**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
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

<table>
<thead>
<tr>
<th>Short Rng kyds</th>
<th>Med Rng kyds</th>
<th>Long Rng kyds</th>
<th>Extreme Rng kyds</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-Pen</td>
<td>Dam</td>
<td>B-Pen</td>
<td>Dam</td>
</tr>
<tr>
<td>0 - 8.5</td>
<td>8.6 - 19.1</td>
<td>19.2 - 25.4</td>
<td>25.5 - 31.8</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1/1</td>
<td>1/1</td>
</tr>
<tr>
<td>225</td>
<td>21</td>
<td>19</td>
<td>17</td>
</tr>
</tbody>
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AA Pk 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…
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
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

MQ-8B Fire Scout

USS Tripoli, 1991

LUGM-145
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 going to 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
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 Ph
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.
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* 2\(^{nd}\) 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 SITREP*\(s\)
  - China navies order of battle book
Questions?