



Harpoon^{4.2} *Evolution and Improvements*

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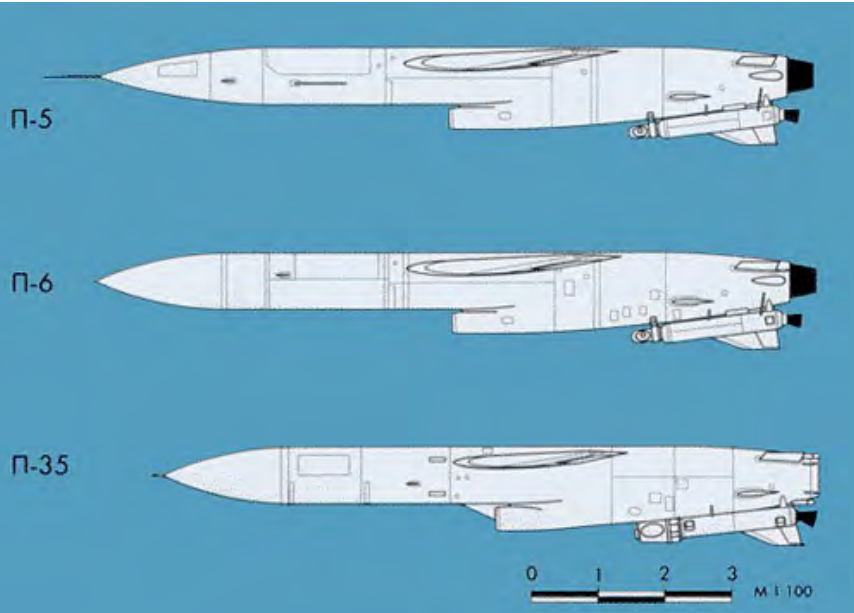
Historicon 2018

Admiralty Trilogy Seminar



Introduction

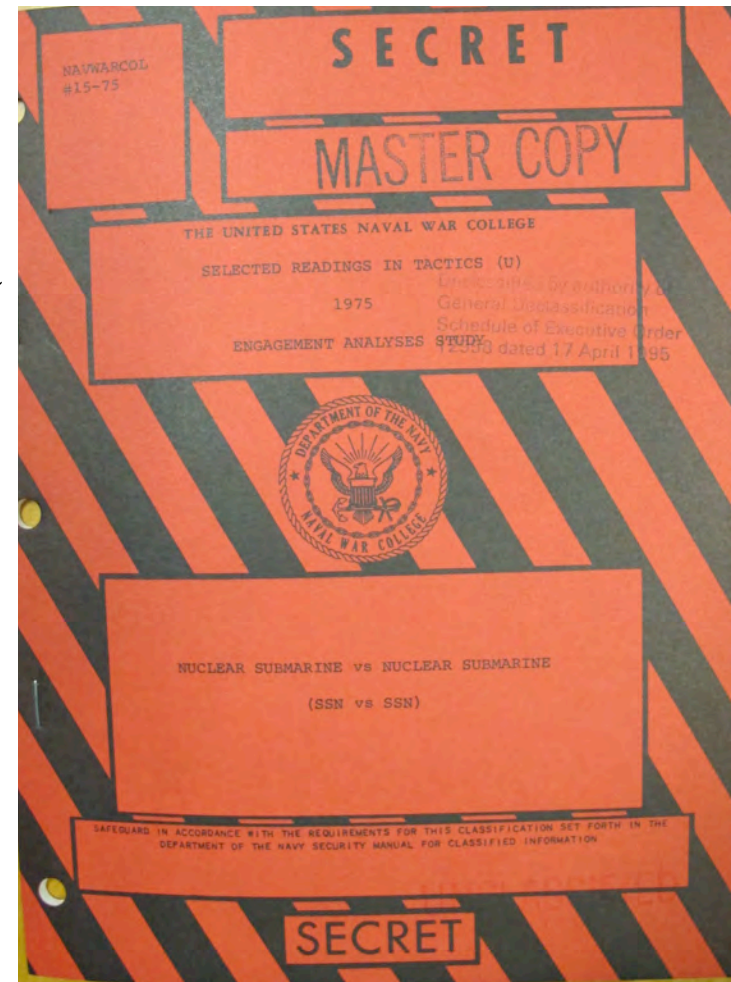
- ◆ *Harpoon*^{4.1} published in 2001!
- ◆ Legacy upgrade started in 2015
 - It was planned as a simple edit and update
- ◆ But there were so many changes....and new data just kept coming in.



Data Sources



- ◆ Inputs from other ATG games, as we worked to keep the rules base consistent.
- ◆ The *Naval SITREP* – incorporated rules changes, expansions, and clarifications into the base document.
- ◆ Integrate information from numerous new data sources...lots of new data.
 - Declassified Naval War College documents
 - Russian arms catalogs
 - System design textbooks and articles
- ◆ Designers' increased understanding of the “physics” of naval warfare.
 - Thermal layer effects – Admiral Sir Sandy Woodward
 - Ship damage – Captain Wayne Hughes



Input from *Command at Sea*



- ◆ Adopted the three-minute Tactical Turn length.
 - Help increase speed of play as it takes just as much time to do a 30-second game turn – Bond's Law of Wargaming.
 - Players can still use 30-second turns if they so choose.
 - Impulse phases for point defense and small combatants

- ◆ Surface gunnery system and armor rules.

- ◆ Radar generations, clutter, and simplified jamming rules.

Chinese H/PJ-45A 130mm/70 gun stats

Short			Med			Long			B/D-		Extreme		
<u>Rng kyds</u>	<u>B-Pen</u>	<u>Dam</u>	<u>Rng kyds</u>	<u>B-Pen</u>	<u>Dam</u>	<u>Rng kyds</u>	<u>Pen</u>	<u>Dam</u>	<u>Pen</u>	<u>Dam</u>	<u>Rng kyds</u>	<u>Pen</u>	<u>Dam</u>
0 - 8.5	2	25	8.6 - 19.1	1	21	19.2 - 25.4	1/1	19			25.5 - 31.8	1/1	17

AA P_k from 0 - 8.2 kyds: 35%, from 8.3 - 16.4 kyds: 5%.

From the *Naval SITREP*



- ◆ Major revisions to Soviet/Russian ASCMs - *NSITREP 26 & 48*
- ◆ Revised critical hit system - *NSITREP 32 & 51*
- ◆ Simplified inflight refueling rules - *NSITREP 41*
- ◆ New damage model - *NSITREP 42*
 - Basis for the 2012 Standard
- ◆ Small boat combat – *NSITREP 48*
- ◆ Collision damage – *NSITREP 53*
- ◆ Limited stealth – *NSITREP 54*
- ◆ *Etc...*

USS Fitzgerald collision, 2017



Expanded Rules - Examples



◆ Radar

- Radar generations, clutter, and jamming rules – accurate, but still playable
- Reduced probability of detection
 - No longer automatic if within range
 - NWC documents showed the probability of non-detect was higher than expected
- Active Electronically Scanned Array Radar
 - AESA radars fitted to both ships & aircraft
 - Low probability of intercept
 - High precision ESM capability
- Electronic warfare
 - 4th gen Digital Radio Frequency Memory (DRFM) based jammers
 - Towed airborne countermeasures

AN/SPY-6 AMDR



Expanded Rules - Examples



◆ Sonar

- Revised thermal layer model
 - Not half of the regular range, think more like one quarter...at best
 - Surface duct will be more prominent
 - VDS also affected by sound velocity profile
- Active towed array systems
 - Very close to low frequency (1,000 Hz)
 - Broadband pulses, tens of frequencies transmitted simultaneously to reduce reverberation
- Explosive echo ranging
 - The Russians had it for years before NATO really went down this road

◆ There's more, but you get the idea.





Entirely New Stuff

◆ Mines

- And not just the traditional moored contact and bottom influence mines, but also propelled warhead mines.

◆ Unmanned vehicles

- UAVs and USVs in particular; UUVs more limited

◆ Ballistic missile defense





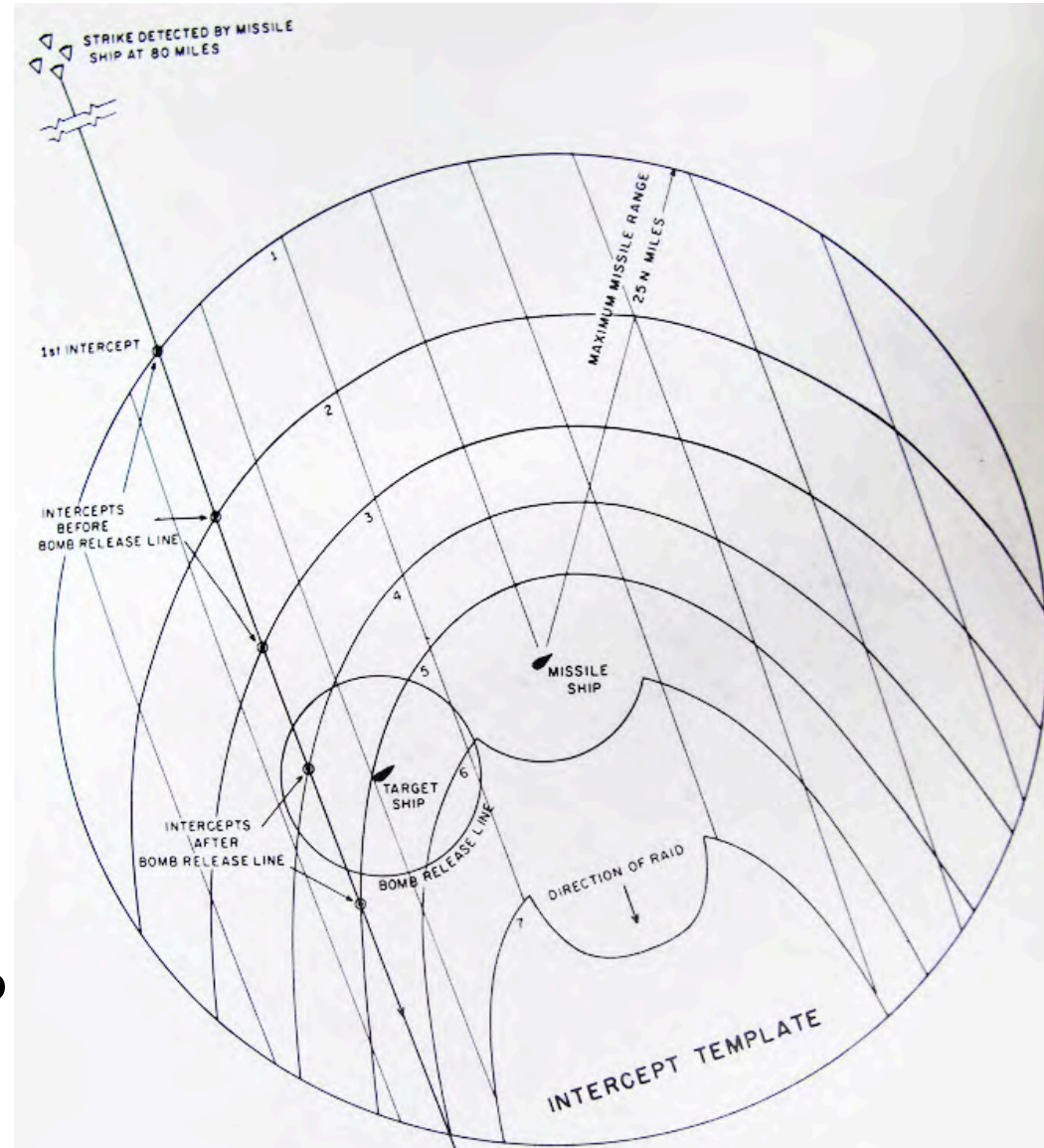
Updated Rules

- ◆ Probability of detection and hit will be reduced: pretty much across the board to reflect data from the Naval War College archives.
- ◆ Passive Target Motion Analysis will be simplified and adjusted to handle both sonar and electronic support systems
 - Need to support Russian and Chinese tactical OTH-T systems
- ◆ Air defense, in particular, is to going be simplified to help improve speed of play.
 - Area air defense will be resolved in three minute Tactical Turns
 - Goal is to get outer air combat down to two or three die rolls
 - Geometry, missile speed, and engagement range will all have a greater impact on surface-to-air missile probability of hit
 - Hypersonic missiles will be supported
 - Fire control generations and director channel capacity will determine engagement rate – will also include reaction time and kill assessment delays
 - Point defense to be resolved in six 30-second impulses



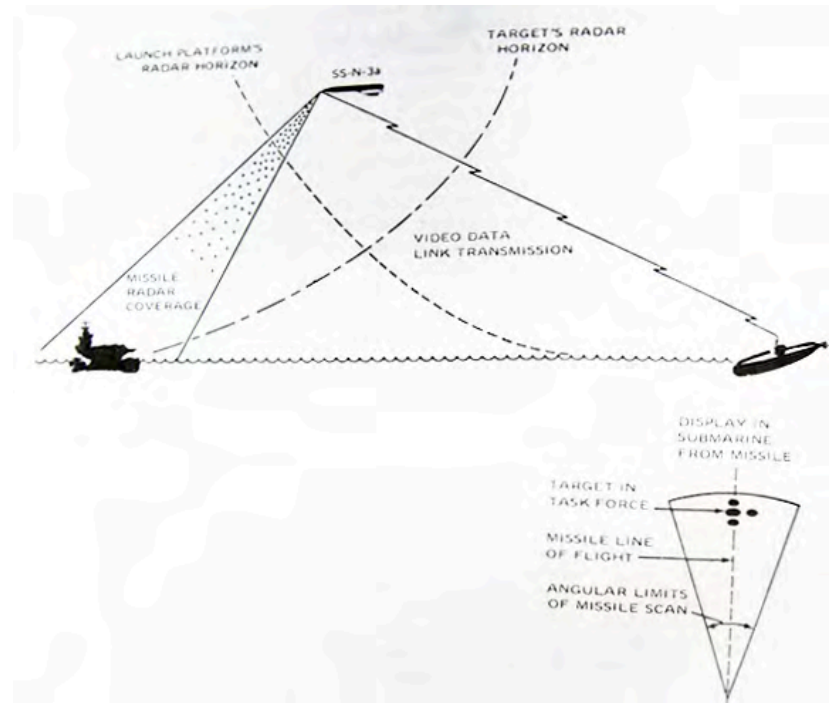
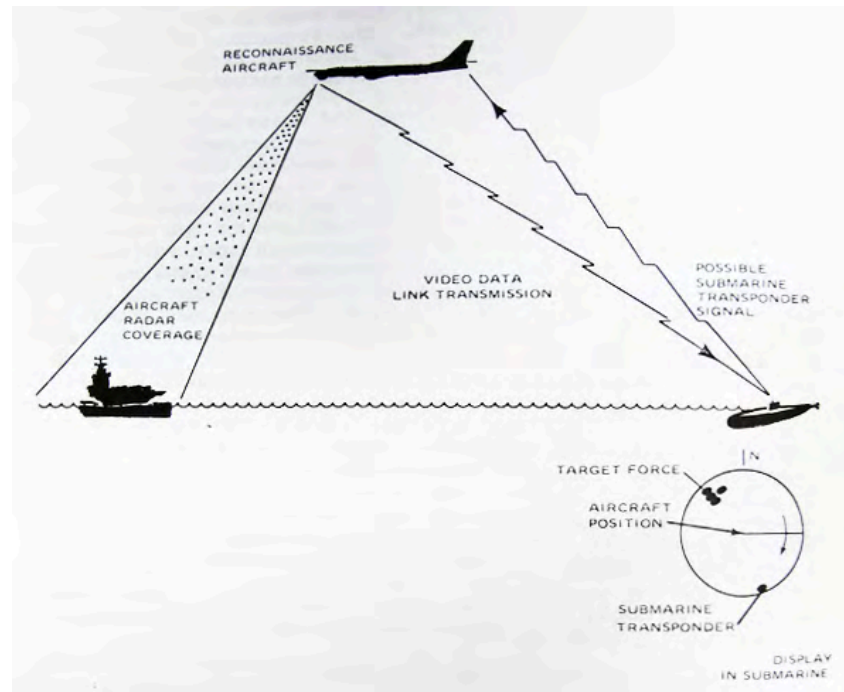
Intercept Opportunities

- ◆ The number of engagements, determined by:
 - Approach geometry
 - Speed of the missiles involved – both SAM and ASCM
 - Reaction time and kill assessment time between shots
- ◆ Attacks not coming directly at the shooter will have fewer engagement opportunities and a lower probability of hit
 - Degrees of crossing targets
- ◆ SAM probability of hit will also be range dependent
 - Further away means lower P_h





Data Links



- ◆ Rules covering data links will be expanded.
 - From the early Tu-95 BEAR D video data link with P-6 (SS-N-3) shooters to the current Cooperative Engagement Capability (CEC)
- ◆ Modeling information flow is critical in modern naval warfare.



Not Really *Harpoon* Specific, but...

- ◆ All games within the ATG system will now use the 2012 Damage Point Standard.
- ◆ *Command at Sea Fleet* series started off with the 2006 Standard damage point equation.
 - For consistency we continued to use the 2006 standard in the *Fleet* series
 - Last *CaS* supplement, *Arctic Fleets*, will be published using the 2012 standard
 - Rest of the series will be converted and customers will receive free updates
- ◆ *Dawn of the Battleship* was published using the 2012 standard.
- ◆ *FG&DN* 2nd Ed will be released with the 2012 standard as well.





ATG Coming Releases

◆ *FG&DN* 2nd Edition

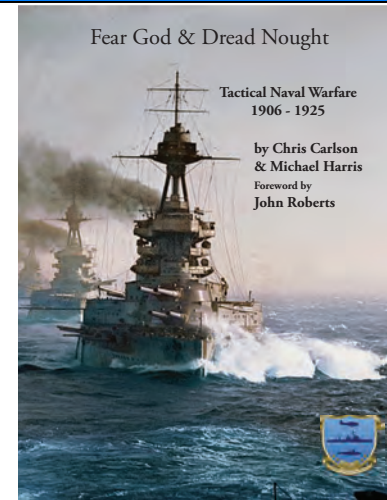
- New rules, *Player's Handbook*, *Quickstart*
- *High Seas Fleet* supplement, Data Annexes
 - Commander's tactical guide next year

◆ *Arctic Fleets*

- Last of the *CaS Fleet* series
- Other products to be updated and re-released
 - No additional charge for electronic copies thru the Wargame Vault

◆ *Harpoon*^{4.2}

- New rules, *Player's Handbook*, *Quickstart*
- New *Navies* series, Data Annexes
- *Troubled Waters II* first supplement





Conclusions

- ◆ *Harpoon*^{4.2} development will go full time as soon as *FG&DN* 2nd Edition is finished.
- ◆ Virtually every section of the rules will be modified, re-written to improve playability while retaining the fidelity of the earlier versions of *Harpoon*.
 - Still a lot of work to do...but hopefully get it out by Cold Wars 2019
- ◆ There's lots more coming from ATG in the future.
 - *FG&DN* 2nd Ed in galley
 - *Arctic Fleets* close behind
 - More *Naval SITREPs*
 - China navies order of battle book





Questions?

