

Harpoon V Jumpstart

An Introduction and Example

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Introduction

This free Jumpstart explains the rules system to new players and familiarizes veteran *Harpoon* players with the many changes we have made to the fifth edition rules. The previous fourth edition was last updated in 2001(!), so there's a lot of catching up to do, not only in terms of new systems that have appeared, but better ways of modeling the complex interactions and technical details of modern naval warfare.

Seriously, there are a lot of moving parts. For example, a detection by radar is affected by the range of the contact, its signature (which is not the same as its size), the type of radar, the radar's technology level, the weather, the contact's proximity to land, and how quickly the detection is processed (a new feature in this edition, the combat system). And then there's offensive jamming.

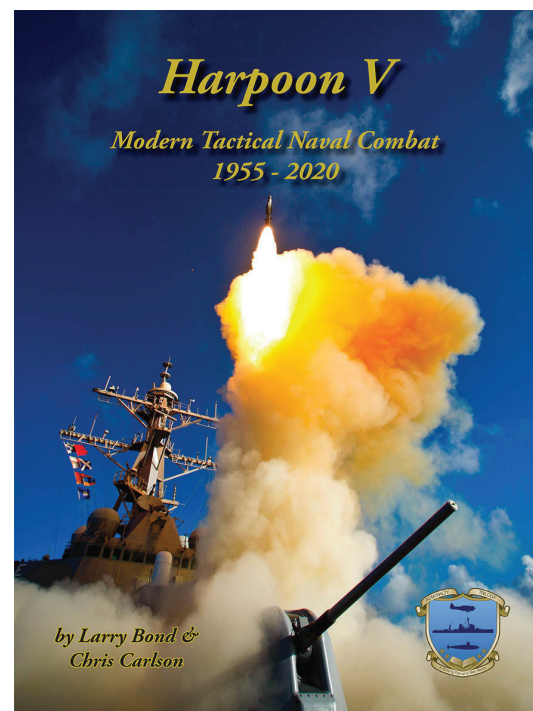
Harpoon is a complex game. It is playable because we have worked hard to ruthlessly simplify the many interactions and abstract, or "black-box" processes that would otherwise slow manual play to a crawl. We want the game to be about making decisions, based on real-world trade-offs.

This game requires that you learn about naval warfare. Like any game, the more you understand, the better your chance of winning. The rules explain, in real-world terms, how radar, sonar, and other sensors work. Some of it is arcane; all of it is real. And in naval warfare, finding the other side is the hard part.

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If you have questions about this Jumpstart or any other part of the *Admiralty Trilogy* game system, please email us at adtrgroup@aol.com. Visit the Admiralty Trilogy Facebook page or our website at admiraltytrilogy.com. We always answer our mail.

Cover: A Harpoon missile fired from the Mk141 launcher aboard USS *Shiloh* during a live-fire exercise (US Navy)



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Includes all corrections & changes through 10 July 2020.

Rules Summary

If you've played other wargames before, this rules summary explains the basics:

Harpoon is a tactical miniatures game, with players taking on the role as a ship captain or formation commander. Turns are simultaneous and can be either thirty minutes or three minutes long, depending on the level of interaction between the two sides. Players first plot their actions for the upcoming turn, then move according to the plotted orders. They execute any ordered weapons fire ("Planned Fire"), then find out what they can see with radar, sonar, or other sensors. If a new threat is detected, they are allowed to use some weapons against it immediately ("Reaction Fire"), and the turn ends with a housekeeping phase, adjudicating damage and such.

The game covers combat between ships, submarines, aircraft, and land installations like coastal missile batteries or radar sites. It does not include ground combat. *Harpoon* also does not cover some naval evolutions, such as underway replenishment, as they are not combat evolutions. We could write the rules for them, but it's boring.

Damage is measured in points, with different weapons inflicting different amounts, depending on many factors, including warhead weight, explosive type, as well as other factors. Ships and land structures are also rated by the amount of damage they can absorb. It is possible to simply sink a ship or destroy a land target with a large enough (or many smaller) weapons, but ships and land installations are more often disabled by "critical hits." These are vital systems, such as fire control or propulsion, that are knocked out by a weapon hit, and reduce the target's ability to fight. Depending on the circumstances, some critical hits may not have much effect (e.g., a disabled sonar during an air battle). Others can be instantly fatal (a magazine detonation). The type of critical hit inflicted varies with the weapon and the target type.

Scenarios usually start out with both sides undetected by their opponents, but this is not a rule. Modern naval warfare is about finding the other side before they find you, organizing your forces for an effective attack, and then executing the attack. While many discussions of naval warfare focus on antiship missile defense, or protecting a formation from submarine or surface attack, a defensive mindset will not win the game.

If you've played an earlier edition of *Harpoon* before, here are some of the big changes in the fifth edition:

First, what hasn't changed: The turn sequence is the same, and while there have been many refinements, the damage system is unchanged. Total up the damage, figure out the critical hit ratio, and roll D6 to find the number of critical hits. Movement is the same, although calculating aircraft endurance has been radically simplified.

But there have been a lot of additions and modifications, many of them linked to a basic change in the nature of the game. In earlier editions of the game, if you could see someone, you could shoot at them. Turns out, it isn't that simple.

- *Radar detection* has been modified to model uncertainties in exactly when an incoming aircraft is "detected." Research on declassified exercise reports in the Naval War College archives showed that just because an aircraft is within a radar's detection range, it's not automatically spotted. That's only the start.

- This edition adds *combat systems* to ships as a vital measure of their capability to convert a detection into a firing solution. One would expect a *Burke*-class DDG to react more quickly than a 1950s *Adams* class DDG. Against a fast-moving aircraft, or a supersonic missile, showing that variation in response time, especially if detection isn't automatic at maximum range anymore, is critical. *Harpoon* now depicts these differences in capability between different generations of combat system technology.

- The hardest (and slowest) part of *Harpoon* to model has always been anti-air-warfare, or "AAW." There's a lot going on, and frankly, a manual game isn't the ideal way to do it. Pushing missile counters around the game board slows play just as the action heats up. A new step-by-step process radically simplifies missile movement, checking key distances (e.g., when can the height-finding radar see them?) in relation to their target. Based on the speed of the incoming bogeys, and the capability of the ship's combat system, the players punch a table that tells them how many shots they get at what range, and they roll their shots. No more pushing and measuring piles of missile counters.

- The surface battle has changed with more emphasis on the surface duct. This meteorological condition traps a radar wave and allows it to travel a lot farther than the normal or standard radar horizon. Our research has shown it to be more common than we thought. How about a 70% chance in the Norwegian Sea? It's a little tricky, but if you can get it working for you, it's a tremendous advantage to whoever's using it. The Russians have built special "targeting complexes," like Monolit-T and Titanit, designed to take advantage of ducting, or anomalous propagation as they refer to it. As the sample scenario will show, it makes early missile boats much more powerful than before.

- Except just finding a contact is no longer good enough to launch an attack. Turns out getting a good fire control solution can take time, even with active sensors. Passive sensors will take a lot longer. You can still use a bearing-only launch, but your "Weapon Placement Roll," the chance that your guess was correct, is pretty poor.

Just like the real world, *Harpoon* requires a player to understand the environment and how to best employ a ship's or aircraft's sensors. You will have to work to first find your enemy, identify him and the threat he presents, fix his position and movement, and then build a fire control solution if you want make a successful attack. And of course, do all this before the other side does. Colonel John Boyd, USAF, referred to this as the OODA loop – Observe, Orient, Decide, and Act – and the faster a ship's commanding officer can perform this decision-making cycle, the greater his advantage over his opponent.

Harpoon V Example Scenario: Guardian

Location: Norwegian Sea, May 1989, 0900 hours

Environment: Sunrise 0330, sunset 1945, moonrise 1150, moonset 0112, half moon. Moderate seas (Sea State 4). Wind from 240° T at 10 knots. There is no cloud cover. Visibility is 80%.

Maximum depth is Very Deep. Convergence Zones are at intervals of 30 nmi. There is a moderate layer between Shallow and Intermediate I depth bands.

An evaporative duct is present, usable by Small and VSmall ships.

Operational Situation: It has been 48 hours since hostilities began between NATO and the Warsaw Pact forces. Executing the US Navy's Maritime Strategy, the Second Fleet has sent a three-carrier task force into the Norwegian Sea to put pressure on the Northern Flank and threaten the Soviet bastion.

Although several Russian attack subs, both nuclear and conventional, have been sunk, a Project 877 Kilo managed to put a torpedo into USS *Biddle* (CG-34).

Barely afloat, *Biddle* is being escorted south by a single guided-missile frigate, USS *Doyle* (FFG-39). *Doyle* was chosen because she has a non-combat Engineering casualty, and can no longer keep up with the task force. She has no trouble keeping up with the crippled *Biddle*, however.

Tactical Situation: Both ships are heading south at *Biddle*'s best speed, 8 knots, with *Doyle* to seaward, while *Biddle* hugs the coastline as close as they dare.

NATO Orders: Escort *Biddle* south. Avoid any engagements, if possible. The air threat is relatively low, since the Soviets will be concentrating their efforts against the carrier task force. There is a moderate threat from submarine and minor surface forces.

Use the coastline to limit possible enemy approach routes, but remain at least 5 nmi away from the coastline to avoid possible Soviet mines.

Air cover from Norwegian fighters and maritime patrol aircraft begins 50 + D6 nmi south of their starting position.

NATO Forces:

TG 20.41

Biddle CG-34 (*Belknap* class CG)

Doyle FFG-39 (*O.H. Perry* class FFG)

with two SH-60B embarked.

NATO Setup: *Biddle* is steaming on course 180° at 8 knots, while *Doyle* screens her to seaward, patrolling 5 nmi out on an arc from 225° to 315°. Both ships are observing strict EMCON - no radar or radio transmissions.

Doyle's two helicopters are taking turns being on Alert +5. Each is armed with one Mk46 torpedo and one drop tank.

NATO Victory Conditions:

Decisive: Both ships reach air cover.

Tactical: *Biddle* reaches air cover.

Soviet Orders: Two rocket cutters have been assigned to finish off stragglers from the NATO task force that was repulsed by the Northern Fleet. They are in pursuit.

Soviet Forces:

Aysberg ("Iceberg")

with Dubrava/Titanit targeting complex, Osa-M SAM system

Rassvet ("Dawn")

with Monolit-T targeting complex, Osa-MA SAM system

(both Project 1234.1 [Nanuchka III] PGG)

Soviet Setup: The two cutters are in line abreast, separated by 10 nmi. They are on course 180° at 24 knots. *Rassvet*, the eastern boat, is 15 nmi from the Norwegian coast.

The two cutters are 60+2D10 nmi north of the US ships.

Soviet Victory Conditions:

Decisive: Both US ships are sunk.

Tactical: The cruiser is sunk.

Special Rules: *Biddle* was hit by a single 53-65K torpedo, inflicting 150 damage points out of 254. The Critical Hit ratio was thus $150/(254-150) = 150/104 = 1.4$. Rolling a D6, the US player got a 3, meaning 8 criticals, plus one more for each .2 above 1.0, for a total of $8 + 2 = 10$.

Of the ten criticals, because the torpedo was a wake-homer, the first two are automatically an Engineering and Rudder. In total, the cruiser suffered two flooding, one Weapon (no magazine detonations), a Rudder, Sensor, CIC and a Bridge Hit, and three Engineering criticals, which included a loss of all electrical power.

The D6 flooding and fire rolls resulted in a flooding percentage of 6%, but was redced by half afterward by damage control, and a fire percentage of 3%. Both fires and flooding were controlled during the next Intermediate Turn, but inflicted another 15 damage points before they were suppressed.

<u>Critical#</u>	<u>D20 Roll</u>	<u>Details</u>
1	--	Auto Engineering: D6-2 fire, 1%
2	--	Auto Rudder
3	12	Flooding, 4%
4	19	Bridge
5	6	CIC - mission kill
6	5	Sensor: SPS-48E
7	10	Engineering: D6-2 fire, 0%, loss of electrical power
8	14	Flooding, 2%
9	3	Weapon: Mk10 launcher
10	15	Engineering: D6-2 fire, 2%

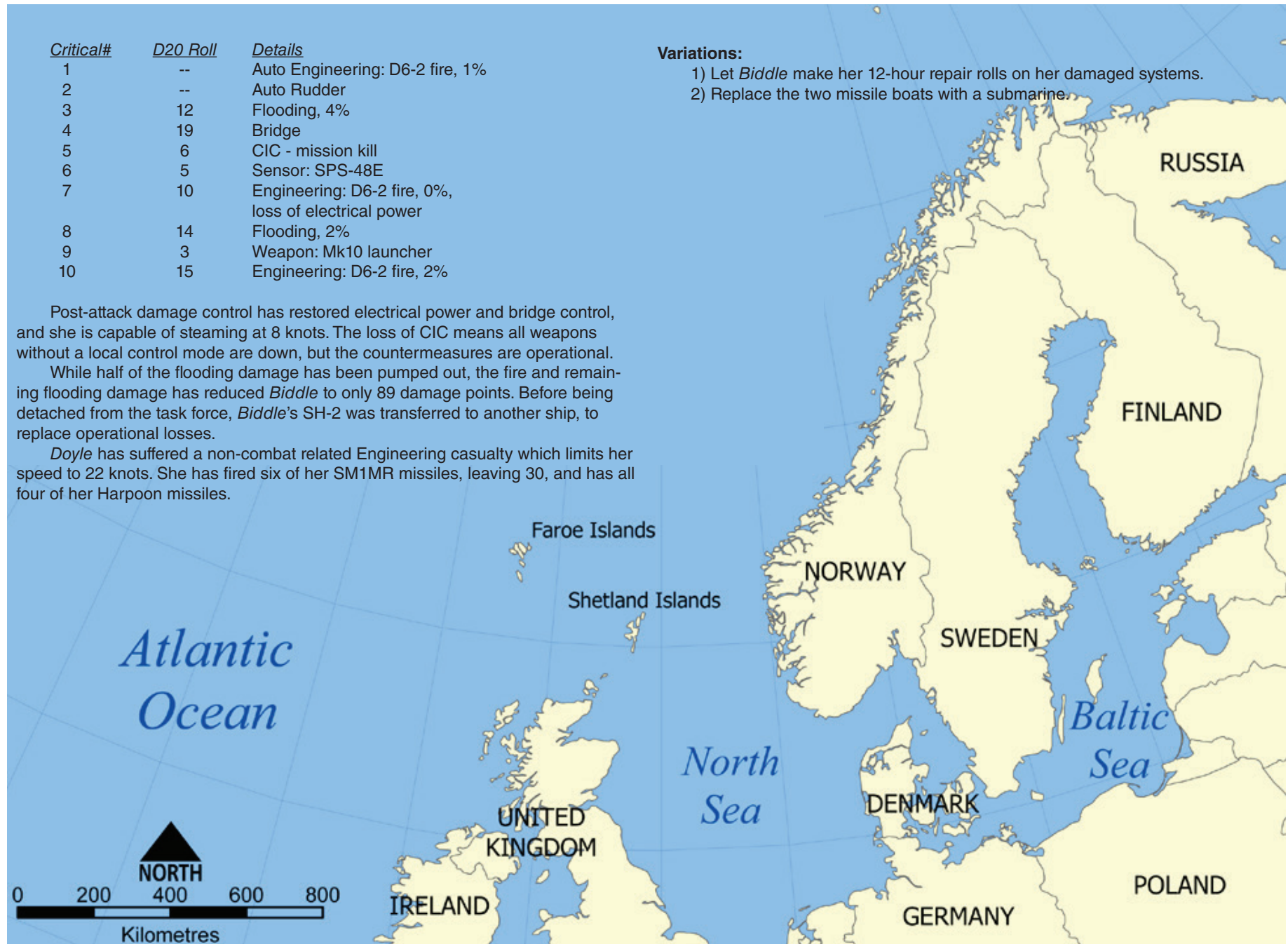
Variations:

- 1) Let *Biddle* make her 12-hour repair rolls on her damaged systems.
- 2) Replace the two missile boats with a submarine.

Post-attack damage control has restored electrical power and bridge control, and she is capable of steaming at 8 knots. The loss of CIC means all weapons without a local control mode are down, but the countermeasures are operational.

While half of the flooding damage has been pumped out, the fire and remaining flooding damage has reduced *Biddle* to only 89 damage points. Before being detached from the task force, *Biddle's* SH-2 was transferred to another ship, to replace operational losses.

Doyle has suffered a non-combat related Engineering casualty which limits her speed to 22 knots. She has fired six of her SM1MR missiles, leaving 30, and has all four of her Harpoon missiles.



Weapons Data Line Example

Annex with data on the weapon

A(8)1 Mk29 NATO Sea Sparrow w/8 RIM-7M//2 Mk91 D

Number of rounds/salvoes
 Name of ammunition
 Number of weapon directors
 Weapon director name

Launcher Name
 Number of mounts the ship carries
 Number of tubes per mount - eight in this case
 Weapon Arc. The single mount is sited aft, with a blind zone forward

Belknap **CG**
Displacement: 6570 std **In Class:** [9]
Size Class: B/Medium **In Service:** 1964 - 95
Propulsion: Steam Turbine **Crew:** 492
Electrn Cnt: 2nd Gen D **Acoustic Cnt:** 2nd Gen T
Signature: Med/Noisy **Armor Rating:** 0
Weapons: **Cbt Sys:** Gen 5 Human
 F(2)1 Mk10 w/60 msls, normal loadout 52 SM2ER Blk II
 and 8 ASROC. Can carry up to 20 ASROC and only 40
 Terrier//2 SPG-55 **D**
 PB/SQ(4)2 Mk141 w/4 Harpoon **D**
 A(1)1 Mk42 5in/54//Mk68 (1.4) **C**
 P/S(R)2 Mk15 Phalanx Blk 0 (5.0A) **C**
 PB/SB(3)2 Mk32 324mm TT w/3 Mk46 **F**
 Aft Pad(1)1 SH-2F Seasprite **B**
Sensors: **ES:**3rd Gen
 SPS-10, SPS-49(V)5, SPS-48E, SPS-59 **J**
 SQS-26 **K**
Remarks:
 Wainwright, Biddle, Josephus Daniels, Jouett, Horne, Sterett, William H.
 Standley, Fox, Belknap. Originally classed as DLGs. Originally fitted with
 two Mk25 stern tubes for Mk48 torpedoes, but these were never used.
 Aluminum superstructure, -15% damage modifier. Carries 12 reload torpe-
 does.
 • New Threat Upgrade added Jul 86- Jul 87, upgrades SPS-48 to SPS-48E.
 Combat System Gen 5 Human.
Damage & Speed Breakdown:

Dam Pts:	0	64	127	191	229	254
Surf Speed:	33	25	16	8	0	Sinks

USS Biddle (US Navy)



Surface Combatant Reference Sheet

Ship Name: **Biddle (CG-34)** In Service: **1964** Config Dt: **1989** Armor Rating: **0**

Class: Belknap	Type: CG	Propulsion: Steam Turbine	Size Class/Description: B Medium	Displacement: 6570	Crew: 492	Signature: Radar/Acoustic: Medium / Noisy
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Damage Point Effects							Maneuvering Data					
Percent Damage	0%	25%	50%	75%	90%	100%	Turn Type	Advance (yds)	CPP: <input type="checkbox"/> Speed Loss per 45° turn	Merch: <input type="checkbox"/> Acceleration ≤75% Max Spd	Waterjet: <input type="checkbox"/> Restr. Turn: <input type="checkbox"/> Acceleration >75% Max Spd	Single Prop: <input type="checkbox"/> Deceleration Any Spd

Damage Points	0	64	127	191	229	254	Standard	300	2	10	5	12
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Speed	33	25	17	8	0	Sinks	Hard	200	3	Aviation Assets:		
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Combat Sys.: **5th Gen Human** GS: **6** ES Gen: **3**
 Countermeasures - Electronic: **2nd D** Acoustic: **2nd Gen. T**
 Other Sensors:
~~Aft Pad(1) SH-2F Seasprite~~ Helicopter was transferred before Biddle was detached

Radars (Annex J)									
Name	Function	Large	Med.	Range Small	VSmall	Stealthy	Gen.	Remarks	
SPS-10	SS	48	35	20	11	6.0	2		
	LAS	48	40	28	11	3.0			
SPS-49(V)5	AS	260	237	169	68	20.0	4		
SPS-48E	3D	250	220	157	63	19.0	4	Critical Hit	
SPS-59	Nav	40	32	18	10	6.0	3	Also known as LN-66	
-	-								
-	-								
-	-								
-	-								

The loss of CIC from a critical hit means all sensors, except the navigation radar, are down. The nav radar is an exception because it is not part of the combat system.

Sonars (Annex K)						
Name	Type	Gen.	Active Range	Passive Range	Freq Band	Remarks
SQS-26	Bow	3	3.8	1.7	LMF^a MF	
-	-					
-	-					
-	-					
-	-					

Weapon Mounts						
Name	Type	Arc	Cells	Wpns Avail	Remarks	
Mk10	VLS/Missile	F(2)1	2	40	//2 SPG-55, 52 SM2ER Blk IIIB, 8 ASROC Critical Hit	
Mk141	VLS/Missile	PB/SQ(4)2	2x4	8	Harpoon IC	
Mk42 5in/54	Gun	A(1)1	1		//Mk68, AA strength 1.4	
Mk15 Phalanx	CIWS	P/S(R)2			AA Strength 5.0A	
Mk32 324mm TT	Torp. Tube	PB/SB(3)2	2	6	Mk46 Mod 5	
-	-					
-	-					
-	-					
-	-					
-	-					
-	-					

The loss of CIC and the combat system means that any weapon that cannot be operated in local control is also down.

Notes and Remarks:

Surface Combatant Reference Sheet

Biddle (CG-34)

Weapon Details

Missiles/ASW Standoff	Min/Max Rng(nmi)		Speed	Damage/Payload	Remarks	Annexes D, E4
SM2ER Blk II	3.5	40.0	1650	ATA 2.0	I/M/T SARH, altitude PVLow - VHigh, partial anti-sskimmer	
(vs Surf)	3.5	25.0	1650	24+D6/3	Gen 2 seeker, VSmall signature	
Harpoon IC	3.0	75.0	561	40+ D6/2	I/TARH Gen 3 seeker, VSmall signature, VLow cruise	
ASROC	0.5	5.0	660	Mk46 Mod 5	Nuke version has 1.8 nmi min range, 5kT W44 warhead.	

Torpedoes	Diam	Range(kyd)	Spd	Dam. Surf/Sub	Max Dpth	Remarks	Annex F
Mk46 Mod 5	324	12.0	45	52	Int V	Active/Passive, 3rd Gen	
		16.0	30		-		
					-		
					-		

Guns Annex C	Shell	Short Range			Medium Range			Long Range			Extreme Range			Max Alt	Air Rng(kyd)	AA Rtg
		kyds	B-Pen	Dmg	kyds	B-Pen	Dmg	kyds	B/D Pen	Dmg	kyds	B/D Pen	Dmg			
Mk42 5in/54	HE	7.8	2	26.0	15.5	1	22.0	20.7	1/0	20.0	25.9	1/1	18.0	High	10.4	1.40
Mk15 Phalanx														Low	2.4	5.00

Ahead-Thrown ASW Annex E3	Max Rng	# of	Damage	Attacks	Remarks
Name	kyds	Proj	Pts	/Tac Turn	

Depth Charges Annex E	Class	Damage			Max	Sink	Remarks
Name	Grouping	Leth	Maj	Min	Depth	Rate	
					-		
					-		

Notes and Remarks:

Biddle has been hit by a torpedo that inflicted 150 dp, leaving 104 dp. She suffered two Flooding (totaling 6%), one Weapon, one Rudder, one Sensor, one CIC, one Bridge, and three Engineering criticals hits (resulting in fires of 3%). She lost power during the attack, but it has been restored, and the fire and flooding have been controlled, although they inflicted an additional 15 damage points. She has 89 points remaining at the beginning of the scenario. The CIC hit has rendered all weapons and sensors inoperative, except for the SPS-59 navigation radar.

Harpoon V Jumpstart

O.H. Perry

Displacement: see remarks

Size Class: C/Small

Propulsion: COGAG/ CPP

Electrn Cnt: 3rd Gen D

Signature: Small/ Quiet

Weapons:

P&S(1)1 Mk75 76mm/62//Mk92 CAS (4.5)

F(1)1 Mk13 w/40 36 SM1MR Blk VI, 4 Harpoon IC//STIR

A(R)1 Mk15 Phalanx Blk 0 (5.0A)

PB/SB(3)2 Mk32 324mm TT w/3 Mk46 Mod 5

Aft Pad(1)2 SH-60B Seahawk

Sensors:

SPS-49(v)2, SPS-55, Mk92 CAS

SQS-56, SQR-19(V)2

Remarks:

FFG 1-16, 19-34, 36-43, 45-61. Has 18 Mk46 torpedoes. The Mk92 CAS gunfire director can be used as a director for a second SM1 channel, but it will only be able to provide half the number of intercepts as the STIR. CHP armor rating for Mk13, 76mm, Engineering, Sensors and CIC is 2. Single shaft, double the effect of Engineering critical hits. Aluminum superstructure, -15% damage modifier.

• Long hull: FFG 36-43, 45-61 displacement 3610 lt, fin stabilizers.

Damage & Speed Breakdown:

DP (3610 t):	0	43	86	129	155	172
Surf Speed:	29	22	14	7	0	Sinks

FFG

In Class: [51]

In Service: 1977 - 2015

Crew: 250

Acoustic Cnt: 2nd Gen T

Armor Rating: 0

Cbt Sys: Gen 4 Semi-Automatic

C

D

C

F

B

ES: 3rd Gen

J

K



USS Doyle (US Navy)



Surface Combatant Reference Sheet

Ship Name: Doyle (FFG-39) In Service: 1977 Config Dt: 1989 Armor Rating: 0

Class: O.H. Perry	Type: FFG	Propulsion: CODAG/CPP	Size Class/Description: C Small	Displacement: 3610	Crew: 250	Signature: Radar/Acoustic: Small / Quiet
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Damage Point Effects							Maneuvering Data					
Percent Damage	0%	25%	50%	75%	90%	100%	Turn Type	Advance (yds)	CPP: <input checked="" type="checkbox"/> Speed Loss per 45° turn	Merch: <input type="checkbox"/> Acceleration ≤75% Max Spd	Waterjet: <input type="checkbox"/> Restr. Turn: <input type="checkbox"/> Acceleration >75% Max Spd	Single Prop: <input checked="" type="checkbox"/> Deceleration Any Spd

Damage Points	0	43	86	129	155	172	Standard	300	1	18	9	18
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Speed	29	22	15	7	0	Sinks	Hard	200	2	Aviation Assets:		
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Combat Sys.: 4th Gen Semi-Automatic GS: 6 ES Gen: 3
 Countermeasures - Electronic: 3rd D Acoustic: 2nd Gen. T
 Other Sensors:
 Aft Pad(1) 2 SH-60B Seahawk

Radars (Annex J)									
Name	Function	Large	Med.	Range Small	VSmall	Stealthy	Gen.	Remarks	
SPS-49(V)2	AS	260	210	150	60	18.0	4		
SPS-55	SS	48	44	25	14	8.0	3		
	LAS	40	40	38	15	5.0			
Mk92 CAS	3D	45	45	35	14	4.0	3		
	SS,GFC	23	23	23	11	6.0			
	-								
	-								
	-								
	-								

Sonars (Annex K)						
Name	Type	Gen.	Active Range	Passive Range	Freq Band	Remarks
SQS-56	Keel	5	3.0	1.3	MFA	
SQR-19(V)2	TA-Fast	6		7.0	VLF-LF	
	-					
	-					
	-					

Weapon Mounts					
Name	Type	Arc	Cells	Wpns Avail	Remarks
Mk75 76mm/62	Gun	P&S(1)1	2		//Mk92 CAS, AA Strength 4.5
Mk15 Phalanx	CIWS	A(R)1	1		AA Strength 5.0A
Mk13	VLS/Missile	F(1)1	1	30/4	//STIR, 30 SM1MR Blk VI, 4 Harpoon IC
Mk32 324mm TT	Torp. Tube	PB/SB(3)2	3	3	Mk46 Mod 5
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				

Notes and Remarks:

Surface Combatant Reference Sheet

Doyle (FFG-39)

Weapon Details

Missiles/ASW Standoff	Min/Max Rng(nmi)		Speed	Damage/Payload	Remarks	Annexes D, E4
SM1MR Blk VI	2.0	25.0	1650	ATA 2.5	PVLow - VHigh altitude envelope, partial sskimmer capable	
vs. Surface	2.0	25.0	1650	24+D6/3	SARH 3rd Gen seeker, VSmall signature	
Harpoon IC	3.0	75.0	561	40 + D6/2	I/TARH 3rd Gen seeker, VSmall signature, VLow cruise	

Torpedoes	Diam	Range(kyd)	Spd	Dam. Surf/Sub	Max Dpth	Remarks	Annex F
Mk46 Mod 5	324	12.0	45	52	Int V	Active/Passive, Gen. 3	
		16.0	30		-		
					-		
					-		

Guns Annex C	Shell	Short Range			Medium Range			Long Range			Extreme Range			Max Alt	Air Rng(kyd)	AA Rtg
		kyds	B-Pen	Dmg	kyds	B-Pen	Dmg	kyds	B/D Pen	Dmg	kyds	B/D Pen	Dmg			
Mk75 76mm/62	HE	6.0	1	18.0	12.1	1	15.0	16.1	0/0	14.0	20.1	0/1	12.0	High	7.0	4.50
Mk15 Phalanx														Low	2.4	5.00

Ahead-Thrown ASW Annex E3	Max Rng	# of	Damage	Attacks	Remarks
Name	kyds	Proj	Pts	/Tac Turn	

Depth Charges Annex E	Class Grouping	Damage			Max	Sink	Remarks
Name		Leth	Maj	Min	Depth	Rate	
					-		
					-		

Notes and Remarks:

The Mk92 CAS gunfire director can be used as a director for a second SM1 channel, but it will only be able to provide half the number of intercepts as the STIR. CHP armor rating for Mk13, 76mm, Engineering, Sensors and CIC is 2. Single shaft, double the effect of Engineering critical hits.

Engineering casualty limits Doyle to 3/4 maximum speed. She has 30 SM1MR remaining, having fired six.

Harpoon V Jumpstart

SH-60B Seahawk

Man Rtnng: 2.0/1.5

Size/Signature: Small/Small

Sensors: 2nd Gen ES, MAD, APS-124 radar, 25 sonobuoys, UYS-1 sonobuoy processor.

ASW

Damage Value: 18

Bombsight: Manual

Throttle Setting/Speed in knots

Altitude	Cruise	Full Mil	Reheat
Low:	125	145	
Med:	125	145	

Ceiling: 5790 m

Cruise Range: 300 nmi

Additional Fuel

120 USG drop tank

Fuel Wt.

370 kg

Engine Type: TS

Int Fuel: 1830 kg

Range Add.

85 nmi

Ordnance Loadouts:

- 2 Mk 46 Mod 5 torpedoes or 2 120 USG fuel tanks (Block 0)
- 1 120 USG fuel tank, 2nd Gen FLIR (some from 1987)

Payload: 1860 kg

Remarks:

Helicopter. Fitted with RAST and 2722 kg cargo hook. Estimated sonobuoy loadout - 15 SSQ-53 (search), 4 SSQ-77B/C VLAD (localization) and 6 SSQ-62 DICASS.

In Svc: 1984 - 2015

SH-60B Seahawk on helicopter pad of USS Doyle (US Navy)



AIR MISSION FORM				Aircraft Type		Mission		ID	Man. Rtg	Damage	Size	Signature											
SH-60B Seahawk Blk 0				Patrol		Pirate 1		2.0 / 1.5	18	Small	Small												
Bombsight		Countermeasures		Infight Refuel		Ceiling (m)		Speed in kts															
Manual		-		N		5790		Throttle Settings															
Engine Type		Int. Fuel./ Crs Rng (kg) (nmi)		Mod. Rng (nmi)		Additional Fuel			Altitude		Cruise		FMP		Aft		Mach 1						
TS		1830 300		385		Gal Weight Range			Low:		125		145				660						
						120 370 85			Medium:		125		145				650						
Max Load		Load		Off Guns		Rtg		High:								575							
1860		601 32%		/ ()				VHigh:								575							
Radars Annex J3				Range				Eng.															
Name		Function		Large		Med		Small		VSmall		Stealthy		Gen		Arc		Eng. Targ		Remarks			
APS-124		SS		160		124		71		40		22.0		4		360							
FLIR Gen:		IRST Gen:		RWR Gen:		ES Gen: 2		MAD: <input checked="" type="checkbox"/>		LLTV: <input type="checkbox"/>		Laser Warning: <input type="checkbox"/>		Helmet Display: -									
Sonars Annex K2				Active Range				Pass. Range				Freq. Band				Remarks				# of Sonobouys: 25			
Name		Type		Gen		Active Range		Pass. Range		Freq. Band		Remarks											
SSQ-53A DIFAR		Sonobouy		5				1.8		VLF-LMF		1,4 hour lifetime - Directional								Loadout: 15			
SSQ-77A VLAD		Sonobouy		5				2.6		VLF-LMF		4, 8 hour lifetime - Directional								Loadout: 4			
SSQ-62B DICASS		Sonobouy		5		1.8				MFa		0.5 hour lifetime								Loadout: 6			
Sonar Processor				Total				Search				Local				Active							
ASW System		# of Bouys		Gen.		Chan.		Chan.		Chan.		Chan.		Chan.		Chan.		Chan.		Remarks		Annex K3	
UYS-1		25				99		61		16		3											
Torpedoes				Diam		Weight		#		Range(kyd)		Speed(kt)		Dam. Surf/Sub		Max Dpth		Remarks		Annex F			
Mk46 Mod 5A(SW)		324		231		1		12.0		45				52		Int V		Active/Passive 3rd Gen					
								16.0		30													
Mines/Depth Charges				Weight		#		Max Depth		Remarks		Annex E,G											
Air-to-Air Missiles				Weight		#		ATA Rtnng		Range		Speed		Remarks		Annex H4							
Electronic Pods				Weight		#		Gen		Remarks		Annex H5											
Ordnance				Type		Weight		#		Range		Speed		Dmg		Remarks		Annex H1, H2, H3					
Notes and Remarks																							

Aysberg

Project 1234.1 [Nanuchka III]

PGG

Displacement: 639 std

In Class: 19 - 7

Size Class: D/Small

In Service: 1977

Propulsion: Diesel

Crew: 65

Electrn Cnt: 2nd Gen J&D

Acoust Cnt: None

Signature: Small/Noisy

Armor Rating: 0

Weapons:

Cbt Sys: Gen 4 Semi-Automatic

PB&SB(3)2 P-120 Malakhit **D**

F(2)1 Osa-M w/20 msls//MPZ-301 Baza **D**

A(1)1 AK-176 76mm/59 (5.9),

A(R)1 AK-630 30mm//F MR-123 (2.7) **C**

Sensors:

Dubrava/Titanit targeting complex, 2 Pechora 1, MPZ-301 Baza **J**

Remarks:

Alloy superstructure, -15% damage modifier.

Damage & Speed Breakdown:

Dam Pts: 0 12 24 35 42 47

Surf Speed: 32 24 16 8 0 Sinks

Rassvet

Project 1234.1 [Nanuchka III]

PGG

Displacement: 639 std

In Class: 19 - 7

Size Class: D/Small

In Service: 1977

Propulsion: Diesel

Crew: 65

Electrn Cnt: 2nd Gen J&D

Acoust Cnt: None

Signature: Small/Noisy

Armor Rating: 0

Weapons:

Cbt Sys: Gen 4 Semi-Automatic

PB&SB(3)2 P-120 Malakhit **D**

F(2)1 Osa-MA w/20 msls//MPZ-301 Baza **D**

A(1)1 AK-176 76mm/59 (5.9),

A(R)1 AK-630 30mm//F MR-123 Vympel (2.7) **C**

Sensors:

Monolit-T targeting complex, 2 Pechora 1, MPZ-301 Baza **J**

Remarks:

Alloy superstructure, -15% damage modifier.

Damage & Speed Breakdown:

Dam Pts: 0 12 24 35 42 47

Surf Speed: 32 24 16 8 0 Sinks

Rassvet has an upgraded SAM system and targeting complex, compared to Aysberg.

Rocket cutter Aysberg (TASS)

The MR-123 Vympel gunfire control radar, code named "Bass Tilt" by NATO, supports both guns.

Aft-facing AK-630 30mm rotary gun

Aft-facing AK-176 76mm gun

The Dubrava antenna is the active channel for the Dubrava/Titanit targeting system code named "Peel Pair" by NATO.

The Titanit or Monolit-T antenna is under this radome, code named "Band Stand" by NATO.

The Baza guidance radar for the Osa SAM system, code named "Pop Group" by NATO.

The Osa SAM system is located under a trap door in the forecastle, to keep it out of the weather until it is needed.



Surface Combatant Reference Sheet

Ship Name: **Aysberg** In Service: **1977** Config Dt: **1989** Armor Rating: **0**

Class: **Pr. 1234.1 [Nanuchka III]** Type: **PGG** Propulsion: **Diesel** Size Class/Description: **D Small** Displacement: **639** Crew: **65** Signature: Radar/Acoustic: **Small / Noisy**

Damage Point Effects: Percent Damage: 0% 25% 50% 75% 90% 100%
 Maneuvering Data: Turn Type, Advance (yds), Speed Loss per 45° turn, CPP: Merch: Waterjet: Restr. Turn: Single Prop:
 Acceleration: ≤75% Max Spd, >75% Max Spd, Deceleration: Any Spd

Damage Points	0	12	24	35	42	47	Standard	200	1	12	6	15
Speed	32	24	16	8	0	Sinks	Hard	100	2	Aviation Assets:		

Combat Sys.: **4th Gen Semi-Automatic** GS: 6 ES Gen: 2
 Countermasures - Electronic: **2nd J&D** Acoustic: **None**
 Other Sensors:

Radars (Annex J)									
Name	Function	Large	Med.	Range Small	VSmall	Stealthy	Gen.	Remarks	
Pechora 1 (#1)	Nav	32	21	12	7	4.0	2		
Pechora 1 (#2)	Nav	32	21	12	7	4.0	2		
Dubrava/Titanit	SS-T	35	25	14	8	4.0	2	Titanit is associated 2nd Gen ES	
MPZ-301 Baza	LAS	22	22	22	15	4.4	3	Also guidance for Osa SAM system	
Pechora 1 (#2)	Nav	32	21	12	7	4.0	2		
Monolit-T	SS-T	80	80	61	34	19.0	3	Passive channel is a 3rd Gen ES	
MPZ-301 Baza	LAS	22	22	22	15	4.4	3	Also guidance for Osa SAM system	

Rassvet has the newer and better Monolit targeting system

Sonars (Annex K)						
Name	Type	Gen.	Range	Range	Band	Remarks
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Weapon Mounts					
Name	Type	Arc	Cells	Wpns Avail	Remarks
P-120 Malakhit	VLS/Missile	PB&SB(3)2	3	6	
Osa-M	VLS/Missile	F(2)1	2	20	
AK-176 76mm	Gun	F(1)1	1		//MR-123, AA strength 5.9
AK-630 30mm	CIWS	A(R)1	1		//MR-123, AA strength 2.7
-	-	-	-	-	-
-	-	-	-	-	-

P-120 Malakhit	VLS/Missile	PB&SB(3)2	3	6	
Osa-MA	VLS/Missile	F(2)1	2	20	
AK-176 76mm	Gun	F(1)1	1		//MR-123, AA strength 5.9

Rassvet also has the improved Osa-MA missile system; compare the performance numbers on page 2

Notes and Remarks:
 AK-176 76mm and AK-630 30mm are controlled by the same FC radar and must fire at the same target.

Surface Combatant Reference Sheet

Aysberg

Weapon Details

Missiles/ASW Standoff	Min/Max Rng(nmi)		Speed	Damage/Payload	Remarks	Annexes D, E4
Osa-M	0.5	3.8	1650	ATA 2.0	Low - Med altitude envelope	
vs. Surface	0.5	3.8	1650	17+D6/3	VSmall signature, 2nd Gen seeker	
P-120 Malakhit	6.0	65.0	594	46 + D6	Small signature, 2nd Gen seeker	
					Low cruise, treat as VLow for detection.	

Missiles/ASW Standoff	Min/Max Rng(nmi)		Speed	Damage/Payload	Remarks	Annexes D, E4
Osa-MA	0.5	6.5	1650	ATA 2.5	PVLow - Med altitude, partially seaskimmer capable	
vs. Surface	0.5	6.5	1650	17+D6/3	VSmall signature, 2nd Gen seeker	
P-120 Malakhit	6.0	65.0	594	46 + D6	Small signature, 2nd Gen seeker	

The Osa-MA system has greater range and some ability to engage seaskimmers, which the Osa-M did not.

Torpedoes	Diam	Range(kyd)	Spd	Dam. Surf/Sub	Max Dpth	Remarks	Annex F
					-		
					-		
					-		
					-		

Guns Annex C	Shell	Short Range			Medium Range			Long Range			Extreme Range			Max Alt	Air Rng(kyd)	AA Rtg
		kyds	B-Pen	Dmg	kyds	B-Pen	Dmg	kyds	B/D Pen	Dmg	kyds	B/D Pen	Dmg			
AK-176 76mm/59	HE	4.5	1	17.0	9.0	1	14.0	12.0	0/0	13.0	15	0/1	11.0	High	7.0	3.40
AK-630 30mm	HE	1.8	0	4.0	4.4	0	4.0	7.1	0/0	3.0	8.9	0/0	3.0	Low	3.6	1.50

Ahead-Thrown ASW Annex E3	Max Rng	# of	Damage	Attacks	Remarks
Name	kyds	Proj	Pts	/Tac Turn	

Depth Charges Annex E	Class Grouping	Damage			Max Depth	Sink Rate	Remarks
Name		Leth	Maj	Min			
					-		
					-		

Notes and Remarks:

Standing Orders

Standing orders are not only an integral part of naval command, but a great way to speed game play. By having both sides issue standing orders, the players can plot movement over long periods of time and quickly bring their forces together.

Standing orders remain in effect until canceled or expired. Every captain issues Standing Night Orders to the Officer of the Deck before he retires for the evening. A good admiral will issue standing orders before a battle, telling his captains what he plans to do.

For example, one side on barrier patrol might issue the following standing orders: "Patrol a 20 nmi track running NW/SE at 15 knots until you detect an enemy. All sensors are passive." The other side could order, "Ships will steam in two columns on course 090° at 20 knots, zigzagging 30° to either side of base course every 20 minutes. Continue movement until 0900. Air search radars will radiate once during each 10 minute-period (random interval), all other sensors passive." The orders could be much more complicated, including both aircraft and ships, laying out search or attack plans.

By writing out these orders, the players are forced to think through their plan of battle. They can consider all the elements: Where will they most likely encounter the enemy? What should they do with their aircraft? Is there a submarine threat? What course should they follow? Have they considered the effects of the environment on movement and detection?

Independently written, the players can then cooperate in plotting their forces' movement, seeing where and how their units encounter each other. This information can then be used to set up the battle. Alternatively, the orders can be turned over to a referee, who interprets and executes them, reporting back to the appropriate commander about detections.

If there are several players on one side, and one has been appointed commander, he should issue standing orders to cover what they will do in case of attack, how they maneuver, and accomplish their mission.

A little prior planning will improve both the speed of play and the quality of the game.

NATO Standing Orders:

- The Task Group is heading generally south along the coastline at 8 kts, *Biddle's* best speed.
- Remain in EMCON until enemy units are passively detected.
- Remain at least 5 nmi away from the coast to avoid mines.
- *Doyle* will keep station from *Biddle* bearing 315° at 5 nmi, but will move to position herself between *Biddle* and any threat.
- *Doyle* will launch Alert +5 helo upon passive detection.

Soviet Standing Orders:

- Both ships steam at 180° at 24 kts, remaining 15 nmi from the coast.
- *Rassvet* will radiate the Monolit-T radar for the last 3 minutes of each 30-minute Intermediate Turn.
- *Aysberg* will remain in EMCON, since its Dubrava radar has a shorter range than the Monolit-T.



Rocket cutters on the prowl.

(forums.airbase.ru)

Excerpt from the Fifth Edition Rules

5.2.9.5 Radar Ducting. Atmospheric refraction bends electromagnetic energy, such as radar waves, as they travel. The Radar Line of Sight table on page 5-3 uses standard atmospheric refraction. However, there are two non-standard, or anomalous cases, that have significant tactical implications for naval vessels.

- The first is the *evaporative duct*. Caused by a rapid change in humidity as height increases above the sea surface, it is often present at sea and can reach a height of 40 meters. Usually, the duct height is 10 - 15 meters, and usable only by Small (C&D size) and VSmall (E-G size) ships, and submarines with a raised periscope/mast radar.

Exception: All Medium (B-size) Russian and Chinese ships with a targeting complex (SS-T) are treated as “Small” ships for employing the evaporative duct with the targeting system. There is a very good reason why the Russians put the radome on top of the bridge, instead of on top of the mast.

In addition, all U.S. ships with the SRS-1 Combat DF 3rd Gen ES are treated as one size class smaller for using the duct.

The evaporative duct enables radar waves to travel farther than the standard atmospheric model. This extends the radar horizon (see the appropriate line-of-sight table) for surface search (SS) and low-altitude search (LAS) radars detecting VLow and surface contacts by more than double.

Weather can have a significant effect on the evaporative duct. Wind speeds greater than 20 knots are too strong to allow the formation of a stable duct; the air is being mixed too much. Furthermore, if there is too much moisture in the air (precipitation or fog), the presence of sea ice, or heavy cloud cover (broken or solid) it will eliminate the humidity gradient and prevent the formation of a duct.

Example: A Project 956 *Sovremenny* class DDG with a Mineral-M [Band Stand] targeting complex wants to target a hostile medium size contact. The scenario takes place in the fall, and the Russian player rolls D100 to determine the evaporative duct’s height. Rolling a 71 and using the -15 Fall modifier yields a final result of 56. Thus all Small, VSmall ships, and submerged submarines with a raised radar mast can use the duct. Medium-size ships cannot. Even though the *Sovremenny* is a Medium size class, the Band Stand’s location effectively makes it a small ship for this purpose.

The Mineral-M has a maximum range of 135 nmi against a medium sized target. However, in looking at the Evaporative Duct line-of-sight table, the *Sovremenny* is limited to a maximum range of 55 nmi (Small observer to medium target).

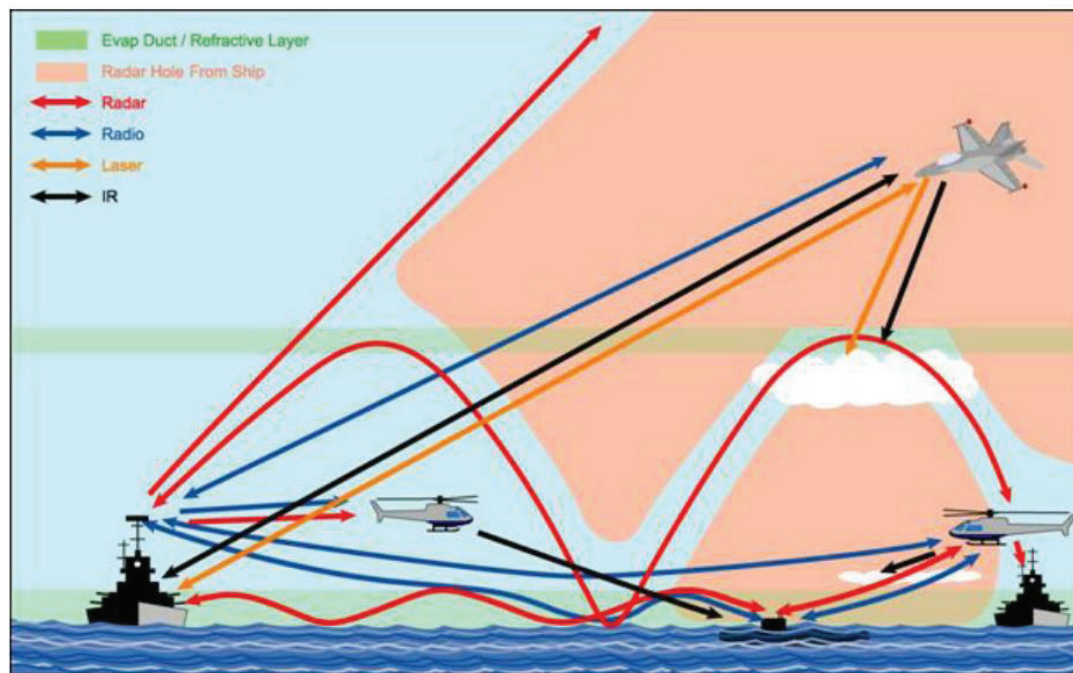
Normally, one would think that extended radar coverage would be a good thing, however, since the atmospheric conditions that cause the duct are not reliable, it is difficult to predict when and how strong a duct will be at any given time of day. In addition, as the radar signals are traveling farther than normal, they become vulnerable to jamming and clutter from distant sources.

Another problem is if the ducted line-of-sight is greater than the radar’s maximum range, then spurious contacts can show up on the display. This is because the radar pulses are no longer properly timed with the radar’s electronics and the ranges provided are “ambiguous.”

Contacts inside the normal radar ranges will be detected and displayed normally on the screen, but if the contact is in the duct, but beyond normal range, it could be displayed at any range. Radar operators can shift scales to see if the range changes, which it will show it to be an ambiguous contact, but will not provide the exact range - just that it is beyond normal detection range.

The bearing reported by the radar is correct.

The anomalous propagation effect works both ways. ES horizons are also increased by the same amount. When determining ES system detection range, use the appropriate line-of-sight table as the base range. Any radar that transmits into the Low Altitude band will have some of the RF energy captured in the duct. This can be detected by an ES system. In some cases, particularly with a shallow evaporative duct, large-size ships’ surface and air search radars could be detectable at the longer range, even though the ships cannot gain any benefit from the duct itself.



EM Propagation

(US Naval Postgraduate School)

0900 Intermediate Turn

After movement, the range is 60.7 nmi.

In the Detection Phase

- *Rassvet* activates the Monolit-T between 0927 – 0930. An evaporative duct is present:

Radar Clutter Value, sea state 4 = 7

Clutter Resistance, 3rd Gen = 8

7 – 8 = -1 or no clutter effect

Monolit range vs. Small = 61 nmi

Monolit range vs. Medium = 80 nmi

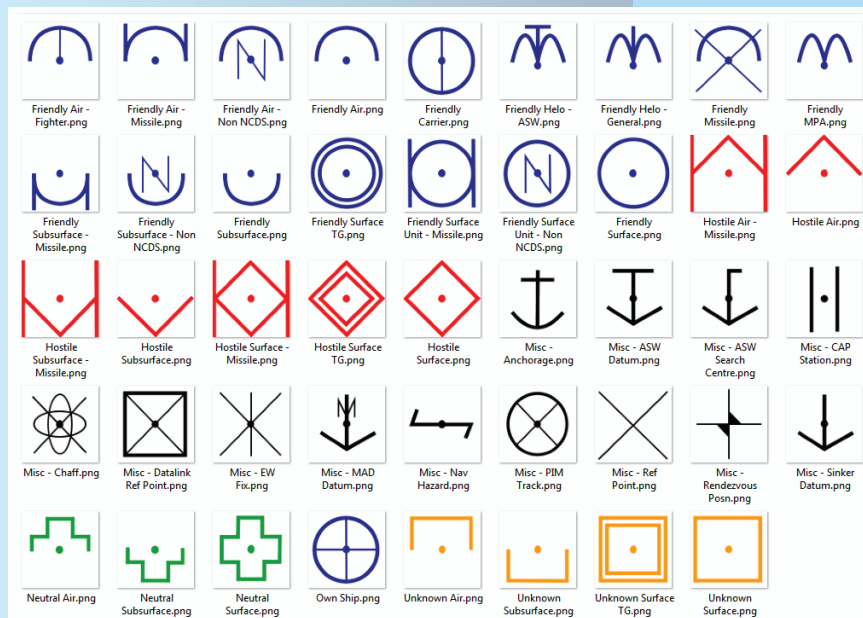
Duct Radar Horizon to Small = 50 nmi

Duct Radar Horizon to Medium = 55 nmi

Detections at the lesser values of 50/55 nmi

- The NATO ships are out of range, so no detections are made this turn.

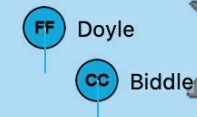
- The ES range for *Doyle* (Small ship) with a duct and 3rd Gen ES is 50 (duct radar horizon) x 1.3 = 65 nmi. Detection chance is 90%. Die roll is 96, no detection is made this Intermediate turn.



NTDS/CDS symbology:

Diamonds for hostile surface contacts, circles for friendly surface. Unknowns would be squares. Later, they used fluffy cloud shapes. The line shows the direction of movement.

- NTDS: Naval Tactical Data System
- CDS: Combat Direction System



Harpoon V Jumpstart

0930 Intermediate Turn

After movement, the range is 53.1 nmi.

In the Detection Phase:

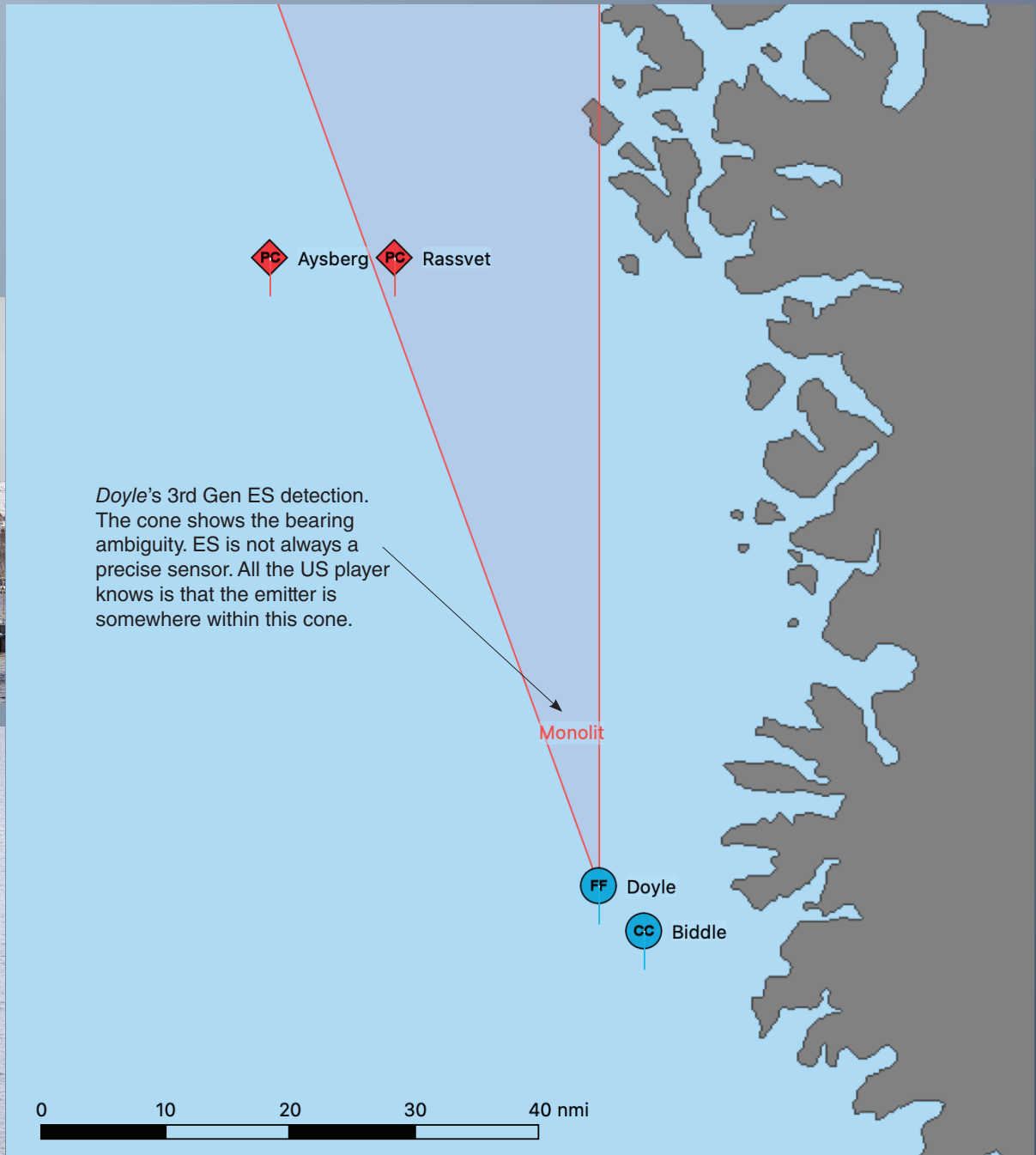
- *Rassvet* radiates Monolit-T again from 0957 - 1000.
- Because the radar emission only lasted for 3 minutes (0957 – 1000), the chance of detection is 90%.

Dice roll = 40. *Doyle* gets an ES hit at 0957 from a Monolit-T radar to the north-northwest.

Project 1234.1 *Rassvet*
[Nuthatch III PGG]
(nevskii-bastion.ru)



Project 1234.1 *Aysberg*
[Nuthatch III PGG]
(military-informant.com)



Harpoon V Jumpstart

1000 Tactical Turn

Plotting Phase

- Begin using Tactical Turns.
- Doyle orders the launch of the Alert +5 helo, call sign Pirate 1.

Pirate 1.

- Doyle orders the other helo to ready for Alert +5. This will take 40 minutes, it will be ready at 1040.

Detection Phase

- Doyle's ES bearing is lost.

1006 Tactical Turn

1006 Movement Phase

- Doyle's helo, Pirate 1, launches on course 045° in VLow flight to proceed along the coastline in a northerly direction.



SH-60B takes off from Doyle.

(US Navy)



1027 Tactical Turn

Detection Phase

- Using Monolit-T, *Rassvet* detects
Contact 1 bears 159° at 46 nmi
Contact 2 bears 157° at 50 nmi.
SH-60B Pirate 1 bears 103° at 26 nmi:

Attempting to detect the helo, SS and SS-T radars trying to detect air contacts at VLow have their range divided by 10, so the Monolit's 61 nmi detection range vs. a Small surface contact becomes 6.1 nmi vs. a Small VLow air contact. The land clutter is not a factor because of the shortened detection range. No detection of Pirate 1.

- *Rassvet's* Active RF FC solution for Contact 1 at 46 nmi:

Base Track Length = 0 Turns (first contact)

4th Gen combat system Mod = 0

Contact Speed Mod = 0

Sensor Type Mod = 0

Decoy Mod = 0

ASCM Speed Mod = -1

ASCM Seeker Mod (2nd Gen) = 0 (The better the seeker generation, the more ambiguity that can be accepted in the fire control solution quality.)

OTH-T Mod = 0

Total = -1 (25.1 – 50.0 range) = Poor

- *Rassvet's* Active RF FC solution for Contact 2 at 50 nmi:

Base Track Length = 0 Turns (first contact)

4th Gen combat system Mod = 0

Contact Speed Mod = 0

Sensor Type Mod = 0

Decoy Mod = 0

ASCM Speed Mod = -1

ASCM Seeker Mod (2nd Gen) = 0

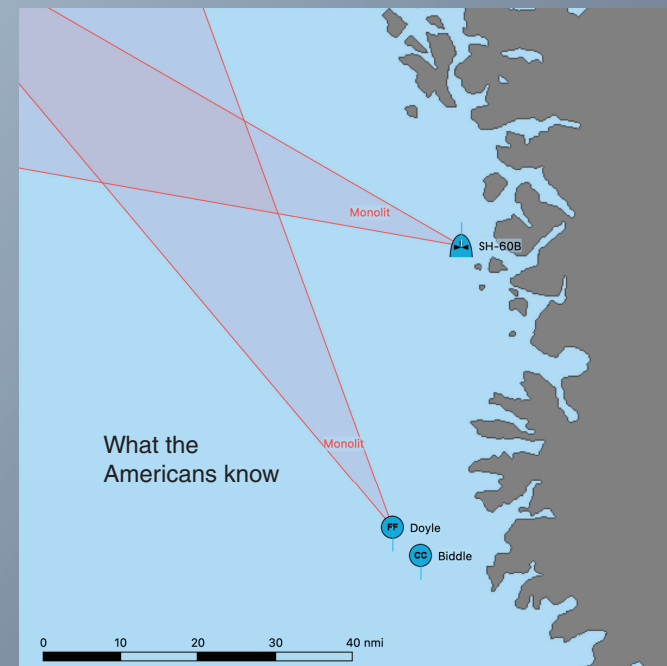
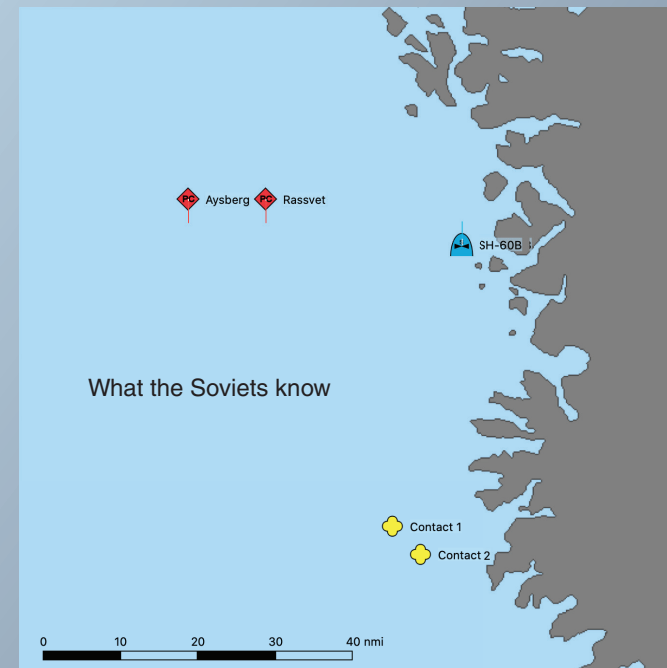
OTH-T Mod = 0

Total = -1 (25.1 – 50.0 range) = Poor

- *Doyle* gets an ES hit from *Rassvet's* Monolit-T radar from the same direction as before. Pirate 1 gets an ES cross-bearing as well. (The data link type is not usable for Passive FC solution cross-fix.)

- *Aysberg* gets information from *Rassvet* on Contacts 1 and 2 via the dedicated data link that is part of both targeting complexes.

While this information gives the American side useful information on the general distance and direction to the threat, and the type of threat (Monolit-T is associated with small craft anti-ship missiles), it is not enough data to fire on. This is a change from earlier editions of Harpoon.



1030 Tactical Turn

Plotting Phase

- Pirate 1 will activate its APS-124 radar and loiter at VLow.
- Doyle will slow to 5 kts to increase separation with Biddle. Biddle will continue on course and speed.
- Rassvet and Aysberg will activate all radars, and maintain course and speed.
- Rassvet will maintain a FC solution on Contact 2, and Aysberg will keep a FC solution on Contact 1 but uses Rassvet's sensor data (both contacts are now less than 50 nmi from their respective attackers).

Detection Phase

- Both Russian ships get an ES bearing (APS-124) from the ESE.
- They can deduce from the emitter type that it must be a helicopter from a nearby American ship, probably an SH-60B. They will therefore classify all contacts as hostile. Knowing the radar's range and capabilities, they can also deduce that they have probably been detected.

- Rassvet's Active RF FC solution for Contact 2 @ 50 nmi:

Base Track Length = 1 Turns

4th Gen combat system Mod = 0

Contact Speed Mod = 0

Sensor Type Mod = 0

Decoy Mod = 0

ASCM Speed Mod = -1

ASCM Seeker Mod (2nd Gen) = 0

OTH-T Mod = 0

Total = 0 (25.1 – 50.0 range) = Fair

- Aysberg's Active RF FC solution for Contact 1 @ 49 nmi:

Base Track Length = 1 Turns

4th Gen combat system Mod = 0

Contact Speed Mod = -1 (5 kts) (Really slow speeds makes it harder to get a solution.)

Sensor Type Mod = 0

Decoy Mod = 0

ASCM Speed Mod = -1

ASCM Seeker Mod (2nd Gen) = 0

OTH-T Mod = 0

Total = -1 (25.1 – 50.0 range) = Poor

- Pirate 1's APS-124 radar picks up two surface contacts at 26 and 36 nmi in the general direction of two ES bearings (Russian Monolit-T and now Dubrava radars):

Radar Clutter Value for airborne SS radar, sea state 4 = 7

Clutter Resistance, 4th Gen radar = 12

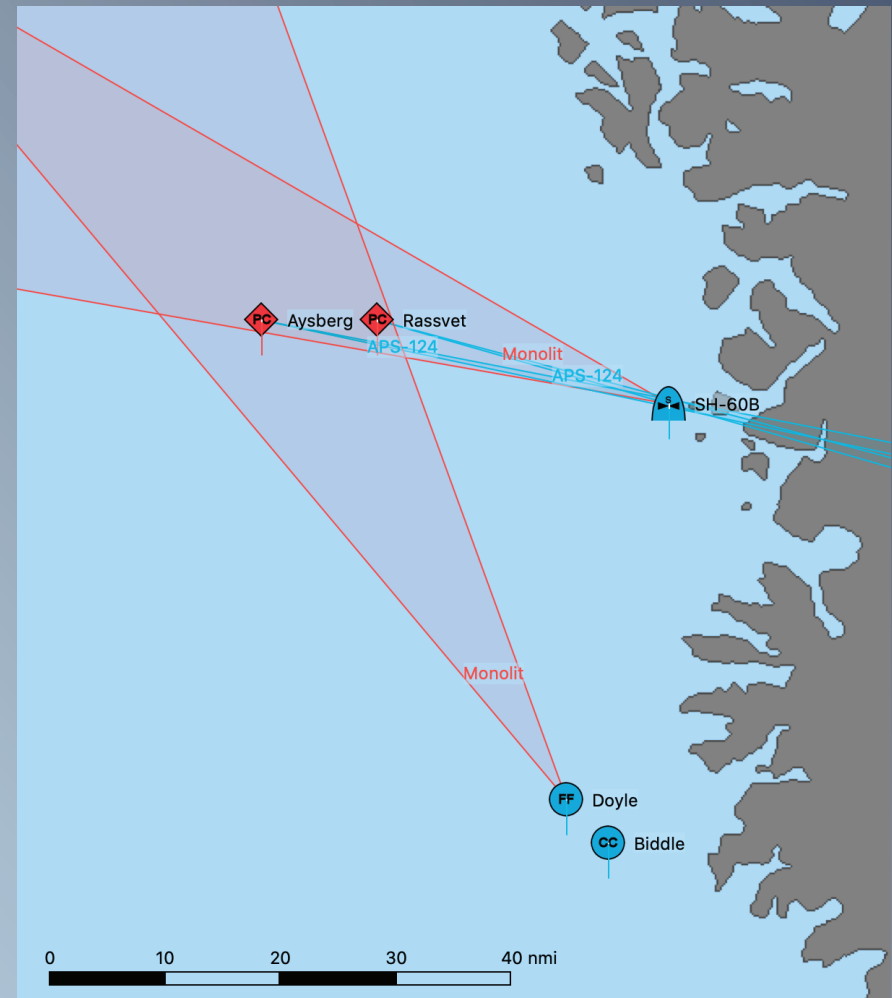
$7 - 12 = -5$, so the clutter has no clutter effect

APS-124 range vs. Small = 71 nmi

Duct Radar Horizon to Small = 50 nmi

Detection at the lesser value of 50 nmi

Since there are no other ships nearby, NATO will classify these contacts as hostile.



- Doyle's Passive RF FC solutions for both surface contacts at 45 and 49 nmi:
- Base Track Length = 0 Turns (first contact)
- 4th Gen combat system Mod = 0
- Contact Speed Mod = 0
- Sensor Type Mod = +1 (Information from the helicopter helps, but this isn't a data link.)
- Decoy Mod = 0
- ASCM Speed Mod = -1
- ASCM Seeker Mod (3rd Gen) = +1 (The Harpoon seeker is better than the P-120 Malakhit.)
- OTH-T Mod = 0
- Total = 1 (25.1 – 50.0 range) = Poor

Harpoon V Jumpstart

1033 Tactical Turn

Plotting Phase

- *Doyle* will turn to 045° (Port turn) at 5 kts to unmask weapons in anticipation of an imminent attack. Also, the speed gives a -1 modifier to enemy FC solution (buying a little more time).

- *Biddle* will turn to 200° (Starboard turn) to increase the bearing separation from *Doyle*. Also, the speed gives a -1 modifier to enemy FC solution (buying a little more time—it's not like *Biddle* can run away).

Detection Phase

- *Rassvet's* Active RF FC solution for Contact 2 at 49 nmi:

Base Track Length = 2 Turns
 4th Gen combat system Mod = 0
 Contact Speed Mod = -1
 Sensor Type Mod = 0
 Decoy Mod = 0
 ASCM Speed Mod = -1
 ASCM Seeker Mod (2nd Gen) = 0
 OTH-T Mod = 0
 Total = 0 (25.1 – 50.0 range) = Fair

- *Aysberg's* Active RF FC solution for

Contact 1 @ 48 nmi:
 Base Track Length = 2 Turns
 4th Gen combat system Mod = 0
 Contact Speed Mod = -1
 Sensor Type Mod = 0
 Decoy Mod = 0
 ASCM Speed Mod = -1
 ASCM Seeker Mod (2nd Gen) = 0
 OTH-T Mod = 0
 Total = 0 (25.1 – 50.0 range) = Fair

- *Doyle's* Passive RF FC solutions for both surface contacts at 44 and 48 nmi:

Base Track Length = 1 Turns
 4th Gen combat system Mod = 0
 Contact Speed Mod = 0
 Sensor Type Mod = +1
 Decoy Mod = 0
 ASCM Speed Mod = -1
 ASCM Seeker Mod (3rd Gen) = +1
 OTH-T Mod = 0
 Total = 2 (25.1 – 50.0 range) = Fair

USS *Doyle* in 1990 (US Navy)

Harpoon V Jumpstart

1036 Tactical Turn

Plotting Phase

- *Rassvet* will fire 6 P-120 SSMs at Contact 2 with a Fair FC solution. The missile seekers will activate at the halfway point.
- *Aysberg* will fire 6 P-120 SSMs at Contact 1 with a Fair FC solution. Seekers will activate at the halfway point.
- *Doyle* will fire 4 Harpoon IC SSMs at the right surface contact (suspected Monolit-T emitter). Seekers will activate at the halfway point. FC solution = Fair.
- *Doyle* will activate all radars, since the SSM launch will provoke a response from the adversaries. *Biddle's* CIC is destroyed so she can't use radar.

Planned Fire Phase

- Missiles away!

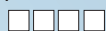
Detection Phase

- *Rassvet* rolls for ES detection (56, 14) and picks up SPS-49(V)2 and SPS-55 radars.
- *Aysberg* rolls for ES detection (01, 91) and picks up only the SPS-49(V)2 radar.
- It appears both bearings match Contact 1. This is definitely an American warship.
- *Doyle* does not pick up any surface contacts on her radar (range to a Small signature size target is 25 nmi, too short to make a detection).

P-120 salvoes

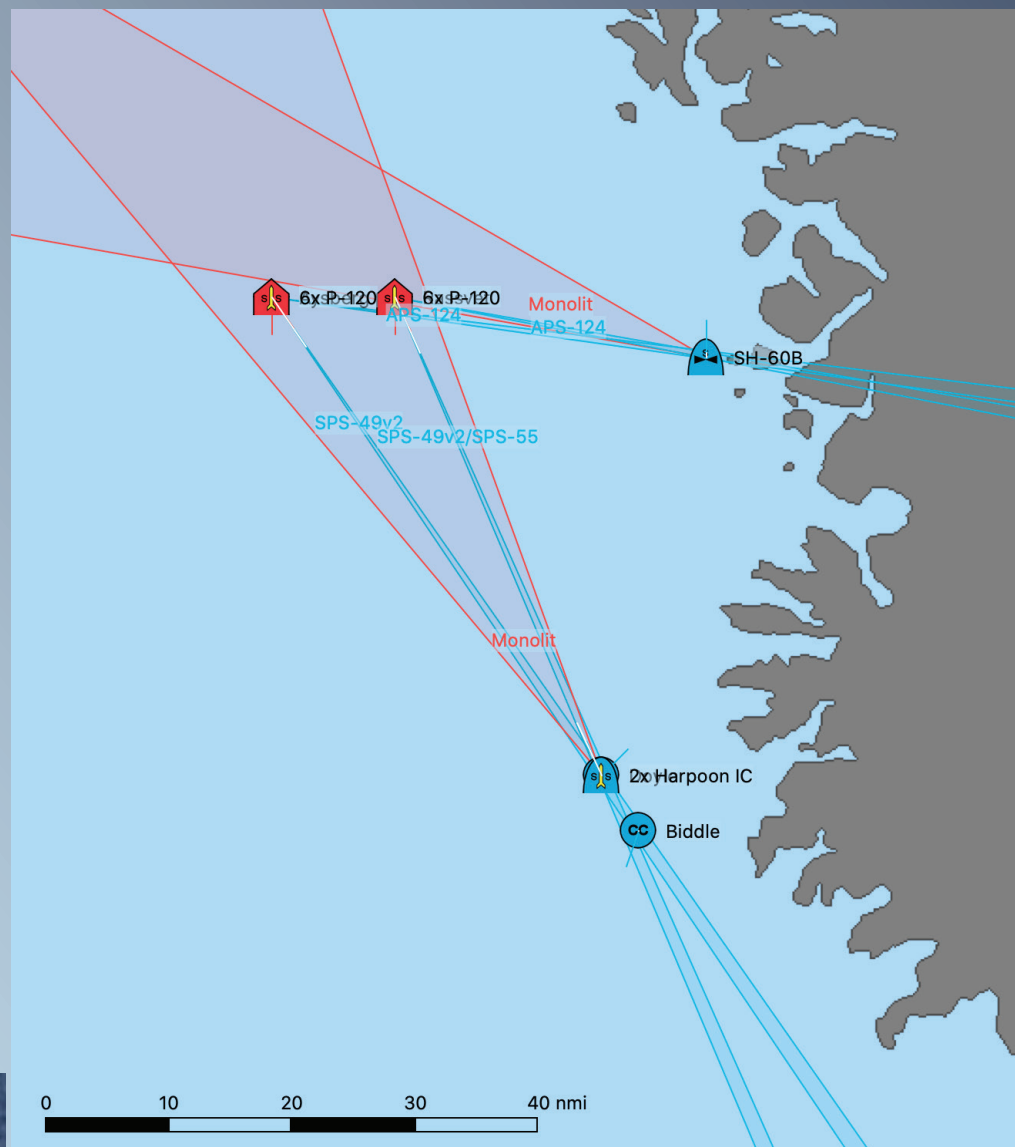


Harpoon Salvo



Harpoon missile in flight

(US Navy)



Rassvet opens fire!



Erik Carlson *EC*



P-120 Malakhit [SS-N-9 Siren] Anti-Ship Cruise Missile

(Mashinostroenie)



(oruzhie.info)

1039 Tactical Turn - Increment 1

Plotting Phase

- Begin 30 second movement increments.
- *Rassvet* and *Aysberg* will turn to 225° (Starboard turn) and maintain 24 kts.
- *Doyle* will detect the Small Signature P-120s with the SPS-55 Low-Altitude

Search (LAS) radar; the P-120 flies at low, but is detected as if it is at VLow:

Radar Clutter Value, sea state 4 = 7

Clutter Resistance, 3rd Gen = 8

7 – 8 = -1 or no clutter effect

SPS-55 LAS range vs. Small = 38 nmi

Duct Radar Horizon to VLow = 60 nmi

Detection at the lesser value of 38 nmi

- *Rassvet* and *Aysberg* will detect the Harpoons (VSmall target at VLow altitude)

with their MPZ-301 (LAS):

Radar Clutter Value, sea state 4 = 7

Clutter Resistance, 3rd Gen = 8

7 – 8 = -1 or no clutter effect

MPZ-301 range vs. VSmall = 15 nmi

Duct Radar Horizon to VLow = 60 nmi

Detection at the lesser value of 15 nmi

Movement Phase

- All missiles move for 30 seconds.
- *Doyle* detects 6 air contacts. This is the first P-120 salvo.
- *Doyle* SAM Reaction Time:

4th Gen combat system = 2 increments (1 increment = 30 seconds)

Combat System Delay Roll (2D6) is 4, 5 for a total of 9 = 0 additional delay

Reaction Time = 2 increments

- *Doyle* Max Intercept Range:

SSM speed 594 kts / 120 x 2 increments = 9.9 nmi delay

SSMs detected at 37.3 nmi

Max Engagement Range = 37.3 – 9.9 = 27.4 nmi

- *Doyle* SAM range check:

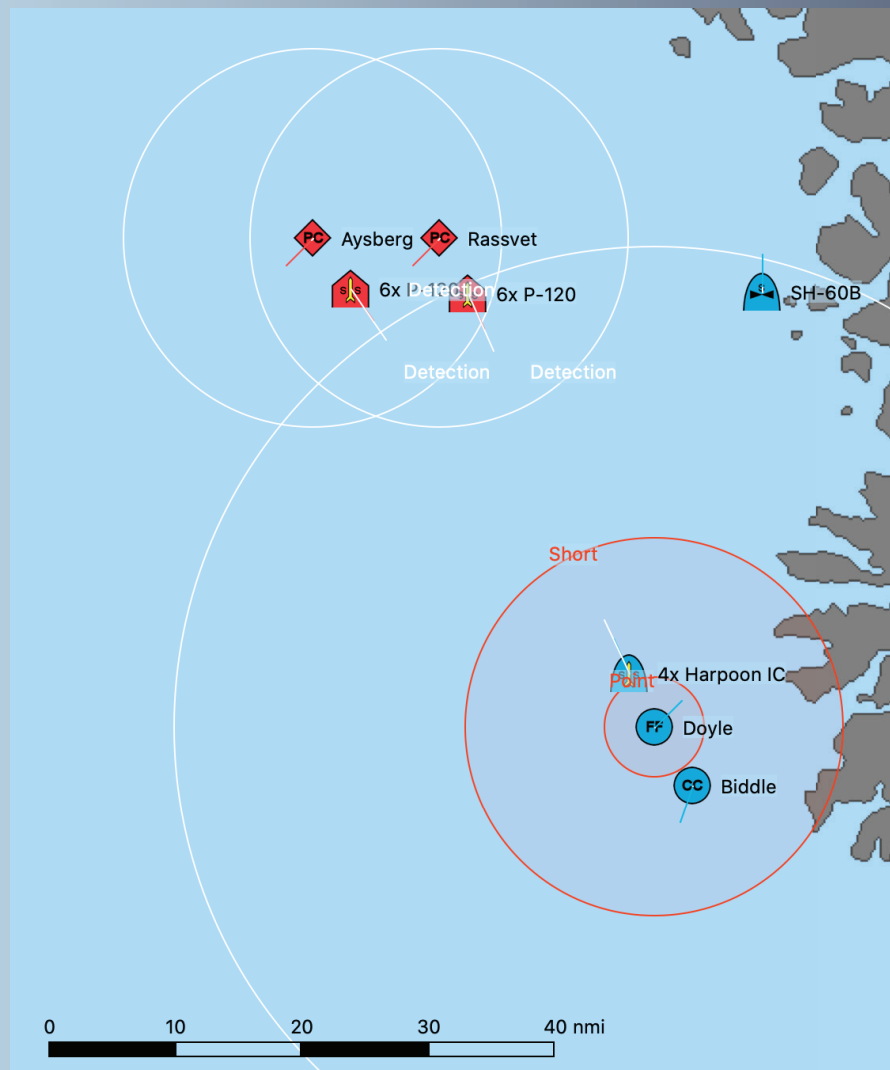
Max SM1MR Air Range = 25 nmi

Normally, SM1MR missiles would be fired when the target was 37.5 nmi away as the P-120 is closing *Doyle* (Transonic missile speed closing modifier = 1.5 x SAM range).

Unfortunately, the Mk 92 Combined Antenna System (CAS) that provides the height finding (HF) data is limited to 12.3 nmi due to sea clutter interference, thus the maximum range *Doyle* can fire out to without an HF input is 15 nmi (Short range).

Intercept Range = Short (≤15 nmi)

4th Gen combat system = 3S-P intercepts (3 Short Range & 1 Point Defense)



Mk 92 CAS detection range:

Radar Clutter Value, sea state 4 = 7 (clutter is double for regular air search/HF)

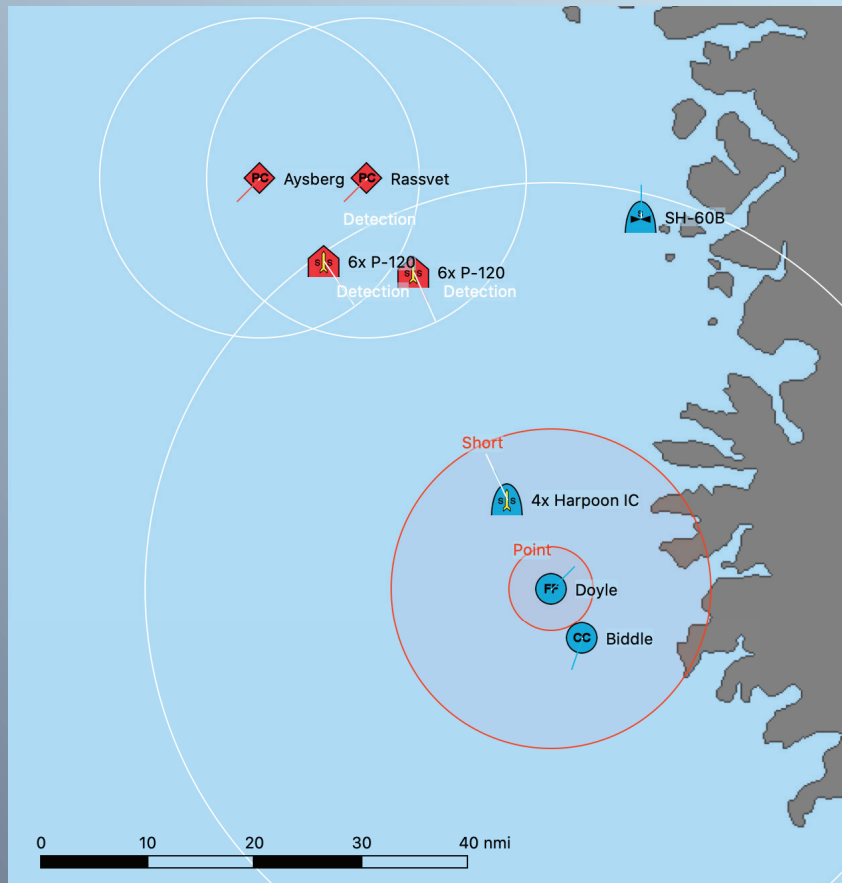
Clutter Resistance, 3rd Gen = 8

14 – 8 = 6 yields a range modifier of .35

Mk92 CAS range vs. Small = 35 x .35 = 12.3 nmi

Duct Radar Horizon to VLow = 60 nmi

Detection at the lesser value of 12.3 nmi



1039.5 Move Increment 2

- All missiles move for 30 seconds.
- *Doyle* detects another 6 air contacts. This is the second P-120 salvo.
- *Doyle* is already reacting to the earlier salvo, so another reaction time roll is not needed. The newly detected raid is basically coming from the same direction and at the same speed.

P-120 missile launch (oruzhie.info)



KT-120 triple cell launcher for P-120 Malakhit missiles (wiki.wargaming.net)

1040.0 Move Increment 3

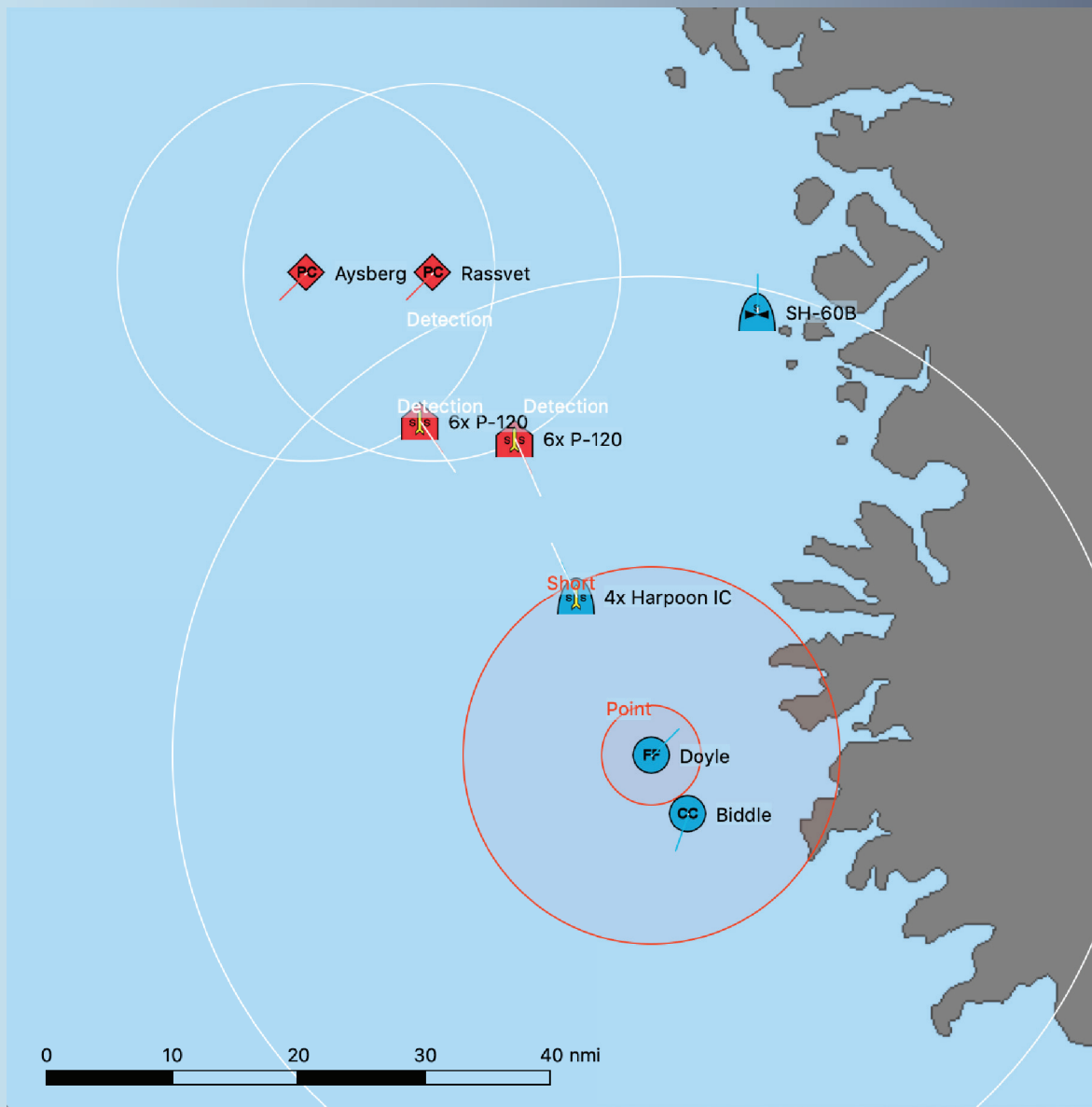
- All missiles move for 30 seconds.



Mk 13 launcher firing a SM1MR missile. (US Navy)



ZIF-122 twin launcher for OSA-M [SA-N-4 Gecko] surface-to-air missiles (bastion-karpenko.ru)



1040.5 Move Increment 4

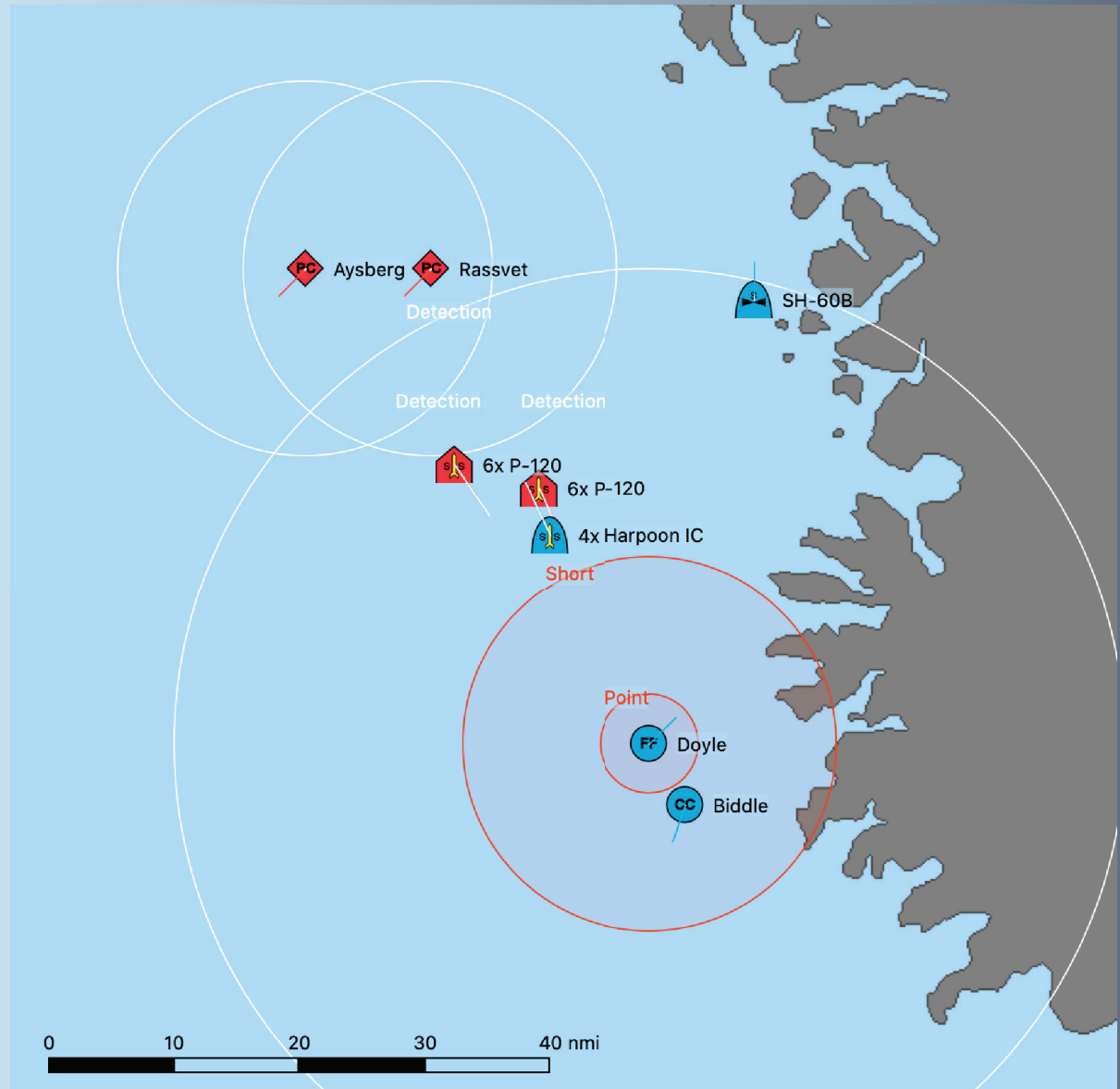
- All missiles move for 30 seconds.
- The Harpoon salvo has reached the halfway point. The Weapon Placement die roll is 2 (Fair FC solution needed a 6 or less). The Harpoons will lock on to their intended target (*Rassvet*).
- *Rassvet* and *Aysberg* rolls for ES detection (35, 62) and picks up the incoming Harpoon missile seekers.



Mk 15 Phalanx Close-in Weapon System (US Navy)



AK-630 Point defense gatling gun (dfnc.ru)

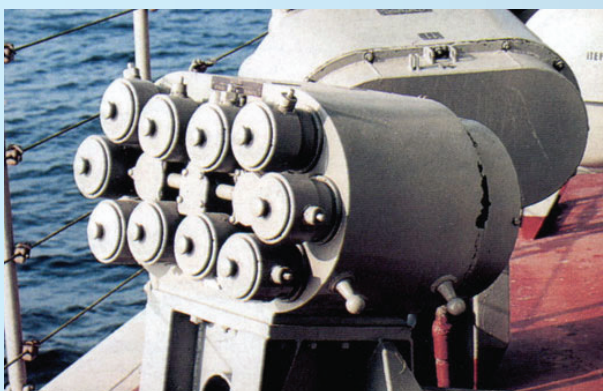


1041.0 Move Increment 5

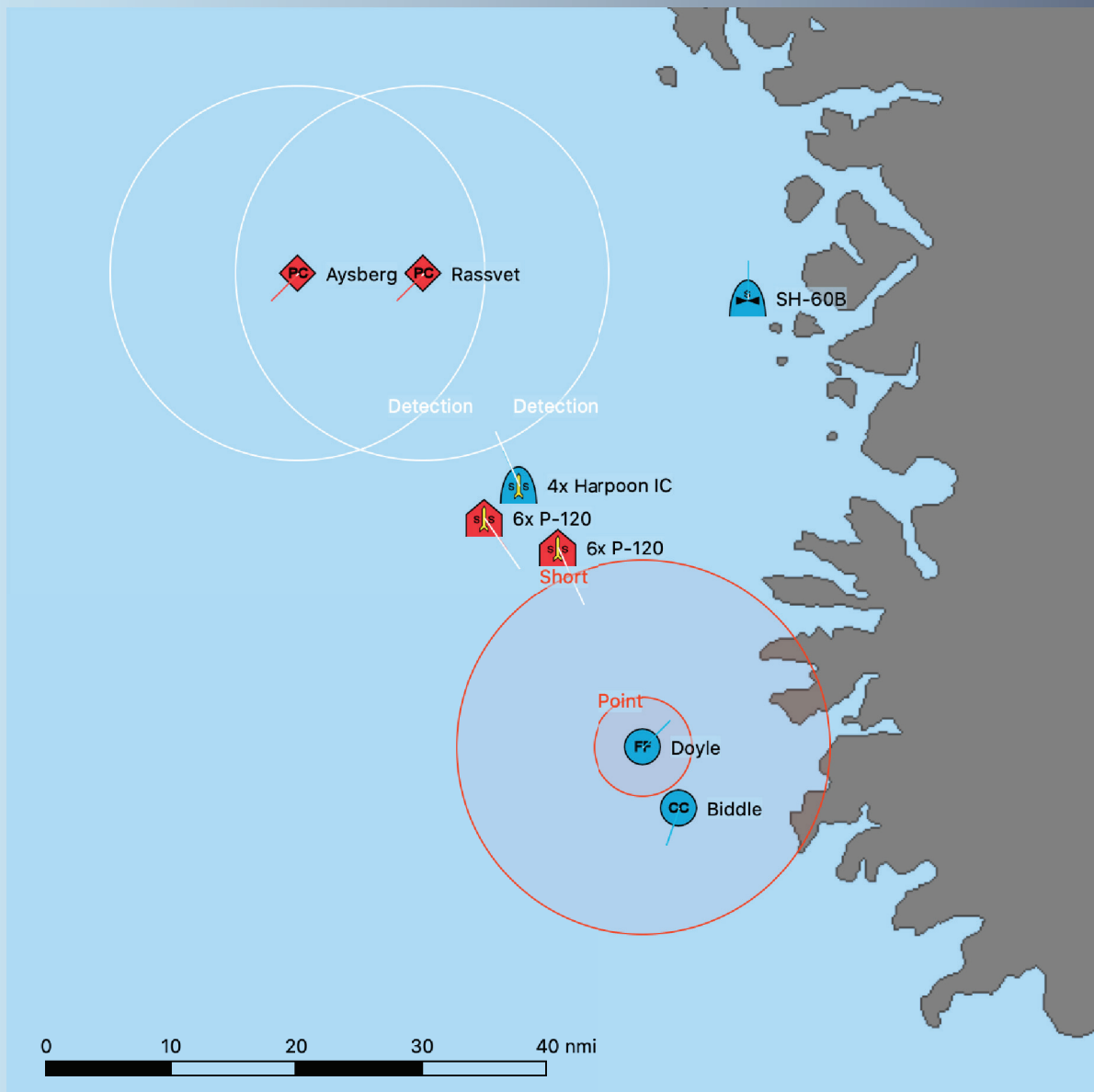
- All missiles move for 30 seconds.
- The first P-120 salvo is at the halfway point. The Weapon Placement die roll is 6 (Fair FC solution needed a 6 or less). The P-120s will lock on to *Biddle*.
- *Biddle* and *Doyle* rolls for ES detection (78, 47) and picks up the incoming P-120 missile seekers.



Mk 137 Super Rapid Blooming Offboard Countermeasures (SRBOC) chaff launcher (US Navy)



KT-216 launcher for PK-10 chaff and flare countermeasures system (militaryrussia.ru)



1041.5 Move Increment 6

- All missiles move for 30 seconds.
- The first salvo of P-120s has reached Intercept Range.
- SAM Intercept Table (P-120 uses Low table):

Intercept Range = Short (≤15 nmi)

4th Gen combat system = 3S-P intercepts (3 Short Range & 1 Point Defense)

- Anti-air Missile Attack:

SM1MR ATA = 2.5

Target Size Small = 0

CS Modifier = +0.5

Target Modifiers = 0

Target Speed Modifier = 0

Bearing Rate (closing) = 0

Range Band Modifier = 0

SAM Modified ATA = 3.0

One missile Pk = 60%, two missile salvo Pk = 84%

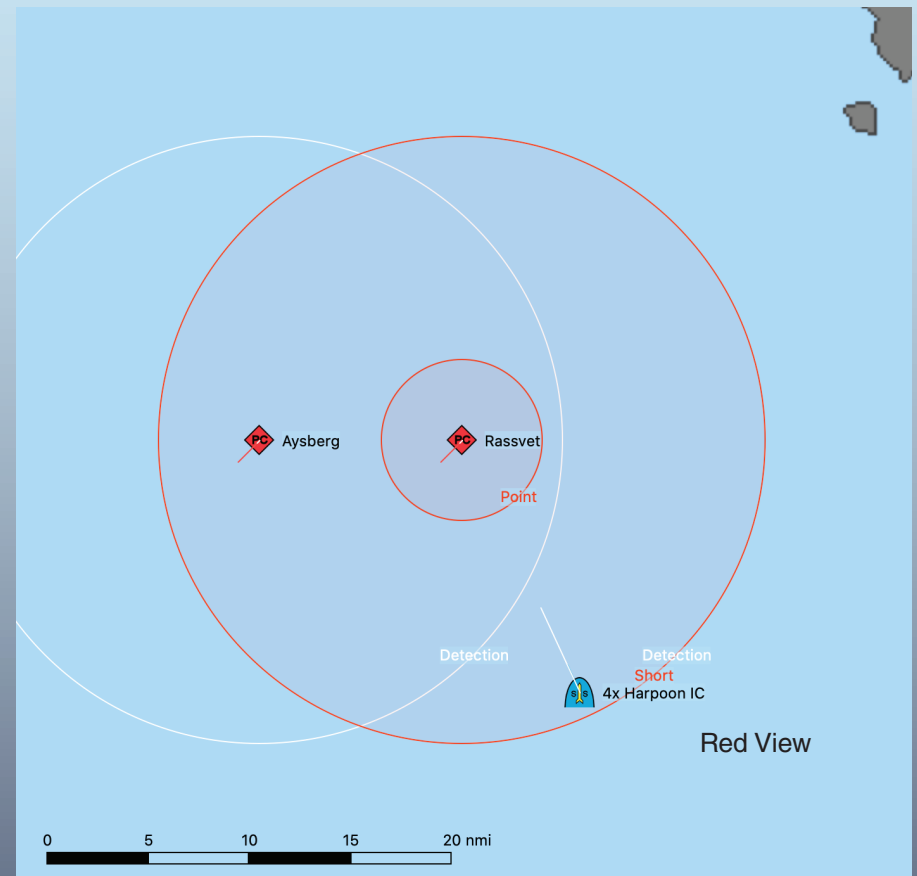
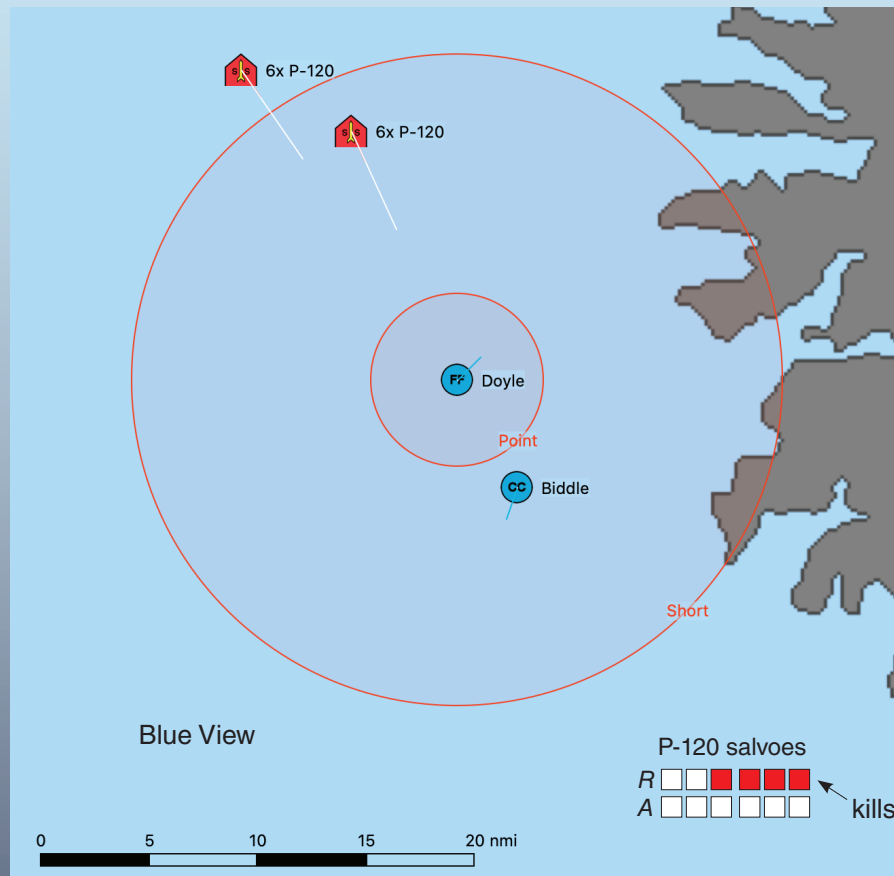
- *Doyle's* STIR and Mk 92 CAS can direct 2 missiles at one target each, but the Mk 92 gets only half the number of intercepts (3 + 1 = 4 intercept attempts).

- 4 intercepts, each a 2 missile salvo w/84% Pk. Die rolls: 26, 68, 47, 81 = 4 hits.

- The second P-120 salvo is at the halfway point. The Weapon Placement roll is 3 (Fair FC solution needed a 6 or less). The P-120s will lock on to *Doyle*.

- *Biddle* and *Doyle* rolls for ES detection on the second P-120 salvo (18, 37) and picks up more incoming P-120 missile seekers.

- This is the last increment in the Tactical Turn. If playing with miniatures, all ships would now execute their plotted three-minute movement.



1042 Tactical Turn - Increment 1

Plotting Phase

- This Tactical Turn will continue using 30 second increments.
- All ship movement orders remain unchanged.

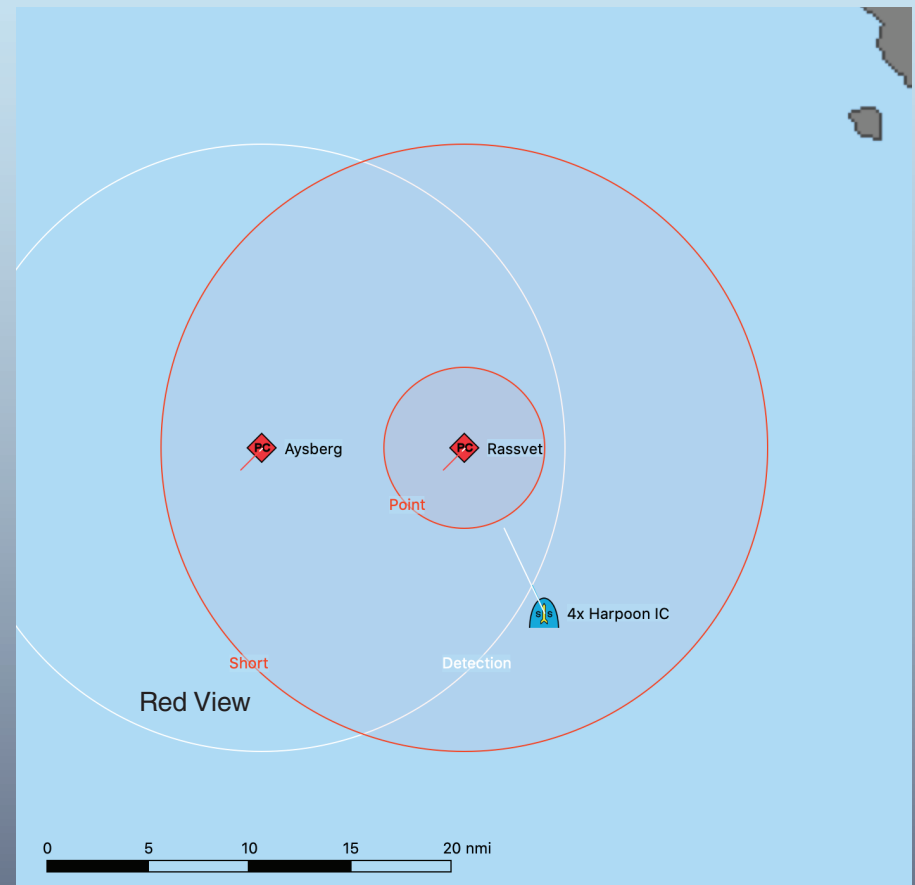
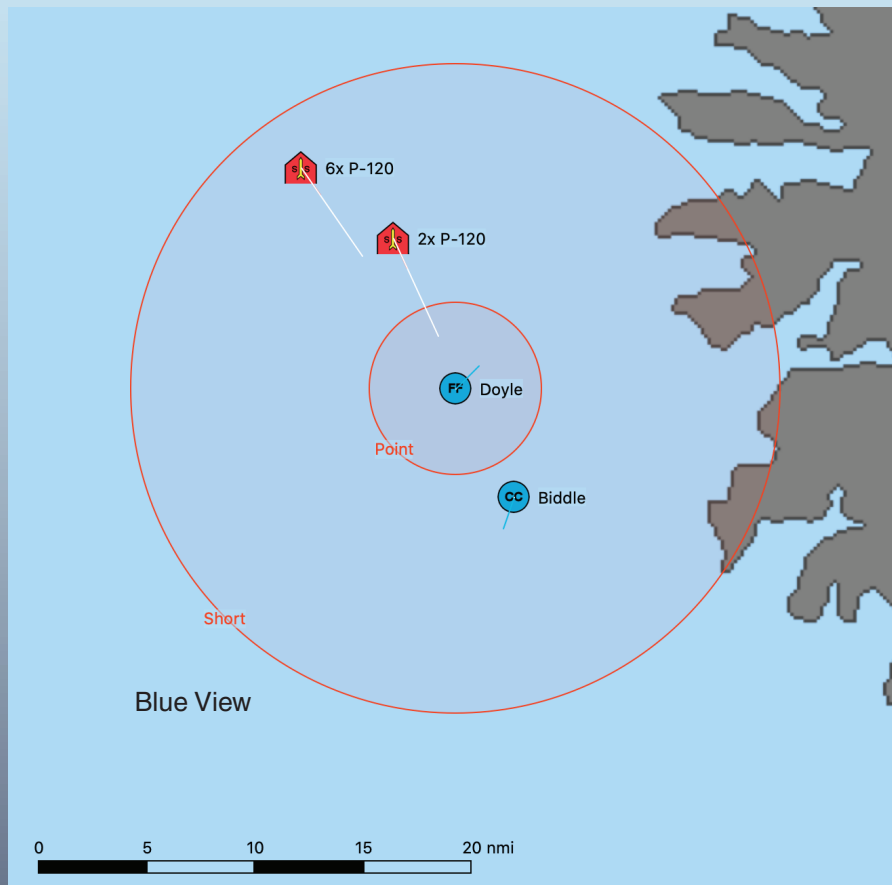
Movement

- All missiles move for 30 seconds.
- The first and second P-120 salvos are in *Doyle's* Short range band. The STIR and Mk 92 CAS has already engaged the first P-120 salvo in this band, and are considered to be busy (until the first salvo reaches the Point Defense band).

P-120 salvos

R
 A

Harpoon Salvo



- *Rassvet* detects 4 air contacts with the MPZ-301 Baza. This is the Harpoon salvo.
- *Rassvet* SAM Reaction Time:
 4th Gen combat system = 2 increment delay
 ES Cue = +1 (Harpoon missile seekers had been detected earlier)
 CS Delay Rolls (2D6) 3, 4 = 7+1 = 8, 0 additional delay
 Reaction Time = 2 increments
- *Rassvet* Max Intercept Range:
 SSM speed 561 kts / 120 x 2 increments = 9.4 nmi delay
 SSMs detected at 15.0 nmi
 Max Intercept Range = 15.0 – 9.4 = 5.6 nmi
 Osa-MA missile range is 6.5 nmi

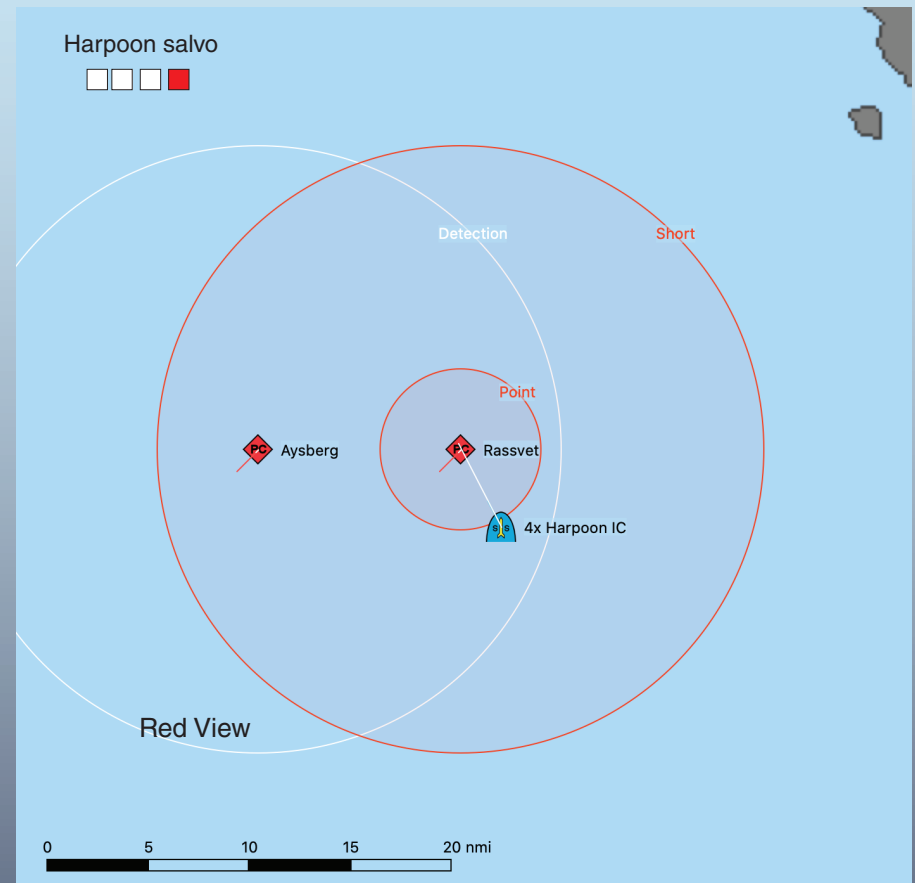
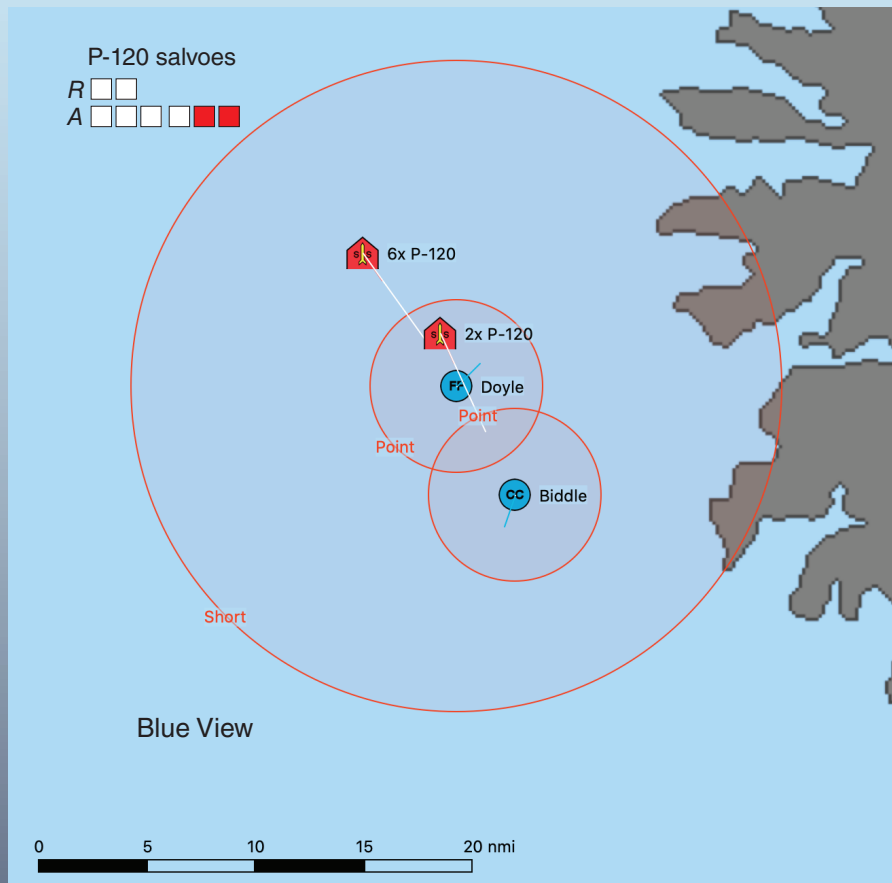
1042.5 Move Increment 2

- All missiles move for 30 seconds.
- Now that the first P-120 salvo has passed into the Point Defense band, *Doyle's* STIR and Mk 92 CAS are available to engage the second P-120 salvo in the Short band. The remaining P-120s from the first salvo cannot be engaged by *Doyle's* Phalanx as they are passing in front of her, which takes the missiles out of the gatling gun's arc.
- 4 intercepts: 2 missile salvo w/84% Pk. Die rolls: 47, 92, 85, 67 = 2 hits.

- *Rassvet* engages with the Osa-MA SAM
4th Gen cbt syst. = 2S-P intercepts (2 Short & 1 Point Defense) vs. a VLow target.
- Anti-air Missile Attack:
Osa-MA ATA = 2.5
CS Modifier = +0.5

- Target Size Small = -1 (VSmall)
- Target Modifiers = -2 PVLow (Partially seaskimmer capable)
- Target Speed Modifier = 0
- Bearing Rate (closing) = 0
- Range Band Modifier = 0
- SAM Modified ATA = 0.0
- One missile Pk = 30%, two missile salvo Pk = 51%

- *Rassvet's* MPZ-301 Baza can direct 2 missiles at one target at a time.
- 2 intercepts, each with a 2 missile salvo w/51% Pk. Die rolls: 18, 59 = 1 hit
- If *Aysberg* were to engage the Harpoons, the ship would only get a single intercept opportunity in the Point Defense band (≤ 4.0 nmi) as the OSA-M has a maximum range of 3.8 nmi. So instead of 2S-P intercepts, it's just P.



1043.0 Move Increment 3

- The second P-120 salvo (4 missiles remaining) is now in *Doyle's* Point Defense band.

The STIR and Mk 92 CAS directors get one shot each, and the Mk15 gets two shots. As the Mk 92 CAS is being used for SM1MR illumination, it can't direct the Mk 75 76mm gun.

- 2 intercepts: 2 missile salvo w/84% Pk. Die rolls: 23, 72 = 2 hits.

- Doyle's* Mk15 Phalanx will shoot at the remaining P-120s from the second salvo:

Mk15 AA Strength = 5.0

Target Speed Mod = 0

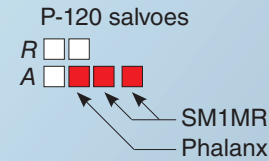
Non-Maneuvering Target Mod = +2

Target Size Mod = 0

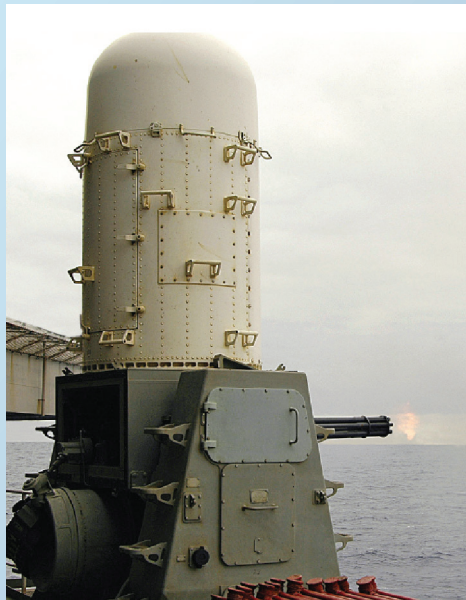
Target Altitude Mod = 0

Total = 7.0 = 71% hit chance.

- The Mk15 is autonomous, and gets two shots. Die rolls: 58, 82 = 1 hit. There is one P-120 left that may hit *Doyle*.

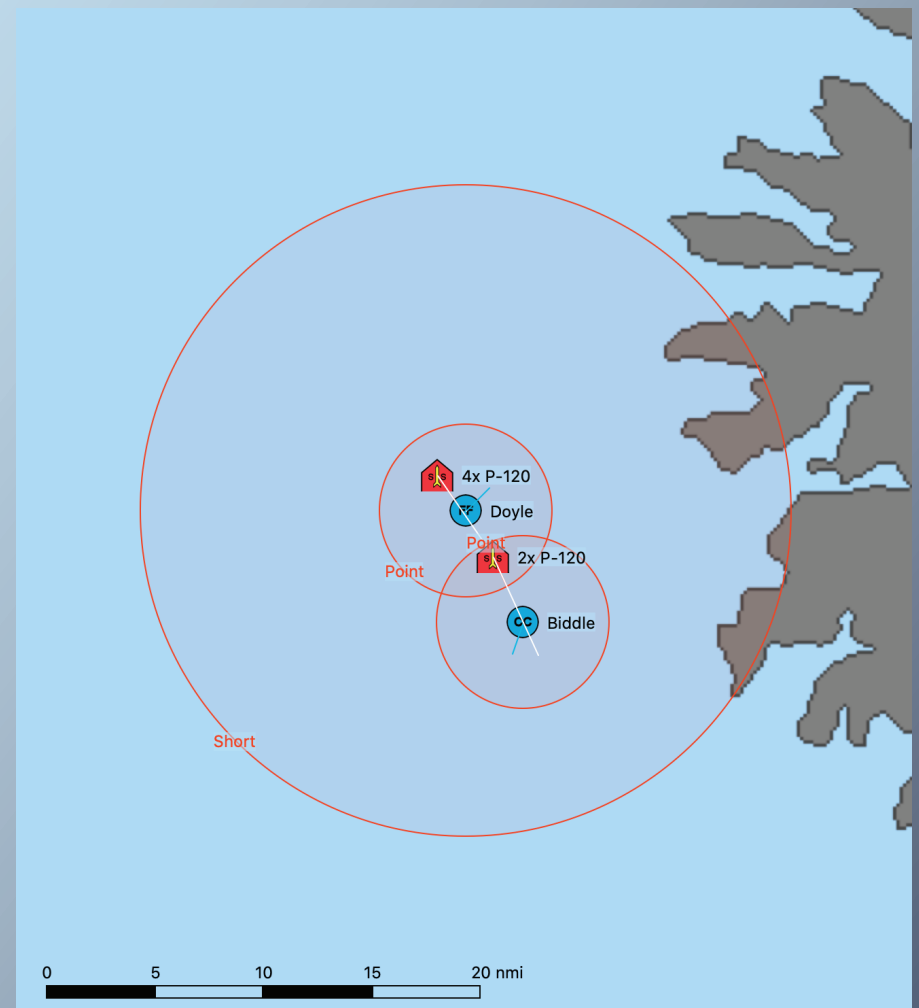


Blue View



Mk15 Phalanx firing

(US Navy)



1043.0 Move Increment 3 (continued)

- In one movement increment, the Harpoons attacking *Rassvet* pass through the Point Defense range band. There is one SAM engagement in the Point Defense band, and then the guns will get a shot:

- One SAM intercept, a 2 missile salvo w/51% Pk. Die roll of 44 = 1 hit. There are now only two Harpoons left in the salvo.

- Both the AK-176 76mm and AK-630 30mm guns engage the same target as they are tied to the single MR-123 Vympel director.

AK-176 AA Strength = 5.9

AK-630 AA Strength = 2.7

Target Speed Mod = 0

Target Maneuvers Mod = -1

Target Size Mod = -1

Target Altitude Mod = -3 (the AK-176 is not seaskimmer capable)

Total = 3.6 = 49% hit chance

- Die roll: 69 = no hit

- The two surviving Harpoons will attempt to hit *Rassvet* on the C&D/Small

Target Signature table:

ECM: 2nd Gen

Seeker: 3rd Gen

Decoys only column = 54% hit chance (Harpoon 1C has a home-on jam feature and a low generation level jammer would work against *Rassvet*)

- Die rolls: 46, 29 = 2 hits.

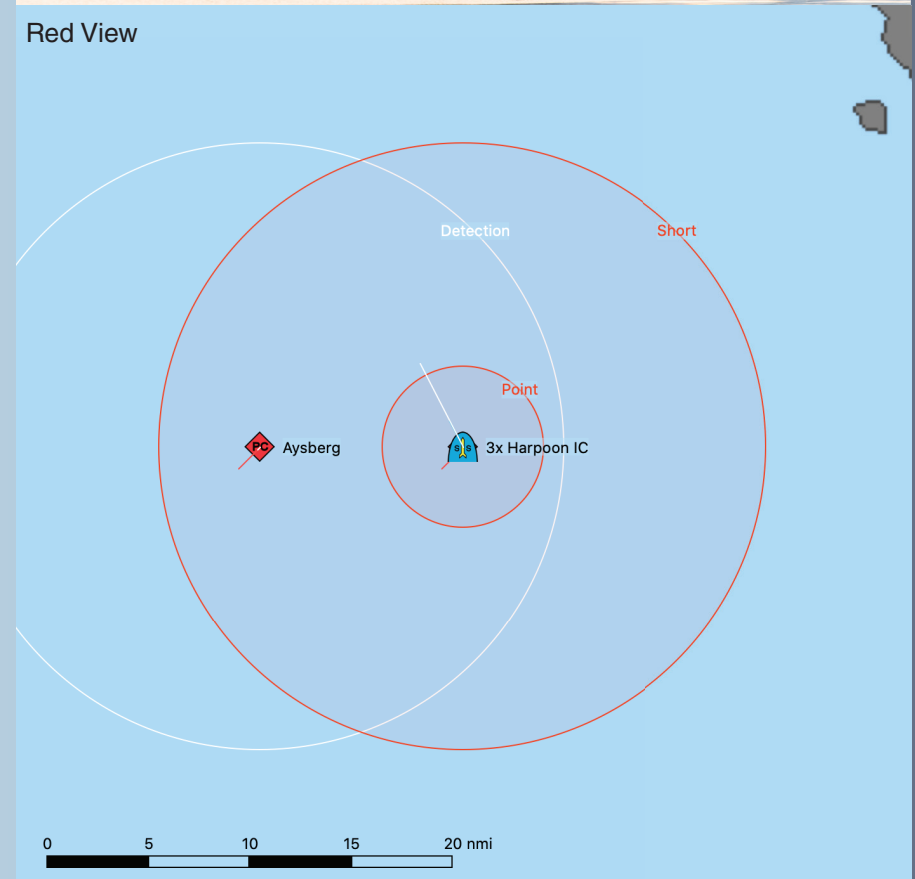
- The Harpoon missile inflicts 40 points of damage. Two Harpoons will inflict 80 points of damage. This greatly exceeds *Rassvet's* original 47 points and she sinks in D10*10 minutes. Die roll: 8 = 80 minutes.

- Aysberg* has no meaningful offensive capability remaining, and will retire to the North.

Harpoon Salvo



Red View



1043.5 Move Increment 4

- The P-120 will attack *Doyle* on the C&D/Small Target Signature table:

ECM: 3rd Gen Decoy

Seeker: 2nd Gen

Use Base Ph column = 39% hit chance

- Die roll: 12. *Doyle* is struck by the P-120 missile.
- Damage from the missile is 46 points. *Doyle* had 172 points at the start, and now has suffered 46 DP (27%). This puts *Doyle* in the 25% Damage and Speed Break-down column. She was already reduced to the 25% speed column from a non-combat casualty, so there is no change in her speed.

- Critical Hits:

Starting unused damage points = 172 minus damage taken this turn = 46

Damage Ratio = $46 / (172 - 46) = .37$

Roll D6 = 4 on the Critical Hit Damage Ratio table = 2 Critical Hits

The P-120 also causes D6 additional Critical Hits due to the missile impact. This D6 roll is 3, making 5 criticals so far, plus the automatic fire critical caused by a missile impact with a warhead of 10 DP or more. *Doyle* suffers a total of 6 Critical Hits. The die rolls for the type of critical are made on the Guided vs. Surface Combatants column of the Critical Hit Table.

Critical Hit #1: Automatic Fire

Critical Hit die roll #1: 5 = Sensor

Critical Hit die roll #2: 2 = Weapon

Critical Hit die roll #3: 12 = Engineering

Critical Hit die roll #4: 8 = CIC

Critical Hit die roll #5: 14 = Flooding

- The P-120's armor penetration is greater than the CHP armor value of 2 for certain protected systems on *Doyle*. All damage will therefore be applied.

- Random rolls for sensor and weapons: sensor - Mk92 CAS, weapon - Mk15.

- CIC is hit and all sensors (except the nav radar) are out. All weapons, except those that can fire in local control, are out of action.

- Fire - a D6 roll of 5 means 5% of 172 original damage point rating (9 points) will be inflicted in the third Tactical Turn and every Intermediate Turn thereafter.

- Engineering - this is the second engineering casualty. Speed is reduced two additional columns to 25% (7 kts) as the ship has a single shaft/propeller. A D6 roll of 5 means no loss of electrical power. A Fire Critical has also started with D6 roll of 1 = 1% (2 points) of additional fire damage.

- Flooding - D6 roll of 6 = 6% (10 points) of additional flooding damage.

- Fire and Flooding Severity Level - all the fire and flooding percentages add up to 12%. This is in the Major level of Damage Control Severity (normally 12% but +2% for the time period in which the ship was built = 14% for Major).

- Biddle* is attacked by two P-120s on the B/Medium table, using the 2nd Gen Decoys column, for a 56% chance to hit. The D100 rolls are 72 and 34, resulting in one hit. Already badly damaged, *Biddle* only had 89 DP left, so the Critical hit ratio is $46/(89-46) = 46/43 = 1.06$. Rolling on the Critical Hit Damage Ratio table (1.0 line, always round down), a D6 roll of 3 for the damage ratio and 5 from the D6 criticals inflicted from the missile strike, plus the automatic fire, the ratio becomes $8 + 5 + 1 = 14$ new critical hits.

Biddle is toast.

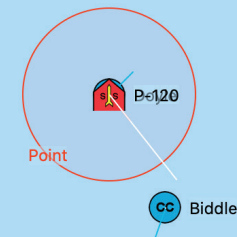
Conclusion

Doyle is seriously damaged (effectively no longer able to fight - a "mission kill"), but she is able to continue south.

This is a Tactical Victory for the Soviets because they sank the cruiser. Crippling the frigate is a plus, but that is balanced by the loss of *Rassvet*.

Final Blue View

P-120 salvoes
 R against *Biddle*
 A against *Doyle*



0 5 10 15 20 nmi

About *SimPlot*

SimPlot (short for Simple Plotter) is a utility program that supports *Harpoon* games by automating the movement process in a graphical environment. SimPlot uses a simplified X, Y coordinate system that makes range and bearing calculations easier. North is always at the top of the screen, and the 0, 0 coordinate is the center of the “game area.” Each whole number of the coordinate system represents one nautical mile.

Presently, SimPlot supports the display and movement for many of the common unit types found in *Harpoon*: surface ships, subs, aircraft, helicopters, missiles, and torpedoes. Additional non-moving unit types that can be displayed are sonobuoys, reference points, and bases. Units can be displayed using the NTDS or Common Warfighting Symbology styles. All units are either red player, blue player, or referee-controlled neutral.

Games in progress can be saved and reloaded using simple JSON text files that SimPlot creates. There is even an option to replay the movement from a current or saved game, so the battle can be reviewed or replayed at a later time.

What SimPlot Does

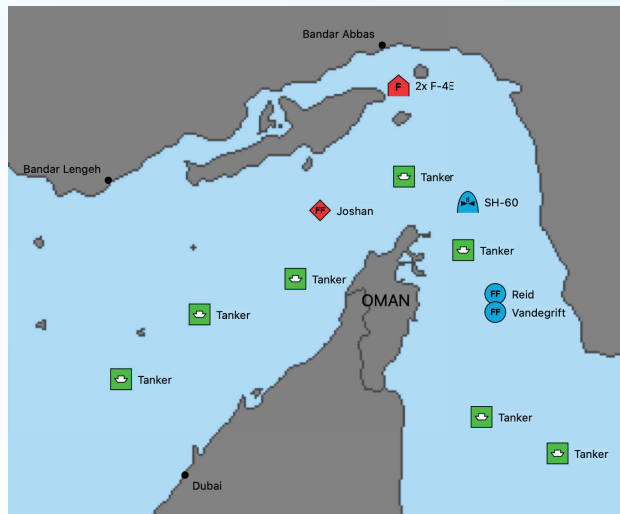
SimPlot allows users to add, modify, and delete units from the screen via pop-up forms. The screen can be zoomed in or out using the keyboard or mouse wheel, and it can also be panned using the arrow keys or right-mouse clicks. Units are selectable and additional data can be displayed, such as the range and bearing to other units on screen.

Units can be given additional graphics such as range circles, range arcs, and ES/sonar bearings. The circles and arcs are typically used for reference (e.g. when will another unit be in detection or weapons range), and the ES/sonar bearings are used to represent passive detections. These graphics can also be colored and labeled for easier reference.

Scenarios can be played on a blank screen or maps created from bitmap images. The maps are just a background image that can give players a sense of location, but they do not by themselves enforce *Harpoon* rules regarding terrain.

SimPlot can be used for single or multiple player scenarios. In single-player games, the player implements his own orders and will see the results immediately. Multiplayer games will need a referee to carry out the player’s orders. The referee will run the game turns until players need to interact with the situation, and then sends player-only versions of the game file. The players will then communicate orders to the referee (via email for example) so the units can be updated and the game continues.

Units can be assigned attributes of “perception” by the referee that denies an opposing player information about enemy units. The visible attributes of a newly detected unit can be restricted in items such as location, heading, speed, class, or size. Even whose side it’s on can be restricted until such time that additional information is available per *Harpoon* detection rules. Perception plays a great role in enforcing fog-of-war for multiplayer refereed games.



The Strait of Hormuz is busy with traffic as U.S. forces search for Iranian units interfering with the flow of oil.

What SimPlot Doesn't Do

SimPlot simply uses computer graphics to track the location, heading, speed, etc. of units in a scenario. It does not roll dice for you, neither does it implement specific *Harpoon* rules. SimPlot is therefore not an actual “game program.” A copy of the *Harpoon* rules is required to use SimPlot to its fullest potential.

Conclusion

SimPlot can improve the *Harpoon* gaming experience by speeding game play and creating a truly blind multiplayer game. It also eliminates the need to physically move units on a game surface, or having to draw and erase lines on graph paper. SimPlot can also reduce the chances of mistakes due to inaccurate measuring or “bumping” unit counters. Faster game play has always been the key to a successful *Harpoon* game, and I think SimPlot does that very well.

The latest version of SimPlot can be downloaded for free from the HarpGamer website (harp gamer.com), as well as maps and pre-made scenarios. There is also an active forum on the “paper rules” version of *Harpoon*. I can be reached for comments via the forums.

Kevin Martell

About *Harpoon*

The first version of *Harpoon* was published in 1980. It provided a simple, tactical game that explained modern naval combat and allowed players to take on the role of a ship captain or formation commander. It used real-world terms as much as possible. It was very well-received, and won the H.G. Wells award for the best miniatures game of 1980. Because it explained the many technical aspects of naval warfare, an insurance agent in rural Maryland used it as one of his many data sources when he wrote a novel about modern submarines, titled *The Hunt for Red October*. The book did well.

Harpoon's second edition appeared in 1983, and improved and expanded the game's modeling, based in large part on the experiences of the Falklands War. Unfortunately, shortly after its release, its publisher, Adventure Games, Inc., headed by Dave Arneson, closed its doors.

The game was picked up by Game Designers' Workshop and the third edition was published in 1987. Over a dozen supplements and annexes followed the original release, and this edition also won the H.G. Wells award. It was also the version used to research and explore the battles in *Red Storm Rising*, another book that sold well.

When Game Designers' Workshop closed its doors, Clash of Arms took over the franchise, and published the fourth edition in 1996, then version 4.1 in 2001. CoA also supported the game with scenarios and annex books, before the designers struck out on their own in February of 2015.

About the Admiralty Trilogy Group

Founded in 2015, the Admiralty Trilogy group publishes the *Admiralty Trilogy* tactical naval games depicting naval warfare from the 1890s to the present day.

- *Dawn of the Battleship* covers the "pre-Dreadnought" era, when guns were still aimed by seaman's eye and ship designers were experimenting with combinations of guns and armor on hulls that still used wood and cast iron. Krupp cemented steel and early optical rangefinders were the peak of naval technology. The supporting supplements, *Monroe's Legacy* and *Dawn of the Rising Sun*, includes scenarios for both the Spanish-American and Russo-Japanese Wars.

- *Fear God & Dread Nought* (taken from Sir Jackie Fisher's coat of arms) and its companion scenario book, *High Seas Fleet*, allow the player to fight all the historical battles of the Great War, along with a few "might-have" or "almost happened" battles. With improved ballistics and metallurgy, and the introduction of mechanical computers and wide-base rangefinders, long-range gunnery became the rule as massive dreadnought battleships, the high technology of their day, dominated naval warfare. The rules also cover aircraft, airships, and submarines.

- *Command at Sea* covers the vast span of the Second World War at sea with complete rules for air, surface, and submarine warfare.

- *Harpoon* was actually the first game, with the first edition appearing in 1980. It has evolved and expanded from a simple "snapshot" of Cold War naval combat to a sophisticated simulation that can handle almost any tactical evolution involving forces fighting at sea from 1955 to the present day.

All four ATG games are exhaustively researched by a team of designers who bring both real-world military backgrounds and decades of naval game design experience. Annexes list the weapon and sensor specifications in real-world terms, with documentation explaining how game-related values like damage points were calculated.

The system is also supported by the biannual *Naval SITREP*, which covers all four games with scenarios, systems specification, rules expansions and clarifications, and articles about tactics and naval technology. Copies of all *Naval SITREP* issues are available at \$3.00 each, and a free downloadable index, updated with each issue, lists all the articles.

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About the Wargame Vault

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