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O. N. I. Publication No. 14

NOT TO PASS OUT OF THE HANDS OF OFFICERS OF THE
NAVY OR OFFICERS OF THE NAVAL RESERVE FORCE

Confidential

PATROL SERVICE COURSE TABLES

NAVY DEPARTMENT
OFFICE OF NAVAL INTELLIGENCE
JULY, 1917



WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

DECLASSIFIED
Authority E.O. 10501

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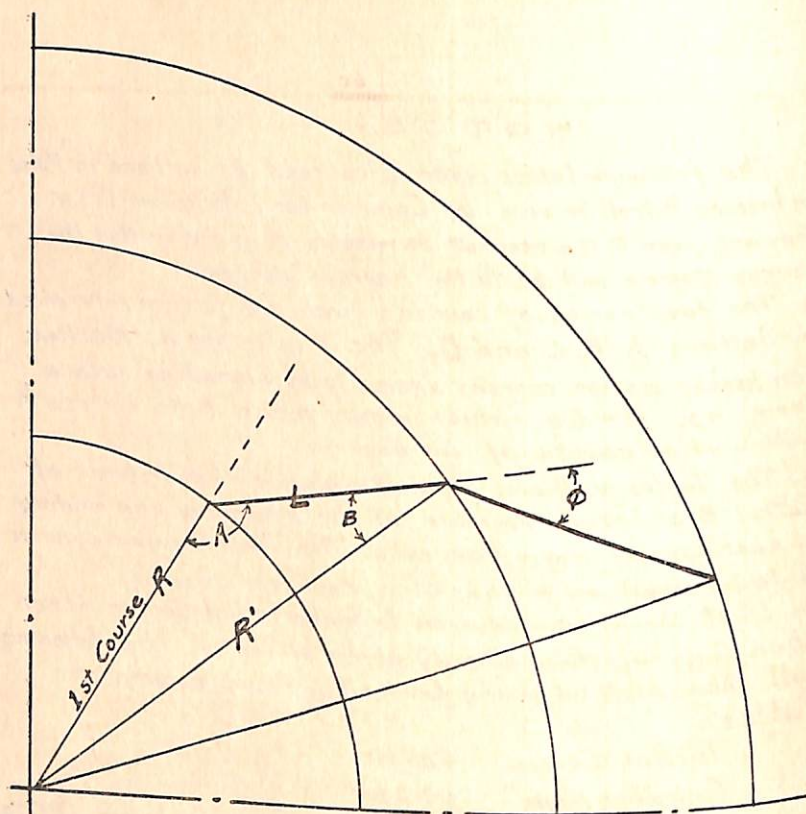
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NAVY DEPARTMENT,
OFFICE OF NAVAL INTELLIGENCE,
Washington, July 9, 1917.

This pamphlet, prepared by Lieutenant C. M. Elder, U. S. Navy, and Assistant Civil Engineer O. A. Sandquist, U. S. N. R. F., is a study of the procedure of antisubmarine patrolling suggested by Commander L. McNamee's lecture delivered at the Naval War College in April, 1917, and included in a confidential publication issued by the Office of Naval Intelligence on May 3, 1917. It is believed that the information as it is set forth will be of practical use to the service in carrying out the principles described by Commander McNamee.

ROGER WELLES,
Captain, U. S. Navy,
Director of Naval Intelligence.



Calculations for courses are based on following formulae:

$$\cos. A = \frac{R^2 + L^2 - R'^2}{2LR}$$

$$\cos. B = \frac{L^2 + R'^2 - R^2}{2LR'}$$

$$\text{Angle } \phi = 180^\circ - (A + \text{Preceding } B)$$

" ϕ = "Controlling Angle" of Tables.

$$\text{Desired Course} = \text{Preceding Course} + \phi$$

With exception of 2nd course, in which the Controlling Angle is the supplement of Angle A.

SCOUT SPEED 15

SUBMARINE SPEED 10

LENGTH OF EACH COURSE 3 MILES

(A)

Initial course only, 2 miles long.

Scouts change course every 12 minutes.

Scouts speed to first change of course 10; thereafter 15; all courses magnetic

COURSE No.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
1	0	2	0	12	0	60-0	120-0	180-0	240-0	300-0	
2	2	4		24	75-30	135-30	195-30	255-30	315-30	15-30	75-31
3	4	6		36	109-30	169-30	229-30	289-30	349-30	49-30	33-46
4	6	8		48	131-0	191-0	251-0	311-0	11-0	71-0	21-49
5	8	10	1	00	147-30	207-30	267-30	327-30	27-30	87-30	16-12
6	10	12		12	160-0	220-0	280-0	340-0	40-0	100-0	12-54
7	12	14		24	171-0	231-0	291-0	351-0	51-0	111-0	10-44
8	14	16		36	180-0	240-0	300-0	0	60-0	120-0	9-11
9	16	18		48	188-0	248-0	308-0	8-0	68-0	128-0	8-2
10	18	20	2	00	195-30	255-30	315-30	15-30	75-30	135-30	7-8
11	20	22		12	201-30	261-30	321-30	21-30	81-30	141-30	6-25
12	22	24		24	207-30	267-30	327-30	27-30	87-30	147-30	5-50
13	24	26		36	213-0	273-0	333-0	33-0	93-0	153-0	5-20
14	26	28		48	218-0	278-0	338-0	38-0	98-0	158-0	4-56
15	28	30	3	00	222-30	282-30	342-30	42-30	102-30	162-30	4-34
16	30	32		12	226-30	286-30	346-30	46-30	106-30	166-30	4-15
17	32	34		24	230-30	290-30	350-30	50-30	110-30	170-30	4-1
18	34	36		36	234-30	294-30	354-30	54-30	114-30	174-30	3-46
19	36	38		48	238-0	298-0	358-0	58-0	118-0	178-0	3-34
20	38	40	4	00	241-30	301-30	1-30	61-30	121-30	181-30	3-22
21	40	42		12	244-30	304-30	4-30	64-30	124-30	184-30	3-12
22	42	44		24	247-30	307-30	7-30	67-30	127-30	187-30	3-3
23	44	46		36	250-30	310-30	10-30	70-30	130-30	190-30	2-55
24	46	48		48	253-0	313-0	13-0	73-0	133-0	193-0	2-45
25	48	50	5	00	256-0	316-0	16-0	76-0	136-0	196-0	2-40
26	50	52		12	258-30	318-30	18-30	78-30	138-30	198-30	2-34
27	52	54		24	261-0	321-0	21-0	81-0	141-0	201-0	2-27
28	54	56		36	263-30	323-30	23-30	83-30	143-30	203-30	2-22
29	56	58		48	265-30	325-30	25-30	85-30	145-30	205-30	2-17
30	58	60	6	00	268-0	328-0	28-0	88-0	148-0	208-0	2-12
31	60	62		12	270-0	330-0	30-0	90-0	150-0	210-0	2-8
32	62	64		24	272-0	332-0	32-0	92-0	152-0	212-0	2-4
33	64	66		36	274-0	334-0	34-0	94-0	154-0	214-0	2-0
34	66	68		48	276-0	336-0	36-0	96-0	156-0	216-0	1-56
35	68	70	7	00	278-0	338-0	38-0	98-0	158-0	218-0	1-52

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(6)

SCOUT SPEED 15

SUBMARINE SPEED 5.

LENGTH OF EACH COURSE 3 MILES.

(B)

Initial course only, 2 miles long.

Scouts hold course for 24 minutes, then change every 12 minutes

Scouts speed to first change of course 5; thereafter 15; all courses magnetic.

COURSE No.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
1	0	2	0	24	0	60-0	120-0	180-0	240-0	300-0	
2	2	3		36	109-30	169-30	229-30	289-30	349-30	409-30	109-30
3	3	4		48	167-0	227-0	287-0	347-0	407-0	467-0	167-0
4	4	5	1	00	209-0	269-0	329-0	389-0	449-0	509-0	209-0
5	5	6		12	242-0	302-0	362-0	422-0	482-0	542-0	242-0
6	6	7		24	269-30	329-30	389-30	449-30	509-30	569-30	269-30
7	7	8		36	293-0	353-0	413-0	473-0	533-0	593-0	293-0
8	8	9		48	313-0	373-0	433-0	493-0	553-0	613-0	313-0
9	9	10	2	00	331-30	391-30	451-30	511-30	571-30	631-30	331-30
10	10	11		12	347-30	407-30	467-30	527-30	587-30	647-30	347-30
11	11	12		24	362-30	422-30	482-30	542-30	602-30	662-30	362-30
12	12	13		36	376-0	436-0	496-0	556-0	616-0	676-0	376-0
13	13	14		48	388-30	448-30	508-30	568-30	628-30	688-30	388-30
14	14	15	3	00	40-0	100-0	160-0	220-0	280-0	340-0	40-0
15	15	16		12	51-0	111-0	171-0	231-0	291-0	351-0	51-0
16	16	17		24	61-0	121-0	181-0	241-0	301-0	361-0	61-0
17	17	18		36	70-30	130-30	190-30	250-30	310-30	370-30	70-30
18	18	19		48	79-30	139-30	199-30	259-30	319-30	379-30	79-30
19	19	20	4	0	88-0	148-0	208-0	268-0	328-0	388-0	88-0
20	20	21		12	96-0	156-0	216-0	276-0	336-0	396-0	96-0
21	21	22		24	104-0	164-0	224-0	284-0	344-0	404-0	104-0
22	22	23		36	111-30	171-30	231-30	291-30	351-30	411-30	111-30
23	23	24		48	118-30	178-30	238-30	298-30	358-30	418-30	118-30
24	24	25	5	0	125-0	185-0	245-0	305-0	365-0	425-0	125-0
25	25	26		12	131-30	191-30	251-30	311-30	371-30	431-30	131-30
26	26	27		24	138-0	198-0	258-0	318-0	378-0	438-0	138-0
27	27	28		36	144-0	204-0	264-0	324-0	384-0	444-0	144-0
28	28	29		48	149-30	209-30	269-30	329-30	389-30	449-30	149-30
29	29	30	6	0	155-0	215-0	275-0	335-0	395-0	455-0	155-0
30	30	31		12	160-30	220-30	280-30	340-30	400-30	460-30	160-30
31	31	32		24	166-0	226-0	286-0	346-0	406-0	466-0	166-0
32	32	33		36	171-0	231-0	291-0	351-0	411-0	471-0	171-0
33	33	34		48	176-0	236-0	296-0	356-0	416-0	476-0	176-0
34	34	35	7	0	180-30	240-30	300-30	360-30	420-30	480-30	180-30
35	35	36		12	185-0	245-0	305-0	365-0	425-0	485-0	185-0
36	36	37		24	190-0	250-0	310-0	370-0	430-0	490-0	190-0
37	37	38		36	194-0	254-0	314-0	374-0	434-0	494-0	194-0
38	38	39		48	198-30	258-30	318-30	378-30	438-30	498-30	198-30
39	39	40	8	0	202-30	262-30	322-30	382-30	442-30	502-30	202-30

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SCOUT SPEED 15 SUBMARINE SPEED 5
LENGTH OF EACH COURSE 3 MILES

(B)

Scouts change course every 12 minutes.

COURSE NO.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
40	40	41	8	12	206-30	266-30	326-30	26-30	86-30	146-30	4-3
41	41	42		24	210-30	270-30	330-30	30-30	90-30	150-30	3-57
42	42	43		36	214-30	274-30	334-30	34-30	94-30	154-30	3-52
43	43	44		48	218-0	278-0	338-0	38-0	98-0	158-0	3-46
44	44	45	9	0	222-0	282-0	342-0	42-0	102-0	162-0	3-42
45	45	46		12	225-30	285-30	345-30	45-30	105-30	165-30	3-36
46	46	47		24	229-0	289-0	349-0	49-0	109-0	169-0	3-32
47	47	48		36	232-30	292-30	352-30	52-30	112-30	172-30	3-28
48	48	49		48	236-0	296-0	356-0	56-0	116-0	176-0	3-23
49	49	50	10	0	239-0	299-0	359-0	59-0	119-0	179-0	3-19
50	50	51		12	242-30	302-30	2-30	62-30	122-30	182-30	3-15
51	51	52		24	245-30	305-30	5-30	65-30	125-30	185-30	3-11
52	52	53		36	248-30	308-30	8-30	68-30	128-30	188-30	3-7
53	53	54		48	252-0	312-0	12-0	72-0	132-0	192-0	3-3
54	54	55	11	0	255-0	315-0	15-0	75-0	135-0	195-0	3-0
55	55	56		12	257-30	317-30	17-30	77-30	137-30	197-30	2-57
56	56	57		24	260-30	320-30	20-30	80-30	140-30	200-30	2-53
57	57	58		36	263-30	323-30	23-30	83-30	143-30	203-30	2-50
58	58	59		48	266-0	326-0	26-0	86-0	146-0	206-0	2-47
59	59	60	12	0	269-0	329-0	29-0	89-0	149-0	209-0	2-45
60	60	61		12	271-30	331-30	31-30	91-30	151-30	211-30	2-42
61	61	62		24	274-30	334-30	34-30	94-30	154-30	214-30	2-39
62	62	63		36	277-0	337-0	37-0	97-0	157-0	217-0	2-37
63	63	64		48	279-30	339-30	39-30	99-30	159-30	219-30	2-35
64	64	65	13	0	282-0	342-0	42-0	102-0	162-0	222-0	2-31
65	65	66		12	284-30	344-30	44-30	104-30	164-30	224-30	2-29
66	66	67		24	287-0	347-0	47-0	107-0	167-0	227-0	2-27
67	67	68		36	289-30	349-30	49-30	109-30	169-30	229-30	2-25
68	68	69		48	292-0	352-0	52-0	112-0	172-0	232-0	2-23
69	69	70	14	0	294-0	354-0	54-0	114-0	174-0	234-0	2-21
70	70	71		12	296-30	356-30	56-30	116-30	176-30	236-30	2-19
71	71	72		24	298-30	358-30	58-30	118-30	178-30	238-30	2-17
72	72	73		36	301-0	1-0	61-0	121-0	181-0	241-0	2-15
73	73	74		48	303-0	3-0	63-0	123-0	183-0	243-0	2-13
74	74	75	15	0	305-30	5-30	65-30	125-30	185-30	245-30	2-11
75	75	76		12	307-30	7-30	67-30	127-30	187-30	247-30	2-9
76	76	77		24	309-30	9-30	69-30	129-30	189-30	249-30	2-7
77	77	78		36	312-0	12-0	72-0	132-0	192-0	252-0	"
78	78	79		48	314-0	14-0	74-0	134-0	194-0	254-0	2-5

(12)

SCOUT SPEED 15 SUBMARINE SPEED 5
LENGTH OF EACH COURSE 3 MILES

(B)

Scouts change course every 12 minutes.

COURSE NO.	COURSE RADII		TIME ELAPSED		COURSES USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
79	79	80	16	0	316-0	16-0	76-0	136-0	196-0	256-0	2-3
80	80	81		12	318-0	18-0	78-0	138-0	198-0	258-0	2-1
81	81	82		24	320-0	20-0	80-0	140-0	200-0	260-0	2-0
82	82	83		36	322-0	22-0	82-0	142-0	202-0	262-0	1-59
83	83	84		48	324-0	24-0	84-0	144-0	204-0	264-0	1-57
84	84	85	17	0	326-0	26-0	86-0	146-0	206-0	266-0	1-55
85	85	86		12	327-30	27-30	87-30	147-30	207-30	267-30	1-54
86	86	87		24	329-30	29-30	89-30	149-30	209-30	269-30	1-53
87	87	88		36	331-30	31-30	91-30	151-30	211-30	271-30	1-51
88	88	89		48	333-0	33-0	93-0	153-0	213-0	273-0	"
89	89	90	18	0	335-0	35-0	95-0	155-0	215-0	275-0	1-49
90	90	91		12	337-0	37-0	97-0	157-0	217-0	277-0	1-48
91	91	92		24	338-30	38-30	98-30	158-30	218-30	278-30	1-46
92	92	93		36	340-30	40-30	100-30	160-30	220-30	280-30	1-45
93	93	94		48	342-0	42-0	102-0	162-0	222-0	282-0	1-44
94	94	95	19	0	344-0	44-0	104-0	164-0	224-0	284-0	1-43
95	95	96		12	345-30	45-30	105-30	165-30	225-30	285-30	"
96	96	97		24	347-0	47-0	107-0	167-0	227-0	287-0	1-41
97	97	98		36	349-0	49-0	109-0	169-0	229-0	289-0	1-40
98	98	99		48	350-30	50-30	110-30	170-30	230-30	290-30	1-39
99	99	100	20	0	352-0	52-0	112-30	172-0	232-0	292-0	"
100	100	101		12	354-0	54-0	114-0	174-0	234-0	294-0	1-37
101	101	102		24	355-30	55-30	115-30	175-30	235-30	295-30	"
102	102	103		36	357-0	57-0	117-0	177-0	237-0	297-0	1-36
103	103	104		48	358-30	58-30	118-30	178-30	238-30	298-30	1-35
104	104	105	21	0	360-0	60-0	120-0	180-0	240-0	300-0	1-33
105	105	106		12	1-30	61-30	121-30	181-30	241-30	301-30	"
106	106	107		24	3-0	63-0	123-0	183-0	243-0	303-0	1-31
107	107	108		36	5-0	65-0	125-0	185-0	245-0	305-0	"
108	108	109		48	6-0	66-0	126-0	186-0	246-0	306-0	1-30
109	109	110	22	0	7-30	67-30	127-30	187-30	247-30	307-30	1-29
110	110	111		12	9-0	69-0	129-0	189-0	249-0	309-0	"
111	111	112		24	10-30	70-30	130-30	190-30	250-30	310-30	1-27
112	112	113		36	12-0	72-0	132-0	192-0	252-0	312-0	"
113	113	114		48	13-30	73-30	133-30	193-30	253-30	313-30	1-26
114	114	115	23	0	15-0	75-0	135-0	195-0	255-0	315-0	1-25
115	115	116		12	16-30	76-30	136-30	196-30	256-30	316-30	"
116	116	117		24	18-0	78-0	138-0	198-0	258-0	318-0	1-24
117	117	118		36	19-0	79-0	139-0	199-0	259-0	319-0	1-23

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SCOUT SPEED	SUBMARINE SPEED
LENGTH OF EACH COURSE	MILES
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
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27	27
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32	32
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34	34
35	35
36	36
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38	38
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41	41
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43	43
44	44
45	45
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51	51
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54	54
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56	56
57	57
58	58
59	59
60	60
61	61
62	62
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64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

LENGTH OF EACH COURSE

MILES

(B)

Scouts change course every 12 minutes.

[illegible]

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SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

(C)

Initial course only, 0.8 miles long.

Scouts hold course for 24 minutes, then change every 12 minutes

Scouts speed to first change of course 2; thereafter 6; all courses magnetic.

COURSE No.	COURSE RADII		TIME ELAPSED		COURSES USING FOR FIRST COURSE—						CONTROL ING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
1	0	0.8	0	24	0	60-0	120-0	180-0	240-0	300-0	
2	0.8	1.2		36	109-30	169-30	229-30	289-30	349-30	409-30	109-28
3	1.2	1.6		48	167-0	227-0	287-0	347-0	407-0	107-0	57-26
4	1.6	2.0	1	0	209-0	269-0	329-0	389-0	449-0	149-0	41-48
5	2.0	2.4		12	240-0	300-0	0	60-0	120-0	180-0	31-3
6	2.4	2.8		24	267-0	327-0	27-0	87-0	147-0	207-0	27-22
7	2.8	3.2		36	290-30	350-30	50-30	110-30	170-30	230-30	23-22
8	3.2	3.6		48	311-0	11-0	71-0	131-0	191-0	251-0	20-24
9	3.6	4.0	2	0	329-0	29-0	89-0	149-0	209-0	269-0	18-7
10	4.0	4.4		12	345-30	45-30	105-30	165-30	225-30	285-30	16-17
11	4.4	4.8		24	0	60-0	120-0	180-0	240-0	300-0	14-47
12	4.8	5.2		36	13-30	73-30	133-30	193-30	253-30	313-30	13-33
13	5.2	5.6		48	26-0	86-0	146-0	206-0	266-0	326-0	12-30
14	5.6	6.0	3	0	37-30	97-30	157-30	217-30	277-30	337-30	11-36
15	6.0	6.4		12	48-30	108-30	168-30	228-30	288-30	348-30	10-50
16	6.4	6.8		24	58-30	118-30	178-30	238-30	298-30	358-30	10-8
17	6.8	7.2		36	68-0	128-0	188-0	248-0	308-0	8-0	9-33
18	7.2	7.6		48	77-0	137-0	197-0	257-0	317-0	17-0	9-1
19	7.6	8.0	4	0	86-0	146-0	206-0	266-0	326-0	26-0	8-33
20	8.0	8.4		12	94-0	154-0	214-0	274-0	334-0	34-0	8-7
21	8.4	8.8		24	101-30	161-30	221-30	281-30	341-30	41-30	7-44
22	8.8	9.2		36	109-0	169-0	229-0	289-0	349-0	49-0	7-23
23	9.2	9.6		48	116-0	176-0	236-0	296-0	356-0	56-0	7-3
24	9.6	10.0	5	0	123-0	183-0	243-0	303-0	3-0	63-0	6-45
25	10.0	10.4		12	129-30	189-30	249-30	309-30	9-30	69-30	6-29
26	10.4	10.8		24	135-30	195-30	255-30	315-30	15-30	75-30	6-14
27	10.8	11.2		36	141-30	201-30	261-30	321-30	21-30	81-30	6-0
28	11.2	11.6		48	147-30	207-30	267-30	327-30	27-30	87-30	5-47
29	11.6	12.0	6	0	153-0	213-0	273-0	333-0	33-0	93-0	5-36
30	12.0	12.4		12	158-30	218-30	278-30	338-30	38-30	98-30	5-25
31	12.4	12.8		24	163-30	223-30	283-30	343-30	43-30	103-30	5-13
32	12.8	13.2		36	168-30	228-30	288-30	348-30	48-30	108-30	5-4
33	13.2	13.6		48	173-30	233-30	293-30	353-30	53-30	113-30	4-55
34	13.6	14.0	7	0	178-30	238-30	298-30	358-30	58-30	118-30	4-46
35	14.0	14.4		12	183-0	243-0	303-0	3-0	63-0	123-0	4-38
36	14.4	14.8		24	187-30	247-30	307-30	7-30	67-30	127-30	4-30
37	14.8	15.2		36	192-0	252-0	312-0	12-0	72-0	132-0	4-22
38	15.2	15.6		48	196-0	256-0	316-0	16-0	76-0	136-0	4-16
39	15.6	16.0	8	0	200-0	260-0	320-0	20-0	80-0	140-0	4-10

SCOUT SPEED 6 SUBMARINE SPEED 2
LENGTH OF EACH COURSE 1.2 MILES

(C)

Scouts change course every 12 minutes.

COURSE NO	COURSE RADII		TIME ELAPSED		COURSES USING FOR FIRST COURSE -						CONTROL- LING ANGLE
	START	FINISH	HRS	MIN.	0°	60°	120°	180°	240°	300°	
40	16.0	16.4	8	12	204-30	264-30	324-30	24-30	84-30	144-30	4-2
41	16.4	16.8		24	208-0	268-0	328-0	28-0	88-0	148-0	3-56
42	16.8	17.2		36	212-0	272-0	332-0	32-0	92-0	152-0	3-51
43	17.2	17.6		48	216-0	276-0	336-0	36-0	96-0	156-0	3-46
44	17.6	18.0	9	0	219-30	279-30	339-30	39-30	99-30	159-30	3-41
45	18.0	18.4		12	223-0	283-0	343-0	43-0	103-0	163-0	3-36
46	18.4	18.8		24	226-30	286-30	346-30	46-30	106-30	166-30	3-32
47	18.8	19.2		36	230-0	290-0	350-0	50-0	110-0	170-0	3-27
48	19.2	19.6		48	233-30	293-30	353-30	53-30	113-30	173-30	3-23
49	19.6	20.0	10	0	237-0	297-0	357-0	57-0	117-0	177-0	3-19
50	20.0	20.4		12	240-0	300-0	0	60-0	120-0	180-0	3-15
51	20.4	20.8		24	243-0	303-0	3-0	63-0	123-0	183-0	3-11
52	20.8	21.2		36	246-0	306-30	6-30	66-30	126-30	186-30	3-7
53	21.2	21.6		48	249-30	309-30	9-30	69-30	129-30	189-30	3-3
54	21.6	22.0	11	0	252-30	312-30	12-30	72-30	132-30	192-30	3-0
55	22.0	22.4		12	255-30	315-30	15-30	75-30	135-30	195-30	2-57
56	22.4	22.8		24	258-0	318-0	18-0	78-0	138-0	198-0	2-53
57	22.8	23.2		36	261-0	321-0	21-0	81-0	141-0	201-0	2-51
58	23.2	23.6		48	264-0	324-0	24-0	84-0	144-0	204-0	2-48
59	23.6	24.0	12	0	266-30	326-30	26-30	86-30	146-30	206-30	2-45
60	24.0	24.4		12	269-30	329-30	29-30	89-30	149-30	209-30	2-42
61	24.4	24.8		24	272-0	332-0	32-0	92-0	152-0	212-0	2-39
62	24.8	25.2		36	274-0	334-30	34-30	94-30	154-30	214-30	2-37
63	25.2	25.6		48	277-0	337-0	37-0	97-0	157-30	217-0	2-35
64	25.6	26.0	13	0	280-0	340-0	40-0	100-0	160-0	220-0	2-31
65	26.0	26.4		12	282-0	342-0	42-0	102-0	162-0	222-0	2-29
66	26.4	26.8		24	284-30	344-30	44-30	104-30	164-30	224-30	2-27
67	26.8	27.2		36	287-0	347-0	47-0	107-0	167-0	227-0	2-25
68	27.2	27.6		48	289-30	349-30	49-30	109-30	169-30	229-30	2-23
69	27.6	28.0	14	0	292-0	352-0	52-0	112-0	172-0	232-0	2-21
70	28.0	28.4		12	294-0	354-0	54-0	114-0	174-0	234-0	2-19
71	28.4	28.8		24	296-0	356-30	56-30	116-30	176-30	236-30	2-17
72	28.8	29.2		36	298-0	358-30	58-30	118-30	178-30	238-30	2-15
73	29.2	29.6		48	301-0	1-0	61-0	121-0	181-0	241-0	2-13
74	29.6	30.0	15	0	303-0	3-0	63-0	123-0	183-0	243-0	2-11
75	30.0	30.4		12	305-0	5-0	65-0	125-0	185-0	245-0	2-9
76	30.4	30.8		24	307-30	7-30	67-30	127-30	187-30	247-30	2-8
77	30.8	31.2		36	309-30	9-30	69-30	129-30	189-30	249-30	2-6
78	31.2	31.6		48	311-30	11-30	71-30	131-30	191-30	251-30	2-5

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SCOUT SPEED 6 SUBMARINE SPEED 2
LENGTH OF EACH COURSE 1.2 MILES.

(C)

Scouts change course every 12 minutes.

COURSE NO	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROL- LING ANGLE
	START	FINISH	HRS	MIN.	0°	60°	120°	180°	240°	300°	
79	31.6	32.0	16	0	313-30	13-30	73-30	133-30	193-30	253-30	2-3
80	32.0	32.4		12	315-30	15-30	75-30	135-30	195-30	255-30	2-1
81	32.4	32.8		24	317-30	17-30	77-30	137-30	197-30	257-30	2-0
82	32.8	33.2		36	319-30	19-30	79-30	139-30	199-30	259-30	1-59
83	33.2	33.6		48	321-30	21-30	81-30	141-30	201-30	261-30	1-57
84	33.6	34.0	17	0	323-30	23-30	83-30	143-30	203-30	263-30	1-56
85	34.0	34.4		12	325-30	25-30	85-30	145-30	205-30	265-30	1-55
86	34.4	34.8		24	327-0	27-0	87-0	147-30	207-0	267-0	1-53
87	34.8	35.2		36	329-0	29-0	89-0	149-0	209-0	269-0	1-51
88	35.2	35.6		48	331-0	31-0	91-0	151-0	211-0	271-0	1-50
89	35.6	36.0	18	0	333-0	33-0	93-0	153-0	213-0	273-0	1-49
90	36.0	36.4		12	334-30	34-30	94-30	154-30	214-30	274-30	1-47
91	36.4	36.8		24	336-30	36-30	96-30	156-30	216-30	276-30	1-47
92	36.8	37.2		36	338-0	38-0	98-0	158-0	218-0	278-0	1-45
93	37.2	37.6		48	340-0	40-0	100-0	160-0	220-0	280-0	"
94	37.6	38.0	19	0	341-30	41-30	101-30	161-30	221-30	281-30	1-43
95	38.0	38.4		12	343-0	43-0	103-0	163-0	223-0	283-0	"
96	38.4	38.8		24	345-0	45-0	105-0	165-0	225-0	285-0	1-41
97	38.8	39.2		36	346-30	46-30	106-30	166-30	226-30	286-30	1-40
98	39.2	39.6		48	348-0	48-0	108-0	168-0	228-0	288-0	1-39
99	39.6	40.0	20	0	350-0	50-0	110-0	170-0	230-0	290-0	"
100	40.0	40.4		12	351-30	51-30	111-30	171-30	231-30	291-30	1-37
101	40.4	40.8		24	353-0	53-0	113-0	173-0	233-0	293-0	"
102	40.8	41.2		36	355-0	55-0	115-0	175-0	235-0	295-0	1-35
103	41.2	41.6		48	356-30	56-30	116-30	176-30	236-30	296-30	"
104	41.6	42.0	21	0	358-0	58-0	118-0	178-0	238-0	298-0	1-33
105	42.0	42.4		12	359-30	59-30	119-30	179-30	239-30	299-30	"
106	42.4	42.8		24	1-0	61-0	121-0	181-0	241-0	301-0	1-32
107	42.8	43.2		36	2-30	62-30	122-30	182-30	242-30	302-30	1-31
108	43.2	43.6		48	4-0	64-0	124-0	184-0	244-0	304-0	1-30
109	43.6	44.0	22	0	5-30	65-30	125-30	185-30	245-30	305-30	1-29
110	44.0	44.4		12	7-0	67-0	127-0	187-0	247-0	307-0	"
111	44.4	44.8		24	8-30	68-30	128-30	188-30	248-30	308-30	"
112	44.8	45.2		36	10-0	70-0	130-0	190-0	250-0	310-0	1-26
113	45.2	45.6		48	11-0	71-0	131-0	191-0	251-0	311-0	1-25
114	45.6	46.0	23	0	12-30	72-30	132-30	192-30	252-30	312-30	"
115	46.0	46.4		12	14-0	74-0	134-0	194-0	254-0	314-0	1-24
116	46.4	46.8		24	15-30	75-30	135-30	195-30	255-30	315-30	1-23
117	46.8	47.2		36	17-0	77-0	137-0	197-0	257-0	317-0	"

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DECLASSIFIED
Authority E.O. 10501

SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

Scouts change course every 12 minutes.



COURSE NO.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
118	47.2	47.6	23	48	18-0	78-0	138-0	198-0	258-0	318-0	1-23
119	47.6	48.0	24	0	19-30	79-30	139-30	199-30	259-30	319-30	1-21
120	48.0	48.4		12	21-0	81-0	141-0	201-0	261-0	321-0	"
121	48.4	48.8		24	22-30	82-30	142-30	202-30	262-30	322-30	"
122	48.8	49.2		36	23-30	83-30	143-30	203-30	263-30	323-30	1-19
123	49.2	49.6		48	25-0	85-0	145-0	205-0	265-0	325-0	"
124	49.6	50.0	25	0	26-0	86-0	146-0	206-0	266-0	326-0	1-18
125	50.0	50.4		12	27-30	87-30	147-30	207-30	267-30	327-30	1-17
126	50.4	50.8		24	29-0	89-0	149-0	209-0	269-0	329-0	"
127	50.8	51.2		36	30-0	90-0	150-0	210-0	270-0	330-0	"
128	51.2	51.6		48	31-30	91-30	151-30	211-30	271-30	331-30	1-16
129	51.6	52.0	26	0	32-30	92-30	152-30	212-30	272-30	332-30	1-15
130	52.0	52.4		12	34-0	94-0	154-0	214-0	274-0	334-0	"
131	52.4	52.8		24	35-0	95-0	155-0	215-0	275-0	335-0	"
132	52.8	53.2		36	36-30	96-30	156-30	216-30	276-30	336-30	1-13
133	53.2	53.6		48	37-30	97-30	157-30	217-30	277-30	337-30	"
134	53.6	54.0	27	0	39-0	99-0	159-0	219-0	279-0	339-0	"
135	54.0	54.4		12	40-0	100-0	160-0	220-0	280-0	340-0	"
136	54.4	54.8		24	41-0	101-0	161-0	221-0	281-0	341-0	1-12
137	54.8	55.2		36	42-30	102-30	162-30	222-30	282-30	342-30	1-11
138	55.2	55.6		48	43-30	103-30	163-30	223-30	283-30	343-30	"
139	55.6	56.0	28	0	45-0	105-0	165-0	225-0	285-0	345-0	1-10
140	56.0	56.4		12	46-0	106-0	166-0	226-0	286-0	346-0	1-9
141	56.4	56.8		24	47-0	107-0	167-0	227-0	287-0	347-0	"
142	56.8	57.2		36	48-0	108-0	168-0	228-0	288-0	348-0	"
143	57.2	57.6		48	49-30	109-30	169-30	229-30	289-30	349-0	1-8
144	57.6	58.0	29	0	50-30	110-30	170-30	230-30	290-30	350-30	1-7
145	58.0	58.4		12	51-30	111-30	171-30	231-30	291-30	351-30	"
146	58.4	58.8		24	52-30	112-30	172-30	232-30	292-30	352-30	"
147	58.8	59.2		36	54-0	114-0	174-0	234-0	294-0	354-0	"
148	59.2	59.6		48	55-0	115-0	175-0	235-0	295-0	355-0	1-5
149	59.6	60.0	30	0	56-0	116-0	176-0	236-0	296-0	356-0	"
150	60.0	60.4		12	57-0	117-0	177-0	237-0	297-0	357-0	"
151	60.4	60.8		24	58-0	118-0	178-0	238-0	298-0	358-0	"
152	60.8	61.2		36	59-0	119-0	179-0	239-0	299-0	359-0	1-4
153	61.2	61.6		48	60-0	120-0	180-0	240-0	300-0	0	1-3
154	61.6	62.0	31	0	61-0	121-0	181-0	241-0	301-0	1-0	"
155	62.0	62.4		12	62-30	122-30	182-30	242-30	302-30	2-30	"
156	62.4	62.8		24	63-30	123-30	183-30	243-30	303-30	3-30	1-2

SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

Scouts change course every 12 minutes.



COURSE NO.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
157	62.8	63.2	31	36	64-30	124-30	184-30	244-30	304-30	4-30	1-2
158	63.2	63.6		48	65-30	125-30	185-30	245-30	305-30	5-30	1-1
159	63.6	64.0	32	0	66-30	126-30	186-30	246-30	306-30	6-30	"
160	64.0	64.4		12	67-30	127-30	187-30	247-30	307-30	7-30	"
161	64.4	64.8		24	68-30	128-30	188-30	248-30	308-30	8-30	"
162	64.8	65.2		36	69-30	129-30	189-30	249-30	309-30	9-30	"
163	65.2	65.6		48	70-30	130-30	190-30	250-30	310-30	10-30	1-1
164	65.6	66.0	33	0	71-30	131-30	191-30	251-30	311-30	11-30	0-59
165	66.0	66.4		12	72-30	132-30	192-30	252-30	312-30	12-30	"
166	66.4	66.8		24	73-30	133-30	193-30	253-30	313-30	13-30	"
167	66.8	67.2		36	74-30	134-30	194-30	254-30	314-30	14-30	0-58
168	67.2	67.6		48	75-30	135-30	195-30	255-30	315-30	15-30	"
169	67.6	68.0	34	0	76-30	136-30	196-30	256-30	316-30	16-30	0-57
170	68.0	68.4		12	77-0	137-0	197-0	257-0	317-0	17-0	"
171	68.4	68.8		24	78-0	138-0	198-0	258-0	318-0	18-0	"
172	68.8	69.2		36	79-0	139-0	199-0	259-0	319-0	19-0	"
173	69.2	69.6		48	80-0	140-0	200-0	260-0	320-0	20-0	0-56
174	69.6	70.0	35	0	81-0	141-0	201-0	261-0	321-0	21-0	0-55
175	70.0	70.4		12	82-0	142-0	202-0	262-0	322-0	22-0	"
176	70.4	70.8		24	83-0	143-0	203-0	263-0	323-0	23-0	"
177	70.8	71.2		36	84-0	144-0	204-0	264-0	324-0	24-0	"
178	71.2	71.6		48	84-30	144-30	204-30	264-30	324-30	24-30	"
179	71.6	72.0	36	0	85-30	145-30	205-30	265-30	325-30	25-30	"
180	72.0	72.4		12	86-30	146-30	206-30	266-30	326-30	26-30	"
181	72.4	72.8		24	87-30	147-30	207-30	267-30	327-30	27-30	0-54
182	72.8	73.2		36	88-0	148-0	208-0	268-0	328-0	28-0	0-53
183	73.2	73.6		48	89-0	149-0	209-0	269-0	329-0	29-0	"
184	73.6	74.0	37	0	90-0	150-0	210-0	270-0	330-0	30-0	"
185	74.0	74.4		12	91-0	151-0	211-0	271-0	331-0	31-0	"
186	74.4	74.8		24	92-0	152-0	212-0	272-0	332-0	32-0	0-52
187	74.8	75.2		36	92-30	152-30	212-30	272-30	332-30	32-30	"
188	75.2	75.6		48	93-30	153-30	213-30	273-30	333-30	33-30	0-51
189	75.6	76.0	38	0	94-30	154-30	214-30	274-30	334-30	34-30	"
190	76.0	76.4		12	95-0	155-0	215-0	275-0	335-0	35-0	"
191	76.4	76.8		24	96-0	156-0	216-0	276-0	336-0	36-0	"
192	76.8	77.2		36	97-0	157-0	217-0	277-0	337-0	37-0	"
193	77.2	77.6		48	98-0	158-0	218-0	278-0	338-0	38-0	"
194	77.6	78.0	39	0	98-30	158-30	218-30	278-30	338-30	38-30	0-50
195	78.0	78.4		12	99-30	159-30	219-30	279-30	339-30	39-30	"

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SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

(C)

Scouts change course every 12 minutes.

COURSE No.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
196	78.4	78.8	39	24	100-0	160-0	220-0	280-0	340-0	40-0	0-50
197	78.8	79.2		36	101-0	161-0	221-0	281-0	341-0	41-0	0-49
198	79.2	79.6		48	102-0	162-0	222-0	282-0	342-0	42-0	"
199	79.6	80.0	40	0	103-0	163-0	223-0	283-0	343-0	43-0	0-48
200	80.0	80.4		12	103-30	163-30	223-30	283-30	343-30	43-30	"
201	80.4	80.8		24	104-30	164-30	224-30	284-30	344-30	44-30	"
202	80.8	81.2		36	105-0	165-0	225-0	285-0	345-0	45-0	"
203	81.2	81.6		48	106-0	166-0	226-0	286-0	346-0	46-0	"
204	81.6	82.0	41	0	107-0	167-0	227-0	287-0	347-0	47-0	"
205	82.0	82.4		12	107-30	167-30	227-30	287-30	347-30	47-30	0-47
206	82.4	82.8		24	108-0	168-0	228-0	288-0	348-0	48-0	"
207	82.8	83.2		36	109-0	169-0	229-0	289-0	349-0	49-0	"
208	83.2	83.6		48	110-0	170-0	230-0	290-0	350-0	50-0	"
209	83.6	84.0	42	0	110-30	170-30	230-30	290-30	350-30	50-30	"
210	84.0	84.4		12	111-30	171-30	231-30	291-30	351-30	51-30	"
211	84.4	84.8		24	112-0	172-0	232-0	292-0	352-0	52-0	0-46
212	84.8	85.2		36	113-0	173-0	233-0	293-0	353-0	53-0	"
213	85.2	85.6		48	113-30	173-30	233-30	293-30	353-30	53-30	"
214	85.6	86.0	43	0	114-30	174-30	234-30	294-30	354-30	54-30	0-45
215	86.0	86.4		12	115-0	175-0	235-0	295-0	355-0	55-0	"
216	86.4	86.8		24	116-0	176-0	236-0	296-0	356-0	56-0	"
217	86.8	87.2		36	116-30	176-30	236-30	296-30	356-30	56-30	"
218	87.2	87.6		48	117-30	177-30	237-30	297-30	357-30	57-30	"
219	87.6	88.0	44	0	118-0	178-0	238-0	298-0	358-0	58-0	0-44
220	88.0	88.4		12	119-0	179-0	239-0	299-0	359-0	59-0	"
221	88.4	88.8		24	119-30	179-30	239-30	299-30	359-30	59-30	"
222	88.8	89.2		36	120-30	180-30	240-30	300-30	0-30	60-30	"
223	89.2	89.6		48	121-0	181-0	241-0	301-0	1-0	61-0	"
224	89.6	90.0	45	0	122-0	182-0	242-0	302-0	2-0	62-0	0-43
225	90.0	90.4		12	122-30	182-30	242-30	302-30	2-30	62-30	"
226	90.4	90.8		24	123-0	183-0	243-0	303-0	3-0	63-0	"
227	90.8	91.2		36	124-0	184-0	244-0	304-0	4-0	64-0	"
228	91.2	91.6		48	124-30	184-30	244-30	304-30	4-30	64-30	"
229	91.6	92.0	46	0	125-30	185-30	245-30	305-30	5-30	65-30	0-42
230	92.0	92.4		12	126-0	186-0	246-0	306-0	6-0	66-0	"
231	92.4	92.8		24	127-0	187-0	247-0	307-0	7-0	67-0	"
232	92.8	93.2		36	127-30	187-30	247-30	307-30	7-30	67-30	"
233	93.2	93.6		48	128-0	188-0	248-0	308-0	8-0	68-0	0-41
234	93.6	94.0	47	0	129-0	189-0	249-0	309-0	9-0	69-0	"

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SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

(C)

Scouts change course every 12 minutes.

COURSE No.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
235	94.0	94.4	47	12	129-30	189-30	249-30	309-30	6-30	69-30	0-41
236	94.4	94.8		24	130-0	190-0	250-0	310-0	10-0	70-0	"
237	94.8	95.2		36	131-0	191-0	251-0	311-0	11-0	71-0	"
238	95.2	95.6		48	131-30	191-30	251-30	311-30	11-30	71-30	"
239	95.6	96.0	48	0	132-30	192-30	252-30	312-30	12-30	72-30	"
240	96.0	96.4		12	133-0	193-0	253-0	313-0	13-0	73-0	"
241	96.4	96.8		24	133-30	193-30	253-30	313-30	13-30	73-30	0-40
242	96.8	97.2		36	134-30	194-30	254-30	314-30	14-30	74-30	"
243	97.2	97.6		48	135-0	195-0	255-0	315-0	15-0	75-0	"
244	97.6	98.0	49	0	135-30	195-30	255-30	315-30	15-30	75-30	0-39
245	98.0	98.4		12	136-30	196-30	256-30	316-30	16-30	76-30	"
246	98.4	98.8		24	137-0	197-0	257-0	317-0	17-0	77-0	"
247	98.8	99.2		36	137-30	197-30	257-30	317-30	17-30	77-30	"
248	99.2	99.6		48	138-0	198-0	258-0	318-0	18-0	78-0	"
249	99.6	100.0	50	0	139-0	199-0	259-0	319-0	19-0	79-0	"
250	100.0	100.4		12	139-30	199-30	259-30	319-30	19-30	79-30	"
251	100.4	100.8		24	140-0	200-0	260-0	320-0	20-0	80-0	"
252	100.8	101.2		36	141-0	201-0	261-0	321-0	21-0	81-0	"
253	101.2	101.6		48	141-30	201-30	261-30	321-30	21-30	81-30	"
254	101.6	102.0	51	0	142-0	202-0	262-0	322-0	22-0	82-0	0-38
255	102.0	102.4		12	142-30	202-30	262-30	322-30	22-30	82-30	"
256	102.4	102.8		24	143-30	203-30	263-30	323-30	23-30	83-30	"
257	102.8	103.2		36	144-0	204-0	264-0	324-0	24-0	84-0	"
258	103.2	103.6		48	144-30	204-30	264-30	324-30	24-30	84-30	"
259	103.6	104.0	52	0	145-30	205-30	265-30	325-30	25-30	85-30	"
260	104.0	104.4		12	146-0	206-0	266-0	326-0	26-0	86-0	0-37
261	104.4	104.8		24	146-30	206-30	266-30	326-30	26-30	86-30	"
262	104.8	105.2		36	147-0	207-0	267-0	327-0	27-0	87-0	"
263	105.2	105.6		48	147-30	207-30	267-30	327-30	27-30	87-30	"
264	105.6	106.0	53	0	148-30	208-30	268-30	328-30	28-30	88-30	"
265	106.0	106.4		12	149-0	209-0	269-0	329-0	29-0	89-0	"
266	106.4	106.8		24	149-30	209-30	269-30	329-30	29-30	89-30	"
267	106.8	107.2		36	150-0	210-0	270-0	330-0	30-0	90-0	"
268	107.2	107.6		48	151-0	211-0	271-0	331-0	31-0	91-0	0-36
269	107.6	108.0	54	0	151-30	211-30	271-30	331-30	31-30	91-30	"
270	108.0	108.4		12	152-0	212-0	272-0	332-0	32-0	92-0	"
271	108.4	108.8		24	152-30	212-30	272-30	332-30	32-30	92-30	"
272	108.8	109.2		36	153-0	213-0	273-0	333-0	33-0	93-0	"
273	109.2	109.6		48	154-0	214-0	274-0	334-0	34-0	94-0	"

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SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

Scouts change course every 12 minutes.



COURSE No.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
274	109.6	110.0	55	0	154-30	214-30	274-30	334-30	34-30	94-30	0-36
275	110.0	110.4		12	155-0	215-0	275-0	335-0	35-0	95-0	0-35
276	110.4	110.8		24	155-30	215-30	275-30	335-30	35-30	95-30	"
277	110.8	111.2		36	156-0	216-0	276-0	336-0	36-0	96-0	"
278	111.2	111.6		48	156-30	216-30	276-30	336-30	36-30	96-30	"
279	111.6	112.0	56	0	157-30	217-30	277-30	337-30	37-30	97-30	"
280	112.0	112.4		12	158-0	218-0	278-0	338-0	38-0	98-0	"
281	112.4	112.8		24	158-30	218-30	278-30	338-30	38-30	98-30	"
282	112.8	113.2		36	159-0	219-0	279-0	339-0	39-0	99-0	"
283	113.2	113.6		48	159-30	219-30	279-30	339-30	39-30	99-30	0-34
284	113.6	114.0	57	0	160-0	220-0	280-0	340-0	40-0	100-0	"
285	114.0	114.4		12	161-0	221-0	281-0	341-0	41-0	101-0	"
286	114.4	114.8		24	161-30	221-30	281-30	341-30	41-30	101-30	"
287	114.8	115.2		36	162-0	222-0	282-0	342-0	42-0	102-0	"
288	115.2	115.6		48	162-30	222-30	282-30	342-30	42-30	102-30	"
289	115.6	116.0	58	0	163-0	223-0	283-0	343-0	43-0	103-0	"
290	116.0	116.4		12	163-30	223-30	283-30	343-30	43-30	103-30	"
291	116.4	116.8		24	164-0	224-0	284-0	344-0	44-0	104-0	0-33
292	116.8	117.2		36	164-30	224-30	284-30	344-30	44-30	104-30	"
293	117.2	117.6		48	165-0	225-0	285-0	345-0	45-0	105-0	"
294	117.6	118.0	59	0	166-0	226-0	286-0	346-0	46-0	106-0	"
295	118.0	118.4		12	166-30	226-30	286-30	346-30	46-30	106-30	"
296	118.4	118.8		24	167-0	227-0	287-0	347-0	47-0	107-0	"
297	118.8	119.2		36	167-30	227-30	287-30	347-30	47-30	107-30	"
298	119.2	119.6		48	168-0	228-0	288-0	348-0	48-0	108-0	"
299	119.6	120.0	60	0	168-30	228-30	288-30	348-30	48-30	108-30	"
300	120.0	120.4		12	169-0	229-0	289-0	349-0	49-0	109-0	0-32
301	120.4	120.8		24	169-30	229-30	289-30	349-30	49-30	109-30	"
302	120.8	121.2		36	170-0	230-0	290-0	350-0	50-0	110-0	"
303	121.2	121.6		48	170-30	230-30	290-30	350-30	50-30	110-30	"
304	121.6	122.0	61	0	171-0	231-0	291-0	351-0	51-0	111-0	"
305	122.0	122.4		12	171-30	231-30	291-30	351-30	51-30	111-30	"
306	122.4	122.8		24	172-0	232-0	292-0	352-0	52-0	112-0	"
307	122.8	123.2		36	172-30	232-30	292-30	352-30	52-30	112-30	"
308	123.2	123.6		48	173-0	233-0	293-0	353-0	53-0	113-0	0-31

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SCOUT SPEED 6

SUBMARINE SPEED 2

LENGTH OF EACH COURSE 1.2 MILES

Scouts change course every 12 minutes.



COURSE No.	COURSE RADII		TIME ELAPSED		COURSES, USING FOR FIRST COURSE -						CONTROLLING ANGLE
	START	FINISH	HRS.	MIN.	0°	60°	120°	180°	240°	300°	
313	125.2	125.6	62	48	176-0	236-0	296-0	356-0	56-0	116-0	0-31
314	125.6	126.0	63	0	176-30	236-30	296-30	356-30	56-30	116-30	"
315	126.0	126.4		12	177-0	237-0	297-0	357-0	57-0	117-0	"
316	126.4	126.8		24	177-30	237-30	297-30	357-30	57-30	117-30	"
317	126.8	127.2		36	178-0	238-0	298-0	358-0	58-0	118-0	"
318	127.2	127.6		48	178-30	238-30	298-30	358-30	58-30	118-30	"
319	127.6	128.0	64	0	179-0	239-0	299-0	359-0	59-0	119-0	"
320	128.0	128.4		12	179-30	239-30	299-30	359-30	59-30	119-30	"
321	128.4	128.8		24	180-0	240-0	300-0	0	60-0	120-0	0-30
322	128.8	129.2		36	180-30	240-30	300-30	0-30	60-30	120-30	"
323	129.2	129.6		48	181-0	241-0	301-0	1-0	61-0	121-0	"
324	129.6	130.0	65	0	181-30	241-30	301-30	1-30	61-30	121-30	"

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