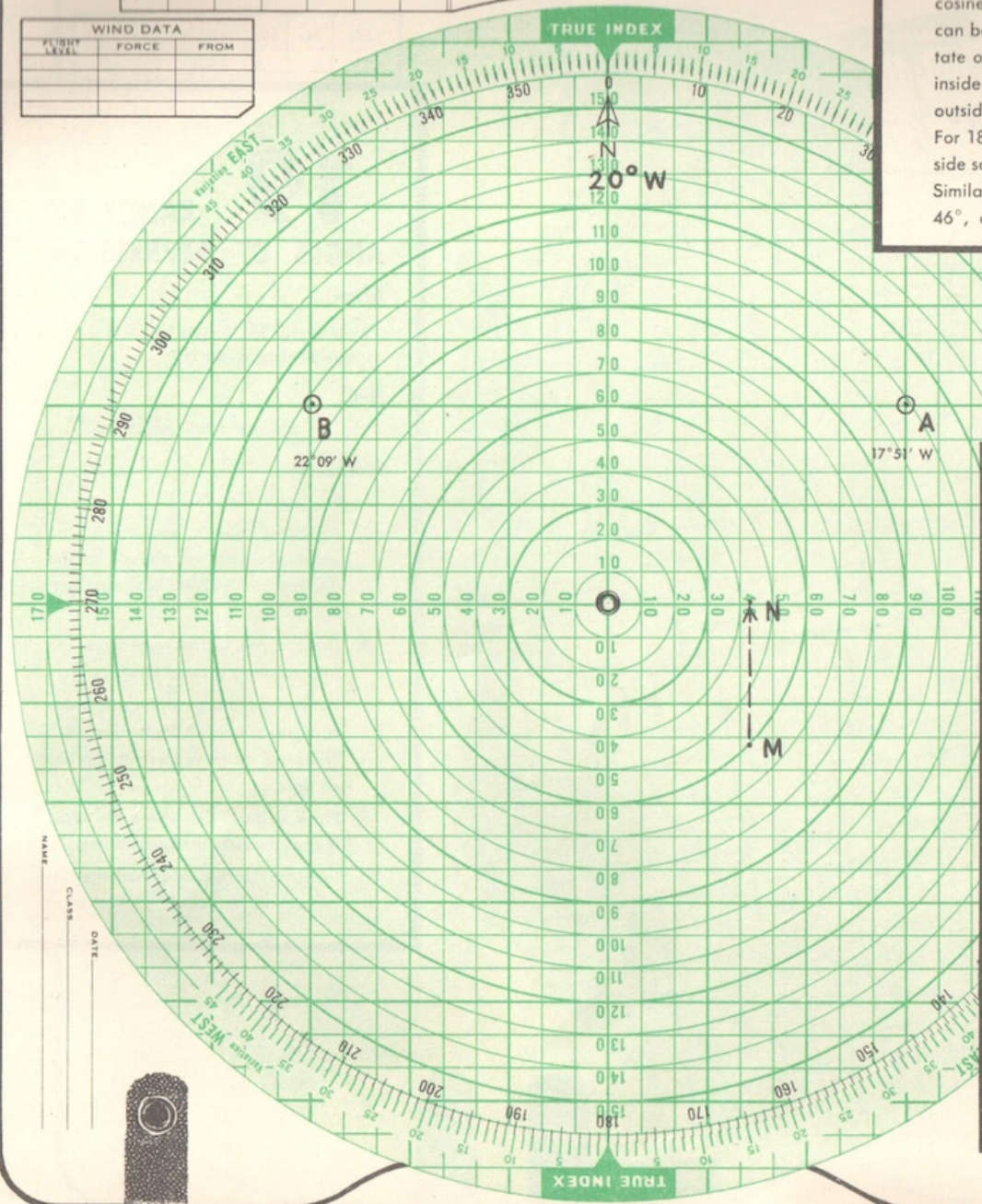
1. Set true index to Mid-lat. (046°).
2. Mark intersection of cross index with 60' circle. Label "M."
3. Reorient to 0° and project "M" to cross index (point "N" as illustrated).

$$\frac{\text{Number of Nautical Miles}}{60' \text{ long. at } 46^\circ \text{ N}} = 42 \text{ mi.}$$

4. On computer set 60' on inside scale opposite 42 miles on outside scale.
5. Note that 70 on outside scale is opposite 10 on inside scale. Label 46° latitude.
6. Opposite 90 miles on outside scale read 129' on inside scale.
7. As point "A" is 90 miles east of 20° W, subtract 129' giving 17°51' W as longitude of "A."
Since point "B" is 90 miles west of 20° W, add 129' giving 22°09' W as longitude of "B."

DRIFT SIGHTS						WIND STAR		SHIP DATA						
CH	MH	TH	DA	TAB	CAS	IAB	TIME	DIR	NAME	TIME	CUS	SPEED	BARS	LAT
							TIME	DIR						
							TIME	DIR						
							TIME	DIR						

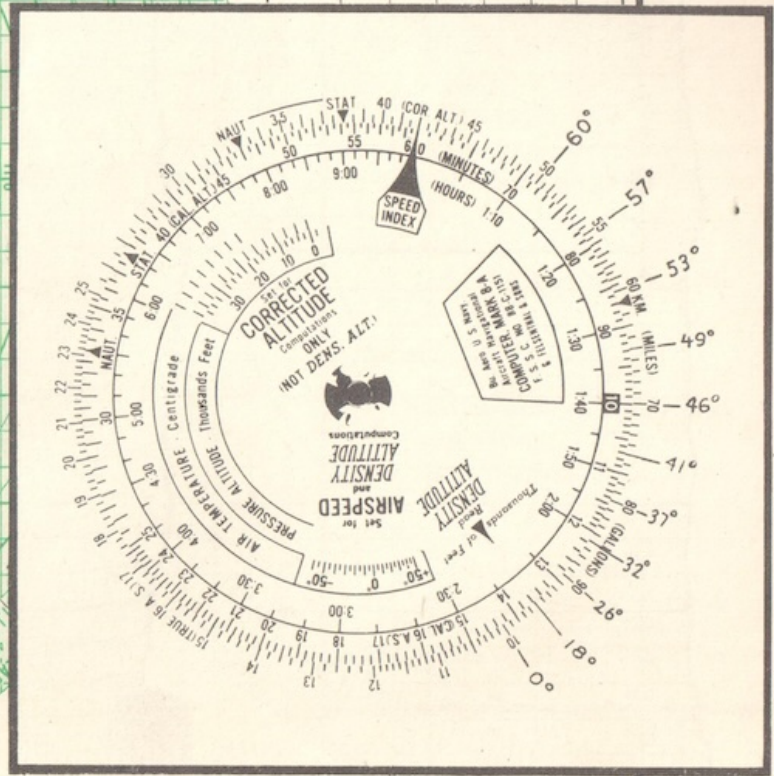
WIND DATA		
FLIGHT LEVEL	FORCE	FROM

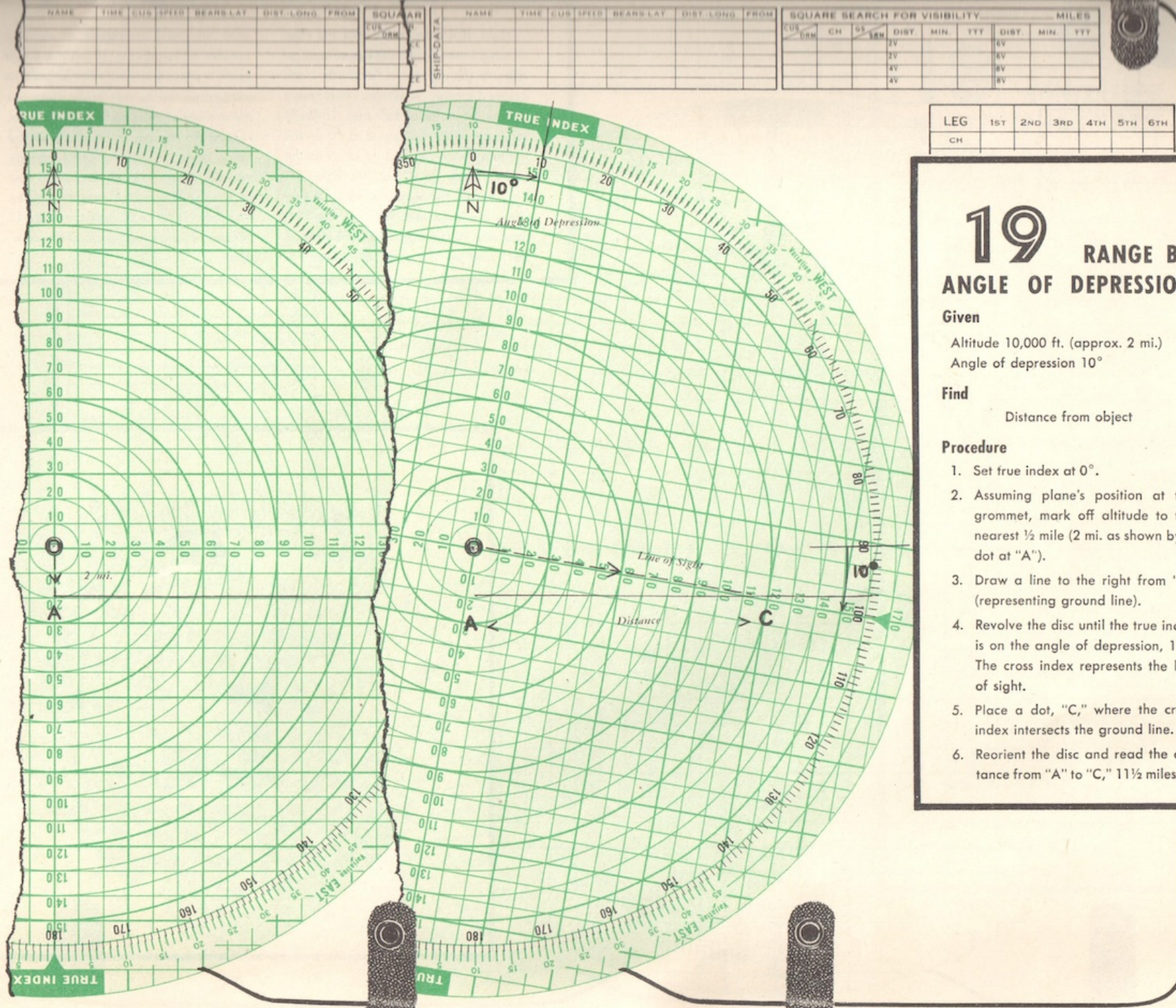


Note: It will be noted that the relationship between the number of nautical miles to the minutes of longitude is the cosine function. A similar relationship can be set up for all latitudes. To facilitate operation, the square at 10 on the inside scale can be placed at 10 on the outside scale for 0° Lat. Mark this 0°. For 18° Lat. the square at 10 on the inside scale is opposite 95. Mark this 18°. Similarly 90 is marked 26°, 70 marked 46°, and up the scale as illustrated.

Thus for rapid conversion of miles to minutes of longitude, 10 on the inside scale is placed opposite the latitude as marked on the outside scale. Opposite the number of miles on the outside scale is read the minutes of longitude on the inside scale. In this fashion longitude may be measured in terms of miles east or west of the central meridian when true index is set at 0° and converted to minutes of longitude by use of the computer.

MI	SAMPLE
MIN	
DRM	
SRM	
MRM	
DRIFT	
ANGLE	
CUS	
TR	





DRIFT SIGHTS						
CH	MH	TH	DA	TAB	CAB	IAB

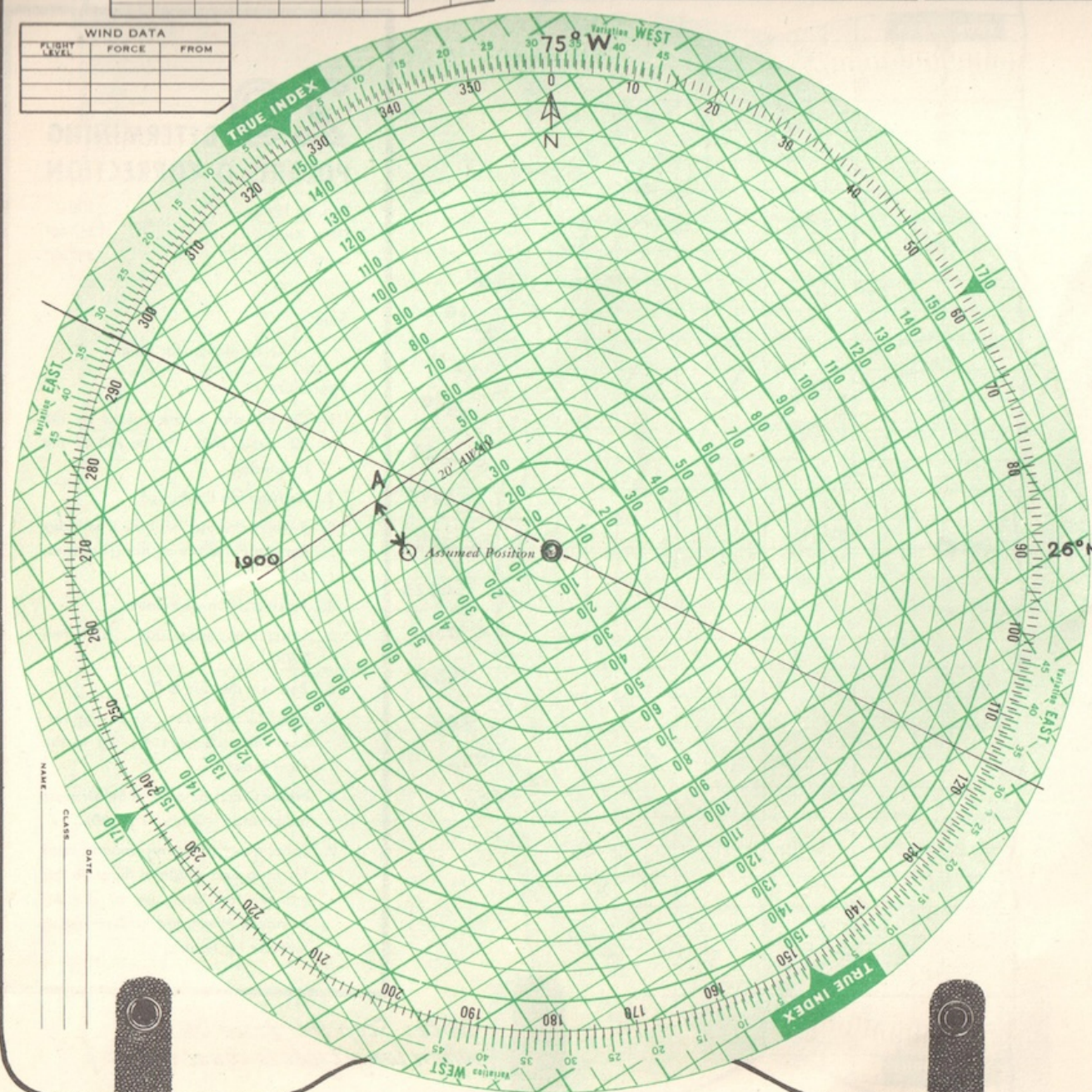
WIND STAR	TIME	DIR.
		FORCE
TIME	DIR.	FORCE

NAME	TIME	CUS	SPEED	BEARS LA	DIST. LONG	FROM

SQUARE SEARCH FOR VISIBILITY										MILES		
CUS	SRM	CH	SS	SRM	DIST.	MIN.	TYT	DIST.	MIN.	TYT		

WIND DATA		
FLIGHT LEVEL	FORCE	FROM

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH						
VAR						



21 CELESTIAL LINE OF POSITION

Given

Mid-lat.	26° N
Mid-long.	75° W
Jan. 25, 1945	1900
Sun GHA	101° 53'
Long.	75° 53' W
Sun LHA	26°
H _c	38° 26'
H _c	38° 06'
Intercept	20' Away
Zn	147°

Find

Line of position

Procedure

1. Set up chart.
2. Locate assumed position, 26° N Lat., 75° 53' W, Long.
3. Revolve the disc until the true index is on the true azimuth (Zn = 147°).
4. From assumed position mark off intercept, 20' Away. Label "A."
5. Through "A" draw line of position (LOP) parallel to the cross index.

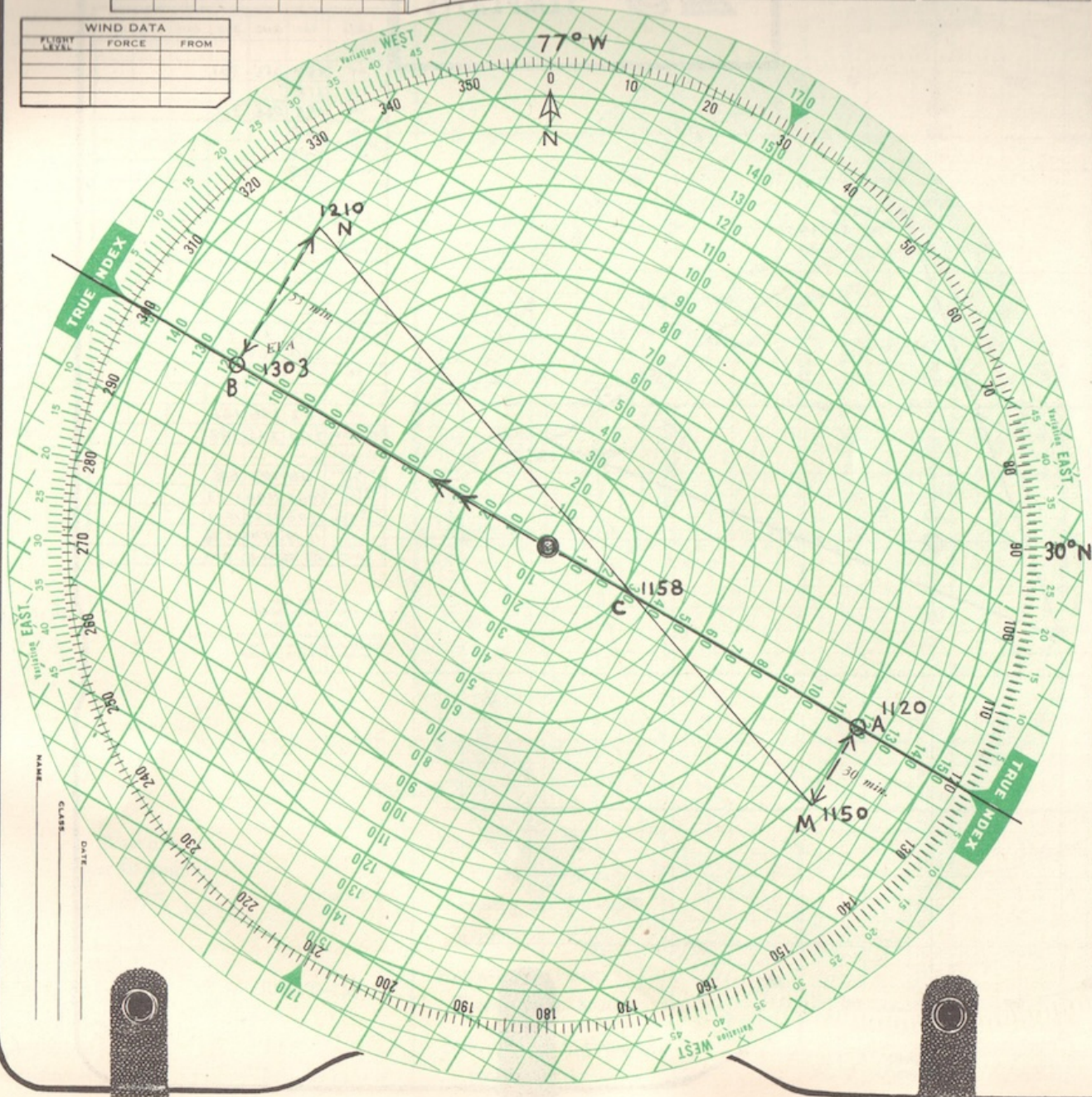
DRIFT FLIGHTS				
CH	MH	TH	DA	TAS

WIND STAR	
TIME	DIR

NAME	TIME	CUS	ED	BEARSLAT	DIST	LONG	FROM

SQUARE SEARCH FOR			
CUS	CH	SS	DIST

WIND DATA		
FLIGHT LEVEL	FORCE	FROM



22 DETERMINING SUNRISE IN FLIGHT

Given

Point "A" 29° N Lat.
75° W Long.
Point "B" 31° N Lat.
79° W Long.

Jan. 30, 1945
Time of sunrise at "A" 1150 GCT
Time of sunrise at "B" 1210 GCT
Departure from "A" 1120 GCT
GS 140 K

Find

Sunrise in Flight

Procedure

1. Set up chart.
2. Locate "A" and "B."
3. Set true index on CUS from "A" to "B," 300°, and draw in CUS line.
4. Find ETA at "B."
5. Since sunrise at "A" is 1150 GCT and departure time is 1120 GCT, mark off 30 min. below "A" in a perpendicular line. Label "M."
6. Since sunrise at "B" is 1210 GCT and ETA is 1303, mark off 53 min. above "B" in a perpendicular line. Label "N."
7. Draw a line from "M" to "N." Sunrise in flight is the intersection of "MN" with "AB." Label "C."
8. Find distance on CUS line to "C," and with GS 140 K determine time, 1158.

23 TEMPLATES

WIND DATA		
FLIGHT LEVEL	FORCE	FROM
	25	050

NAME _____
CLASS _____
DATE _____

DRIFT SIGHTS					
CH	MH	TH	DA	TAS	IAS

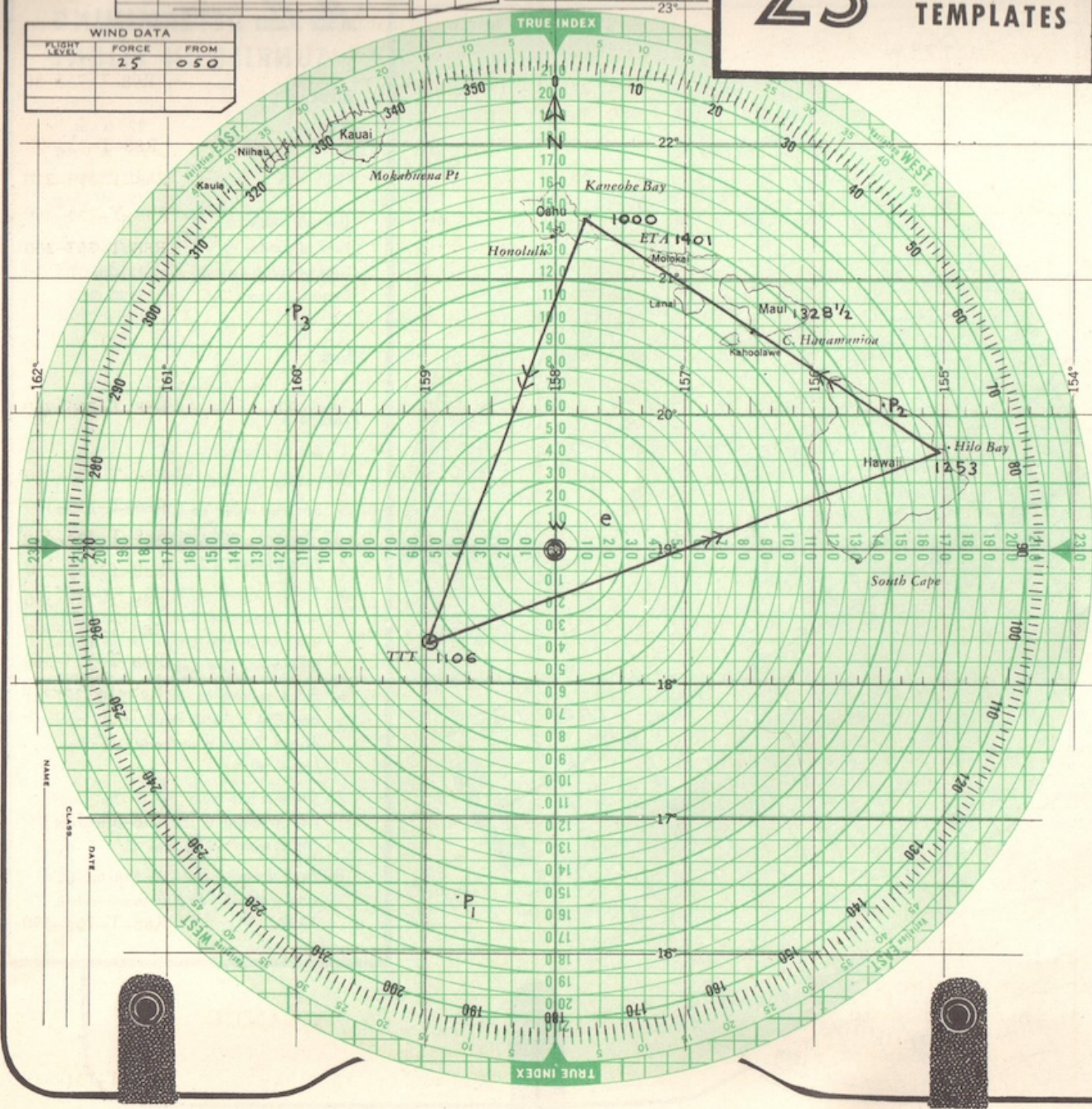
WIND STAR		
TIME	DIR	FORCE

SHIP DATA		
NAME	TIME	CUS

SIGHTS		
MIN.	TTT	DIST.

LEG	1ST	2ND	3RD	4TH	5TH	6TH
CH						
MH	184	055	301			
VAR	11E					
TH	195	066	312			
TAS	160					
PRESS. ALT.	1000					
TEMP.	+20					
CAS	156					
IAS	156					
MI. SAMPLE MIN.	-	-	-			
DRM	-	-	-			
SRM	-	-	-			
MRM	-	-	-			
DRIFT ANGLE	5R	3R	9L			
CUS	200	069	303			
TR	-	-	-			
PGS	-	-	-			
GS	182	136	166			
MI ON CUS	200	242	188			
MI ON TR	-	-	-			
MIN. ON LEG	66	107	68			
DEPART. TIME	1000	1106	1253			
ETA	1106	1253	1401			
LAT.	18-19	19-43	21-28			
LONG.	158-58	155-02	157-47			

SHEET, PLOTTING, FOR
TRAINING PLOTTING BOARD
BU. AERO. U. S. NAVY
STOCK NO. 988-5-615 CONTRACT NO. N0003264
MANUFACTURER'S PART NO. FRA-35
G. FELSENTHAL & SONS, CHICAGO



PLOTING BOARD TEMPLATES FOR MK3 PLOTING BOARD

(88-B-770 AND 88-B-780)

Templates are transparent patterns used with plotting boards in navigational computations. Such templates are available on order from CNO, Op-33-E.

District	Scale of in. per 60 nautical miles	Stock No.
Coco Solo	1½	88-T-500
" "	2	88-T-510
Corpus Christi	1½	88-T-512
" "	2	88-T-514
Culebra Island, W.I.	1½	88-T-518
" "	2	88-T-520
Dutch Harbor	1½	88-T-522
" "	2	88-T-524
Greenland Area	1½	88-T-526
" "	1½	88-T-528
Guantanamo	1½	88-T-530
" "	2	88-T-540
Hawaii N.	1½	88-T-555
" S.	1½	88-T-557
Hawaiian Islands N.	2	88-T-560
" " S.	2	88-T-570

Iceland Area	1½	88-T-574
" "	2	88-T-576
Jacksonville	2	88-T-580
Kodiak	1½	88-T-584
" "	2	88-T-586
Narragansett Bay	1½	88-T-588
" "	2	88-T-589
Norfolk	1½	88-T-590
" "	2	88-T-600
Panama	1½	88-T-630
" "	2	88-T-640
Pensacola	1½	88-T-658
" "	2	88-T-660
Puget Sound	1½	88-T-670
" "	2	88-T-672
San Diego	1½	88-T-700
" "	2	88-T-710
San Francisco	1½	88-T-720
" "	2	88-T-722
Sitka	1½	88-T-730
" "	2	88-T-732
Virgin Islands	1½	88-T-740
" "	2	88-T-750

Truk, Nomoi Is., Ponape (from South)	1½	R88-T-753-60
Truk, (from West) and Woleai Is. (from E)	1½	R88-T-753-70
Yap (from E) Guam (from SW), Woleai Is. (from NW)	1½	R88-T-753-80
Palau Is. and Yap (from SW)	1½	R88-T-753-90
Ellice Is.	1½	R88-T-753-210
Gilbert Islands	1½	R88-T-753-240
Nauru I., Ocean I.	1½	R88-T-753-260
Greenwick Is. (Kaping- amarangi Is.)	1½	
Loyalty Is. (New Caledonia) and New Hebrides Is.	1½	R88-T-753-280
Marcus Is.	1½	
Marianas Is. (from N)	1½	R88-T-753-290
" " (from S)	1½	R88-T-753-300
" " Marcus I.	1½	R88-T-753-320
Marshall Is. (from NE)	1½	R88-T-753-330
" " (from SE)	1½	R88-T-753-340
" " (from NW)	1½	R88-T-753-350
" " (from SW)	1½	R88-T-753-360
" " Wake Is.	1½	R88-T-753-370

New Caledonia I.	1½	
New Hebrides Is., Santa Cruz Is., & SE		
Solomon Is.	1½	R88-T-753-380
New Hebrides Is.	1½	
Santa Cruz Is.	1½	
Solomon Is.	1½	R88-T-753-390
Wake Is.	1½	

ATLANTIC

Trinidad I. and Windward Is.	1½	R88-T-751
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NACI-HO TEMPLATES FOR MARK 3A

PACIFIC

District	Scale of in. per 60 nautical miles	Stock No.
Admiralty Is.	1½	
Bismark Archipelago and Greenwich Is.	1½	R88-T-753
Bismark Arch. (NE New Britain, New Ireland and NW Solomon Is.)	1½	R88-T-753-10

Caroline Is. Senyavin Is. (Ponape) Kusaie (from North) and Eniwetok (from South)	1½	R88-T-753-30
Senyavin Is. (Ponape), Kusaie (from South)	1½	R88-T-753-40
Truk, Nomoi Is., Ponape (from North)	1½	R88-T-753-50

CARRIER DATA BOARD

BULLETIN BOARD		DATE 23 Nov. 1944			ZONE			VAR 21° W			S.D.O. Lt. S. Robinson			PLANES			READY			STATUS			PILOTS				
Recognition Approaches		Wind	Kts.	From	DISPOSITIONS										1	2	3	4	5	6	7	8	9	PLANE SPOT			
Brgs.		Surf.			Own Forces										A	B	A	B	A	B	A	B	A	B	Flight Deck		
Brgs.		1000													Alert												
Time 0430		2000	26	135											Air Bm												
Lat.		3000													Standby												
Long.		4000													Time												
Cus 350		5000													Mission												
Speed 25		7000													Land												
Dist 65		10000													Landing Order												
Brg 160															Substitutions												
From Cocos Island																											
Nearest Field at																											
Lat.		YE Ident													Freq.												
Long.		Dial													Freq.												
Nearest Land at Cocos Island		YE Voice													Freq.												
Lat. 28-38 S		Dial													Plane Assignments												
Long. 89-17 E															1	2	3	4	5	6	7	8	9				
RADIO DATA															A												
Freq. Dial															B												
Calls VF Base		YE Ident													Availability												
VS VB		Dial													Yes	No											
VT AGC		YE Voice													Planes												
		Dial													Pilots												
															Flights												
					<p>Our Mission</p> <p>Depart 0530. Proceed to Cocos Island at TAS 141 k. Scout Geographic Sector clockwise 280° to 310° allowing 3 hours for search. Return to Cocos Island.</p>																				<p>WEATHER FORECAST</p> <p>Visibility 20 miles.</p> <p>Temperature at 2000 ft. +10°C.</p>		

REQUIRED

Exercise

56 IAS

First leg: CH, TTT

Second leg: CH, TTT

Third leg: CH

Mid-lat. 28°00' S

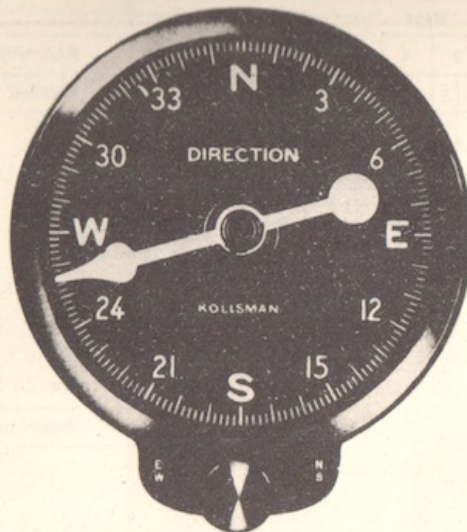
Mid-long. 88°00' E

DEVIATION TABLE

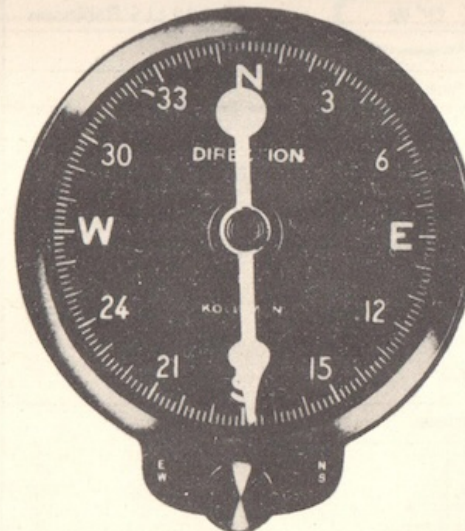
Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

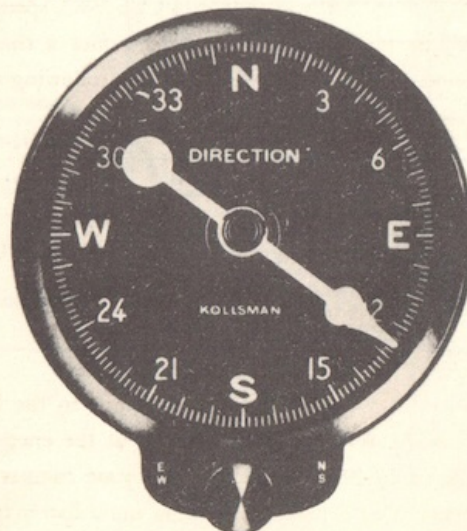
Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176



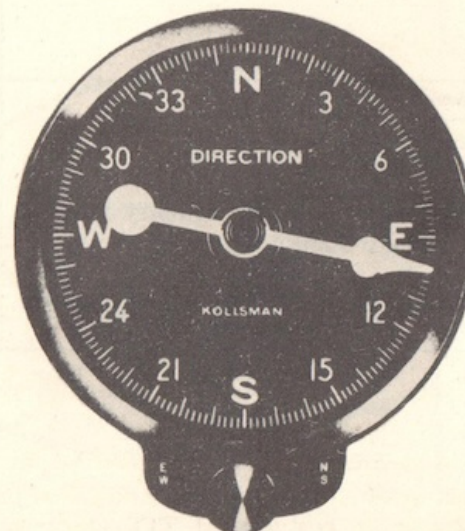
- A. At 0639 you sight enemy at limit of visibility. While heading directly toward enemy your compass reads 256°.



- B. Paralleling enemy's course, compass reads 178°.



- D. At 0710 enemy changes course. While paralleling enemy course your compass reads 126°.



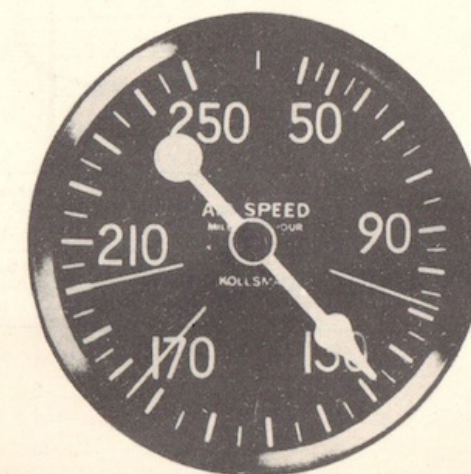
- E. At 0715 message received; At 0720 Pt. Option CUS 315°, speed 24 K.
At 0820 you head directly for enemy distance 15 mi. compass reads 100°

- C. Enemy speed is estimated at 20 K. What is 0639 enemy position?

While tracking the enemy you notice a change in wind, so you take a wind star with the following results:

CH	IAS	Drift
122°	108 K	5° R
058°	111 K	13.5° L
005°	113 K	13° L

What is the new wind?



- F. Depart immediately to intercept Pt. 0₁ at IAS 128 mph.
What is CH to Pt. 0₁?
What is ETI?
What is EPI?

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

Exercise GIVEN

57 Mid-lat. 46°00' N

Mid-long. 145°00' W

USS RANGER 0925 position: bearing 337°, distant 60 miles from Corsair Island, 44°28' N Lat., 147°35' W Long. on CUS 018°, speed 24 K. You receive orders to depart RANGER at 1000, at altitude 2000 ft. proceed to Corsair Island, search a geographic sector 060° to 090° to a maximum distance, allowing three hours for the search, and return to Corsair Island at the end of the third leg. Search sector in a counterclockwise direction. Aerology gives the wind at 20 K from 205°, T -21° at flight altitude, visibility 25 miles. Variation 19° E, TAS 130 K.

REQUIRED

IAS, CH and TTT, 1st leg of search

CH and TTT, 2nd leg of search

CH 3rd leg of search

GIVEN

At 1215 you sight enemy at limit of visibility. While heading directly toward enemy, your compass reads 000°; paralleling enemy's course, your compass reads 087°. Enemy speed estimated to be 22 K.

REQUIRED

1215 enemy position

GIVEN

At 1334 enemy changes course. While paralleling new enemy course, compass reads 013°. Ten minutes later you receive a message that the RANGER at 1350 will change course to 050°, speed 25 K.

While tracking enemy you notice a change of wind, and take a wind star with the following results:

CH	IAS	Drift
233°	112 K	2° L
290°	108 K	16° R
102°	104 K	9° L

REQUIRED

Wind force and direction.

GIVEN

At 1412 you are ordered to return to the RANGER. While heading directly for enemy, estimated to be 20 miles distant, your compass reads 226°. You depart this position immediately to intercept the RANGER at IAS 136 K.

REQUIRED

CH to intercept, ETI, EPI

Exercise GIVEN

58 Mid-lat. 31°00' S

Mid-long. 160°00' E

USS SARATOGA 1145 position, bearing 064°, distant 40 miles from Bromley Island, 32°09' S Lat. 161°25' E Long., on CUS 330°, speed 24 K. You receive orders to depart SARATOGA at 1205 and at altitude 3000 ft. proceed to Bromley Island; then search a geographic sector from 280° to 310° to a maximum distance. Allow 3.5 hours for the search, and return to Bromley Island at the end of the third leg. Search the sector in a clockwise direction. Aerology gives the Wind as 27 K from 355°, at flight altitude T + 5°, visibility 30 miles. Variation 14° E, TAS 136 K.

REQUIRED

IAS, CH and TTT, 1st leg of search

CH and TTT, 2nd leg of search

CH 3rd leg of search

GIVEN

At 1432 you sight enemy at limit of visibility. While heading directly toward enemy, your compass reads 322°; paralleling enemy's course, your compass reads 197°. Enemy speed estimated to be 20 K.

REQUIRED

Enemy position

GIVEN

At 1517 enemy changes course. While paralleling new enemy course, your compass reads 141°. Ten minutes later you receive a message that the SARA-TOGA at 1530 will change to CUS 298°, speed 26 K. While tracking the enemy you notice a change of wind, and take a wind star with the following results:

CH	IAS	Drift
175°	111 K	8.5° L
106°	114 K	3° R
028°	126 K	10° R

REQUIRED

Wind force and direction.

GIVEN

At 1553 you are ordered to return to the SARA-TOGA. While heading directly at the enemy, estimated to be 25 miles distant, your compass reads 053°. You depart this position immediately to intercept the SARATOGA at IAS 134 K.

REQUIRED

CH to intercept, ETI, EPI

DEVIATION TABLE

Mag.	000	030	060	090	120	150	180	210	240	270	300	330
Comp.	002	033	064	093	122	150	179	208	237	267	299	330

AIRSPEED CALIBRATION TABLE

Ind.	70	80	90	100	110	120	130	140	150	160	170
Cal.	68	76	84	94	106	118	130	142	155	166	176

Exercise GIVEN

59 Mid-lat. 19°00' N -
Mid-long. 131°00' W
Fleet Guide 0730 position, 17°47' N Lat., 132°17' W Long., on CUS 048°, speed 20 K. USS CHARGER, 0730 position, bearing 320°, distant 35 miles from the 0730 position of the Fleet Guide, on CUS 015°, speed 22 K. You are ordered to depart CHARGER at 0730 and proceed to the Fleet Guide; then search a relative sector from 070° to 090° to a maximum distance. Allow three hours for the search; intercept the Fleet Guide on the third leg of the search. From Aerology you find the following data: Wind 26 K from 195°, T -10° at flight altitude 3,500. ft., visibility 20 miles. Variation 12° E, TAS 124 K.

REQUIRED

IAS, CH and TTT, 1st leg of search
CH and TTT, 2nd leg of search
CH 3rd leg of search

GIVEN

At 0906 you sight the enemy at limit of visibility. While heading directly toward the enemy, your compass reads 355°, paralleling enemy's course, compass reads 210°. Enemy speed estimated to be 30 K.

REQUIRED

Enemy position

GIVEN

At 0948 you receive a message that at 1015 the CHARGER will change to CUS 055°, speed 24 K. At 0950 enemy changes course. While paralleling new enemy course, your compass reads 268°. While tracking enemy you notice a change in wind, and take a wind star with the following results:

CH	IAS	Drift
153°	114 K	7° R
056°	116 K	10° L
320°	119 K	3° L

REQUIRED

Wind force and direction.

At 1040 you head directly for the enemy, estimated to be 15 miles away; your compass reads 357°. You depart this point immediately to intercept the CHARGER. IAS 111 K.

REQUIRED

CH to intercept, ETI, EPI

GIVEN

Exercise

60 Mid-lat. 23°00' N
Mid-long. 26°00' W
USS RANGER 0930 position bears 097°, distance 35 miles from Sherman Rock, 21°21' N Lat., 26°26' W Long., on CUS 005°, speed 26 K. You receive orders to depart RANGER at 0930, and at altitude 3000 ft. proceed to Sherman Rock; then search a geographic sector from 350° to 020° to a maximum distance. Allow three hours for the search, and return to Sherman Rock at the end of the third leg. Search the sector in a counterclockwise direction. Aerology gives the Wind 22 K from 235°, at flight altitude, T + 6°, visibility 20 miles. Variation 17° W, TAS 134 K.

REQUIRED

IAS, CH and TTT, 1st leg of search
CH and TTT, 2nd leg of search
CH, 3rd leg of search

GIVEN

At 1102 you sight an enemy convoy at the limit of visibility. While heading directly for the convoy, your compass reads 006°; paralleling convoy's course, your compass reads 130°. Convoy's speed estimated to be 14 K.

REQUIRED

Position of the convoy

GIVEN

You report this position and receive orders to track the convoy and send in amplifying reports. At 1142 you receive a message that the RANGER will change to CUS 042° at 1158, speed 28 K. While tracking the convoy you notice a change of wind and take a wind star with the following results:

CH	IAS	Drift
230°	122 K	13.5° R
179°	122 K	4.5° R
137°	122 K	9° L

REQUIRED

Wind force and direction.

GIVEN

At 1234 you are ordered to return to the RANGER. While heading directly for the convoy, estimated to be 15 miles distant, your compass reads 217°. You depart this position immediately to intercept the RANGER. IAS 136 K.

REQUIRED

CH to intercept, ETI, EPI

Exercise

GIVEN

61 Mid-lat. 04°00' N
Mid-long. 88°00' E
Fleet Guide 0900 position 03°08' N Lat., 86°58' E Long., on CUS 044°, speed 20 K. USS WICHITA 0900 position, bearing 330°, distant 47 miles from the 0900 position of the Fleet Guide, on CUS 010°, speed 25 K. You are ordered to depart WICHITA at 0900 and proceed to the Fleet Guide; then search a relative sector from 080° to 100° to a maximum distance. Allow three hours for the search; intercept the Fleet Guide on the third leg of the search. From Aerology you find the following data: Wind 15 K from 205°, T -1° at flight altitude 2000 ft., visibility 20 miles. Variation 4° W. TAS 125 K.

REQUIRED

IAS, CH and TTT, 1st leg of search
CH and TTT, 2nd leg of search
CH, 3rd leg of search

GIVEN

At 1130 you sight the enemy at the limit of visibility. While heading directly toward the enemy, your compass reads 346°; paralleling enemy's course, your compass reads 199°. Enemy speed estimated to be 18 K.

REQUIRED

Enemy position

GIVEN

At 1142 you receive a message that at 1112 the WICHITA changed to CUS 075°, speed 30 K. At 1150 the enemy changes course. While paralleling new enemy course, your compass reads 133°, speed 18 K. While tracking the enemy, you notice a change in the wind and take a wind star with the following results:

CH	IAS	Drift
230°	121 K	9° L
170°	121 K	8° L
105°	121 K	1° R

REQUIRED

Wind force and direction.

GIVEN

At 1310 you head directly for the enemy, estimated to be 15 miles away, and your compass reads 005°. You depart this position immediately to intercept the WICHITA. IAS 131 K.

REQUIRED

CH to intercept, ETI, EPI

*Exercise

GIVEN

62 Mid-lat. 25°00' S
Mid-long. 120°00' E
Fleet Guide 1240 position, 24°15' S Lat., 120°54' E
Long, on CUS 244°, speed 26 K. USS INTREPID 1240 position bearing 104°, distant 45 miles from 1240 position of Fleet Guide, on CUS 232°, speed 20 K.

You depart INTREPID at 1240 with orders to proceed to the Fleet Guide; then search a geographic

sector from 165° to 195° to a maximum distance. Allow 3.5 hours for the search, and intercept the Fleet Guide at end of third leg. Altitude 6000 ft., T -7°. Wind 26 K from 215°, visibility 20 miles. Variation 12° E. TAS 120 K.

REQUIRED

IAS, CH and TTT, 1st leg of search
CH and TTT, 2nd leg of search
CH, 3rd leg of search

GIVEN

At 1500, you sight an enemy raider at the limit of visibility and report its position. While heading directly for the enemy, your compass reads 215°; paralleling enemy's course, your compass reads 255°. Enemy speed estimated to be 23 K.

REQUIRED

1500 enemy position.

GIVEN

While tracking enemy, a wind star is taken with the following results: (Altitude 1000 ft., T 0°.)

CH	IAS	Drift
000°	115 K	12° R
243°	115 K	2° L
131°	115 K	10° L

REQUIRED

Wind direction and force.

GIVEN

At 1523, you receive a message that the INTREPID is out of action. You are to return to the ENTERPRISE which at 1550 will bear 065°, distant 35 miles from the 1240 position of the Fleet Guide, and will be on CUS 257°, speed 24 K.

At 1550 while heading directly for the raider, estimated to be 10 miles away, your compass reads 168°. You depart this point immediately to intercept the ENTERPRISE, IAS 122 K, altitude 1000 ft., T +5°.

REQUIRED

CH to intercept, ETI, EPI

GIVEN

Exercise

63 Mid-lat. 20°00' S
Mid-long. 125°00' E
Fleet Guide position, 21°16' S. Lat., 126°47' E

Long., on CUS 272°, speed 22 K. USS ESSEX 1345 position, bearing 197°, distant 50 miles from the 1345 position of the Fleet Guide, on CUS 260°, speed 24 K.

You are ordered to depart ESSEX and proceed to the Fleet Guide; then search a relative sector from 300° to 330° to a maximum distance. Allow 3.5 hours for the search, and intercept the Fleet Guide on the third leg of the search. From Aerology you find the following data: Wind 20 K from 034°, T +5° at flight altitude 2000 ft., visibility 15 miles. Variation 10° E. TAS 110 K.

REQUIRED

IAS, CH and TTT, 1st leg of search
CH and TTT, 2nd leg of search
CH, 3rd leg of search

GIVEN

At 1537, you sight the enemy at the limit of visibility. While heading directly toward the enemy, your compass reads 176°; paralleling enemy's course, your compass reads 024°. Enemy speed is estimated to be 20 K.

REQUIRED.

Enemy position at 1537

GIVEN

At 1600 you receive a message that at 1615 the ESSEX will change to CUS 295°, speed 26 K. The enemy changes course at 1640. While paralleling new enemy course, your compass reads 273°; while tracking enemy, you notice a change in the wind and take a wind star with the following results:

CH	IAS	Drift
133°	104 K	11.5° R
012°	104 K	9° L
251°	104 K	4° L

REQUIRED

Wind force and direction.

GIVEN

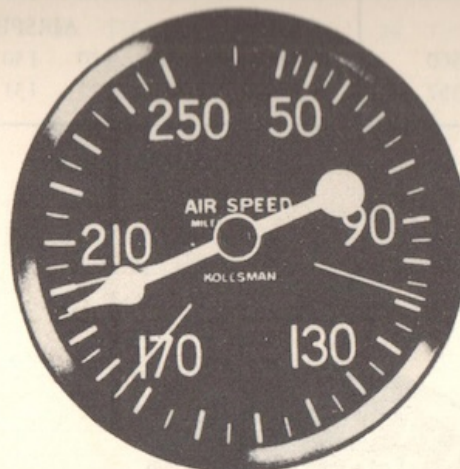
At 1730 while heading directly for the enemy, estimated to be 15 miles away, your compass reads 198°. You depart this point immediately to intercept the ESSEX, IAS 122 K.

REQUIRED

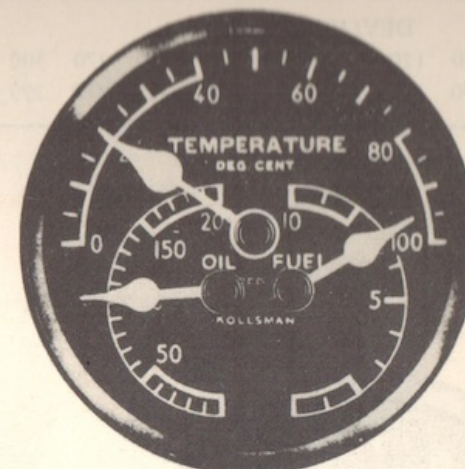
CH to intercept, ETI, EPI



A. Time of take-off 0700.



B. Average IAS in climb 196 mph.



C. Average Temperature $+19^{\circ}$.

D. Rate of climb 800 ft. per min.

REQUIRED	
TAS in climb	Min. in climb
Wind in climb	CH to maintain CUS

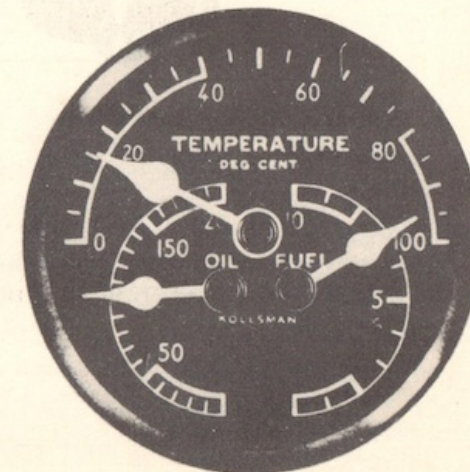
E. Enemy sighted and tracked. At 1200 message received: 1200 PT OPTION 1 CUS 200° SP 20 K



F. At 1240



G. Altitude 4000 ft.



H. Temperature $+15^{\circ}$

DEVIATION TABLE

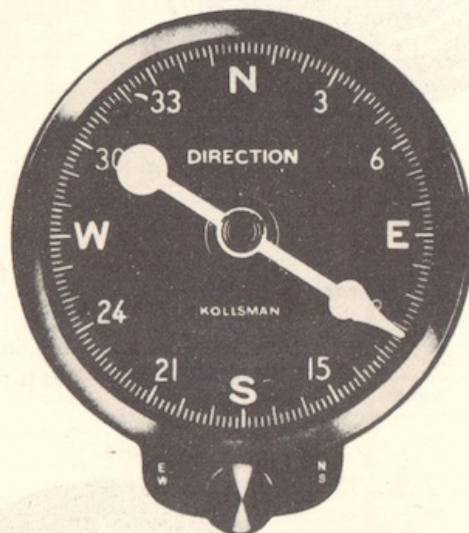
Mag.	030	060	090	120	150	180	210	240	270	300	330	360
Comp.	028	059	090	121	152	183	214	241	270	299	328	357

AIRSPED CALIBRATION TABLE

Ind.	110	120	130	140	150	160	170	180	190	200
Cal.	113	122	131	140	149	158	167	177	186	196

The following data was obtained:

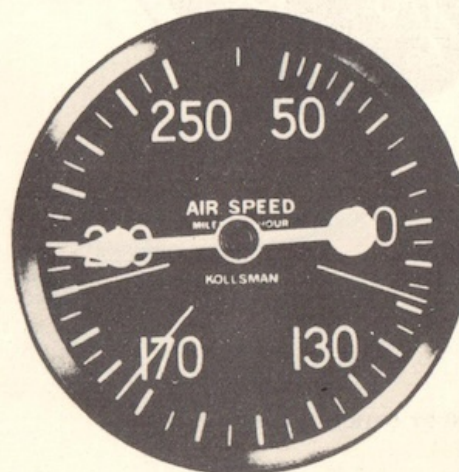
I. CH
122°



184°
061°

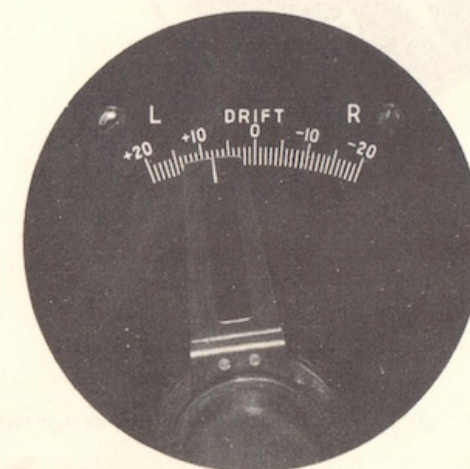
REQUIRED
New wind.

IAS
208 mph



208 mph
208 mph

Drift
8° L



8° L
1° L

J. At 1245 message received: 1230 PT OPTION 2 CUS 210° SP 25 K

REQUIRED
1300 position.

K. At 1300 enemy bears 005° relative, distant 10 mi., CH 144°

L. Your carrier is sunk.
At 1310 message received: 1330 PT OPTION 1
CUS 150° SP 25 K

To which carrier will you return assuming you
turn at 1321 and your DR position is 27°59.5'
N Lat., 147°44' W Long.?

ANSWERS

- | | | | | | |
|--|--|---|--|---|--|
| 1. TH 153°
GS 130 K
DA 11° L | U.S.S. Mississippi
to Cape St.
George
Brg. 321°
Dist. 45 mi. | 21. TH 225°
DRM 244.5°
ETI 0906
EPI 14°48' N Lat.
161°38' W Long. | 26. 1st. leg
TH 358°
SRM 116 K
GS 106 K
Mi. on CUS 129
Min. on leg 72
TTT 1142
2nd. leg
TH 198°
SRM 90 K
GS 103 K
CUS 180°
Mi. on CUS 158
Min. on leg 93 | DRM 250
SRM 118 K
MRM 122
CUS 240°
GS 115 K
Mi on CUS 119
Min. on leg 62 | EPT 01°42' S Lat.
45°16' E Long.
TH in 267°
DRM in 280°
SRM in 102 K
Mi. on CUS in 186 |
| 2. TH 288°
GS 150 K
DA 12° L | 14. Pilot to Guadalcanal
Brg. 304°
Dist. 104 mi.
Pilot to Malaita
Brg. 334°
Dist. 106 mi.
Pilot to Enemy
Squadron
Brg. 299°
Dist. 147 mi. | 22. DRM 0261/2°
MRM 170
TH 024°
CUS 0151/2°
ETI 1022
EPI 17°34' N Lat.
148°031/2' E Long. | 27. 1st. leg
TH 015°
SRM 107 K
CUS 002°
GS 110 K
Mi. on CUS 95
Min. on leg 52
TTT 1252
2nd. leg
TH 142°
SRM 64 K
CUS 148°
GS 70 K
Mi on CUS 100
Min. on leg 86 | 29. 1st. leg
TH 076°
CUS 085°
GS 125 K
Mi. on CUS 140
Min. on leg. 67
TTT 0647
2nd. leg
TH 264°
DRM 261°
SRM 105 K
MRM 162
CUS 256°
GS 126 K
Mi. on CUS 194
Min. on leg 92
ETI 0819 | 32. TH out 073°
TTT 115°
TH in 190°
EPT 20°03' S Lat.
43°08' W Long. |
| 3. TH 125°
TAS 119 K | 15. Wind 20 K
Direction 058° | 23. TH 265°
DRM 248°
ETI 1028
EPI 19°22' N Lat.
169°13' E Long. | 34. 1st. leg
TH 273°
GS 144 K
Time out 66 min.
TTT 1806
2nd. leg
TH 077°
GS 113 K
CUS 085°
Time in 84 min. | 30. 1st. leg
TH 139°
Min. 87.5
CUS 127.5°
EPT 28°41' N Lat.
24°51' W Long.
2nd. leg
TH 322°
Min. 62.5
CUS 329.5° | 33. 1st. leg
TH 272°
GS 97 K
TTT 1203
EPT 46°14' N Lat.
127°52' W Long.
2nd. leg
TH 119°
DRM 105°
SRM 113.5 K
Mi. on CUS 200 |
| 4. TH 107°
DA 9° R | 16. Wind 28 K
Direction 147° | 24. 1st. leg
TH 273°
GS 144 K
Time out 66 min.
TTT 1806
2nd. leg
TH 077°
GS 113 K
CUS 085°
Time in 84 min. | 35. 1st. leg
TH 155°
GS 134 K
Time out 92 min.
TTT 0832
2nd. leg
TH 355°
GS 140 K
CUS 345°
Time in 88 min. | 31. TH out 114°
GS out 146 K
TTT 0857 | 35. TAS 128 K
CH out 258°
TTT 1304
EPT 40°50' N Lat.
178°09' E Long. |
| 5. CUS 141°
GS 109 K
DA 12° L | 17. Wind 26 K
Direction 116° | 25. 1st. leg
TH 155°
GS 134 K
Time out 92 min.
TTT 0832
2nd. leg
TH 355°
GS 140 K
CUS 345°
Time in 88 min. | | | |
| 6. Wind 30 K
CUS 222°
GS 148 K | 18. Wind 85 K
Direction 036° | | | | |
| 7. Wind 27 K
Direction 349° | 19. TH 102°
DRM 115°
CUS 109.5°
GS 137 K
ETI 07431/2
EPI 32°10' N Lat.
120°39' W Long. | | | | |
| 8. Wind 28 K
Direction 056°
CUS 010° | 20. TH 007°
DRM 013°
SRM 132 K
CUS 022°
GS 136 K
Mi. on CUS 75
ETI 0818
EPI 25°10' N Lat.
165°22' W Long. | | | | |
| 9. TH 208°
GS 110 K
DA 13° R
Actual Wind 34 K
Direction 133° | | | | | |
| 10. TH 335°
GS 111 K
DA 6° L | | | | | |
| 11. TH 323°
TAS 143 K
DA 1° R | | | | | |
| 12. Wind 36 K
Direction 080° | | | | | |
| 13. U.S.S. Mississippi
to Tampa
Brg. 133°
Dist. 123 mi. | | | | | |

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36. 1st. leg 2nd. leg 3rd. leg
TH 067° 190° 140°
CUS 068° 202° 150°

1129 position: 46°40' N Lat.
00°42' E Long.

37. 1st. leg 2nd. leg 3rd. leg
TH 332° 082° 171°
CUS 344° 073° 179°

1543 position: 34°32' N Lat.
71°42' W Long.

Brg. 075°
Dist. 143 mi.

38. 1st. leg 2nd. leg 3rd. leg
TH 130° 050° 288°
CUS 138° 038° 302°

1709 DR position: 36°09' S Lat.
179°22' E Long.

Brg. 113°
Dist. 136.5 mi.

39. IAS 124 K
1st. leg 2nd. leg 3rd. leg
CH 082° CH 192.5° CH 304°
TTT 1059 CUS 180° CUS 285°
TTT 1125 ETA 1227

40. 1st. leg 2nd. leg 3rd. leg
CH 120° 228° 327°
CUS 120° 220° 307°
GS 120 K 144 K 116 K
Mi. on CUS 134 46 176
Min. on leg 67 19 90
TTT 0952 1011 ETA 1141

41. 1st. leg 2nd. leg 3rd. leg
CH 241° 129° 066°
CUS 250° 150° 074°
GS 155 K 120 K 93 K
Mi. on CUS 145 50 141
Min. on leg 56 25 91
TTT 1346 1411 ETA 1542

42. IAS 125 K
CH 338°
ETI 0750
1st. leg 2nd. leg 3rd. leg
CH 086° CH 168° CH 252°
GS 108 K CUS 195° DRM 284°
TTT 0913 Mi. on CUS 78 CUS 277°
EPT 30°53' GS 117 K GS 151 K
N Lat. TTT 0953 ETI 1053
162°56' EPT 29°38' EPI 29°54'
W Long. N Lat. N Lat.
163°20' 166°14'
W Long. W Long.

43. IAS 127 K
CH 095°
DRM 115°
CUS 109.5°
GS 154 K
ETI 0741
EPI 32°10' N Lat.
120°40' W Long.
1st. leg 2nd. leg 3rd. leg
CH 072° CH 321° CH 240°
GS 151 K CUS 345° DRM 246°
TTT 0841 Mi. on CUS 78 CUS 250.5°
EPT 32°10' GS 111 K GS 112 K
N Lat. TTT 0923 ETI 1025
117°40' EPT 33°24' EPI 32°45'
W Long. N Lat. N Lat.
118°04' 120°14'
W Long. W Long.

44. IAS 116 K
To Pt. Option
CH 138°
ETI 0425
1st. leg 2nd. leg 3rd. leg
CH 031° CH 120° CH 222°
CUS 049° CUS 138° CUS 233°
GS 99.5 K GS 121 K GS 118 K
TTT 0533 TTT 0554.5 ETI 0648
EPI 30°06' N Lat.
118°50' W Long.

45. 1st. leg 2nd. leg 3rd. leg
CH 212° CH 125° CH 048°
SRM 128 K SRM 74 K SRM 109 K
CUS 214° CUS 105° CUS 019°
Mi. on CUS 98.5 Mi. on CUS 74 Mi. on CUS 128
Min. on leg 54 Min. on leg 49 Min. on leg 64
TTT 1609 TTT 1658 ETA 1702

46. 1st. leg 2nd. leg 3rd. leg
CH 312° CH 209° CH 096°
SRM 116 K SRM 128 K SRM 140 K
CUS 298° CUS 202.5° CUS 099°
Mi. on CUS 120 Mi. on CUS 98 Mi. on CUS 109.5
Min. on leg 62.5 Min. on leg 39 Min. on leg 51.5
TTT 0912.5 TTT 0951.5 ETA 1043

47. IAS 129 K
1st. leg 2nd. leg 3rd. leg
CH 144° CH 032° CH 288°
CUS 143.5° CUS 049° CUS 306.5°
TTT 0904 TTT 0931 ETI 1031
EPI 30°32' N Lat.
158°50' W Long.

48. To Pt. Option
IAS 122 K
CH 358°
DRM 012°
SRM 132 K
Mi. on CUS 74
ETI 0818
EPI 25°10' N Lat.
165°21' W Long.
Search
1st. leg 2nd. leg 3rd. leg
CH 008° CH 136° CH 222°
GS 140 K GS 154 K CUS 223°
TTT 0931 CUS 135° GS 106 K
TTT 1005 Mi. on CUS 128
EPI 25°02' N Lat.
164°15' W Long.

49. IAS 138 K
TO Pt. Option
CH 306°
ETI 0525

1st. leg	2nd. leg	3rd. leg
CH 336°	CH 234°	CH 143°
GS 120 K	CUS 245°	CUS 161°
TTT 0650	GS 147 K	GS 159 K
	TTT 0725	EPI 10°38' S Lat. 167°05' E Long.

50. IAS 132 K
To Pt. Option
CH 295°
DRM 316°
SRM 141 K
MRM 44
ETI 0919
EPI 32°20' N Lat.

158°26' W Long.

1st. leg	2nd. leg	3rd. leg
CH 329°	CH 216°	CH 139°
GS 160 K	CUS 235°	CUS 146°
TTT 1027	GS 131 K	GS 122 K
	TTT 1110	Mi. on CUS 140 EPI 32°20' N Lat. 159°37' W Long.

51. IAS 127 K

1st. leg	2nd. leg	3rd. leg
CH 169°	CH 060°	CH 012°
GS 150 K	CUS 055°	CUS 003°
	GS 124 K	GS 112 K
TTT 0927	TTT 1022	EPI 37°18' N Lat. 72°40' W Long.

52. IAS 127 K

CH 143°
ETI 0416

1st. leg	2nd. leg	3rd. leg
CH 023°	CH 115°	CH 209°
CUS 025°	CUS 116°	CUS 228.5°
TTT 0526	TTT 0610	ETI 0716 EPI 30°53' N Lat. 169°14' W Long.

53. To Pt. Option
IAS 132 K
CH 051°
ETI 1127

1st. leg	2nd. leg	3rd. leg
CH 049°	CH 132°	CH 238°
CUS 060°	CUS 154°	CUS 253°
TTT 1249	TTT 1331	ETI 1427
		EPI 36°53' N Lat. 166°19' W Long.

1st. leg	2nd. leg	3rd. leg	4th. leg	5th. leg
CUS 305°	215°	125°	035°	305°
TH 305°	227°	125°	023°	305°
GS 100 K	122.5 K	150 K	122.5 K	100 K
Mi. on CUS 24	24	48	48	72
Min. on leg	14.4	11.7	19.2	23.5
TTT 1634.4	1646.1	1705.3	1728.8	1812

1807 plane's position
44°50' N Lat.
150°22' W Long.

	1st. leg	2nd. leg	3rd. leg
TH	239°	333°	348°
CUS	227°	332°	351°
SRM			91 K
DRM			028°
MRM			84
GS	138 K	102 K	104 K
Min. on leg	66	46.5	55.5
Mi. on CUS 152		79	96

0930 plane's position
51°00' N Lat.
176°32' W Long.

56. IAS 135 K

CH, 1st. leg 294°
TTT of 1st. leg 0646
CH, 2nd. leg 060°

TTT of 2nd. leg 0720

CH, 3rd. leg 152°

0639 enemy position 28°23' S Lat.

86°17' E Long.

Wind Force 28 K

Direction 085°

CH to intercept 093°

ETI 0939

EPI 27°48' S Lat.

88°42' E Long.

57. IAS 133 K

CH, 1st leg 082°

TTT of 1st leg 1144

CH, of 2nd leg 320.5°

TTT of 2nd leg 1217.5

CH, 3rd leg 214°

1215 enemy position 46°14.5' N Lat.

144°15.5' W Long.

Wind 30 K

Direction 259.5°

CH to intercept 267.5°

ETI 1542

EPI 47°43' N Lat.

146°30' W Long.

58. IAS 131 K

CH, 1st leg 274°

TTT of 1st leg 1349

CH, 2nd leg 007°

TTT of 2nd leg 1440

CH, 3rd leg 110°

Enemy position 30°00' S Lat.

158°17' E Long.

Wind 23 K

Direction 315°

CH to intercept 066°

ETI 1652

EPI 30°17' S Lat.

160°39' E Long.

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59. IAS 124 K

CH, 1st leg 086°

TTT of 1st leg 0911

CH, 2nd leg 341°

TTT of 2nd leg 0935

CH, 3rd leg 229°

Enemy position 18°30' N Lat.

129°12' W Long.

Wind 21 K

Direction 130°

CH to intercept 296°

ETI 1146

EPI 19°33' N Lat.

131°53' W Long.

60. CH, 1st leg 034°

TTT of 1st leg 1050

CH, 2nd leg 284°

TTT of 2nd leg 1132

CH, 3rd leg 194°

Position of convoy 24°09' N Lat.

25°58' W Long.

Wind 30 K

Direction 149°

CH to intercept 181°

ETI 1315

EPI 22°50' N Lat.

25°15' W Long.

61. IAS 125 K

CH, 1st leg 106°

TTT of 1st leg 1044

CH, 2nd leg 009°

TTT of 2nd leg 1111

CH, 3rd leg 261°

Enemy position 04°23' N Lat.

89°22.5' E Long.

Wind 21 K

Direction 286°

CH to intercept 310°

ETI 1413.5

EPI 05°06' N Lat.

88°12' E Long.

62. IAS 116 K

CH, 1st leg 163°

TTT of 1st leg 1453

CH, 2nd leg 245°

TTT of 2nd leg 1544

CH, 3rd leg 321°

1500 enemy position 27°19' S Lat.

120°58' E Long.

Wind 26 K

Direction 265°

CH, to intercept 338°

ETI 1720

EPI 24°09' S Lat.

120°50' E Long.

63. IAS 112 K

CH, 1st leg 320°

TTT of 1st leg 1555

CH, 2nd leg 222°

TTT of 2nd leg 1636

CH 3rd leg 108°

Enemy position at 1537 19°46' S Lat.

124°58' E Long.

Wind 20 K

Direction 060°

CH to intercept 173°

ETI 1842

EPI 21°47' S Lat.

124°27' E Long.

64. Departure Time 07-00-25

SRM 209.5 K

MRM 340.5

Min. on leg 98

CUS 049°

GS 214 K

CH 037°

EPI 28°23' N Lat.

148°41' W Long.

TTT 1321

Leg back to card

CH 205°

CUS 215°

GS 165 K

ETA 1500

TAS in climb 174 K

Wind in climb 21 K

Direction 196°

Min. in climb 5

CH to maintain CUS 038°

New wind 30 K

Direction 247°

1300 position 28°11' N Lat.

147°54' W Long.

Sangamon

SRM 177 K

MRM 269

Min. on leg 91

CH 256°

CUS 273°

GS 162 K

Independence

SRM 141 K

MRM 293

Min. on leg 125

CH 236°

CUS 248°

GS 160 K

Carrier to which you return is Sangamon

EPI 28°13' N Lat.

152°22' W Long.