Electromagnetic Spectrum Operations

July 2016

Jack Dorsett
Vice Admiral, U.S. Navy (ret)
Sun Tzu
The Art of War

If you know your enemies and know yourself, you will not be put at risk.

If you only know yourself, but not your opponent, you may win or you may lose.

If you know neither yourself nor your enemy, you will always endanger yourself.
PLA Navy:

Integrated Network
Electronic Warfare
Integrated Network Electronic Warfare
“Wangdian Yitizhan”

2006 “Science of Campaigns”
- A PLA Campaign Strategy designed to: Jam, Deceive & Paralyze an Enemy’s Information Systems

Includes:
- Reconnaissance
- Jamming & Anti-Jamming
- Networking and Platform Integration
- Space Operations
- Sensor-to-Shooter Connectivity
- Electronic Attack
Chinese Concept Development

“Introduction To Electronic Warfare”
Major General Dai Qingmin
Published

“Integrated Network Electronic Warfare”

Science of Campaigns
---
Pre-emptive use of IW/CNO/EA
---
Every campaign includes IW

Science of Military Strategy
---
Transform from Platform-based to Network-based Operations

INEW Concept Development

1999  2002  2006  2013
Evolution of PLAN INEW Capabilities

1999: Limited Unit & Fleet EW Training

2004: Training at Regimental Level

2013: Training at Battalion Level

2015: By 2020: Training at Company/Unit Level

2020+: Large Cadre of EW Professionals

Creation of Informationized Training Centers (12)

Lanzhou MR: INEW Exercise

Hu Jintao “Train in Complex EM Environments”

Blue/Red Cyber Exercise

2004: Training at Regimental Level

Limited Unit & Fleet EW Training

Stove-Piped Personnel Training
Evolution of PLAN INEW Capabilities

**Equipment**
- 1980s/1990s ESM Receivers/Jammers
- Qu Dian Battle Management System
- Multi-spectrum Comms
- Advanced C4ISR Satellites
- NRJ6A ESM; Secure, Jam-Resistant Datalinks

**Challenges:**
- Cultural Resistance
- Limited Advanced EW
- Limited Fleet DataLinks
- Insufficient sea-based ISR

1999 2005 2010 2015
U.S. Navy:

Electromagnetic Spectrum Warfare
Principles of Electromagnetic Spectrum Warfare

- Gain decisive advantage in the EM spectrum.
- Transition from individual ships to fleets collectively performing EM warfare.

“Future conflicts will be won in a new arena…that of the electromagnetic spectrum and cyberspace. We must merge, then master those realms.”

Admiral Jonathan W. Greenert, USN
Chief of Naval Operations, 2011–2015
Electromagnetic Spectrum Warfare
Core Functions

Battlespace Awareness (Real Time Spectrum Ops)
- Understand own ship emissions
- Detect and track enemy emissions
- Know commercial use of EMS

Control the Spectrum
- Secure, reliable comms (protected EHF)
- Spectrum management
- Electronic protection
- Networked across the fleet

Dominate the Spectrum
- ECM, deception, decoys
- Spread spectrum usage
- Electronic attack
- Advanced EMS battle management aids
Real Time Spectrum Operations (RTSO)

- Tools to assess threats and opportunities
- Tools to develop courses of action using modeling and simulation
- Tools to auto-allocate electromagnetic spectrum
- Tools to permit tasking of EMSO
- Tools to analyze success of operations
US Navy Concept Development

- **“Information Dominance”**
  - Concept Created 2009

- **“Electromagnetic Maneuver Warfare”**
  - Concept Created 2012

- **EMW Campaign Plan**
  - Developed 2013

- **Fleet Concept Of Operations**
  - Created 2014

**Exercises:**
- EMW C2X
- C2 Assured Comms
- Counter ISR Wargame
- EMW Tech Wargame

Navy Warfare Development Command = Fleet Lead

# EMW Capabilities

## Current
- SEWIP Block II
- SSEE Increment F
- E-2D
- Aegis
- CEC
- Link 16
- Protected SATCOM

## Future (2018–2028)

- Directed Energy Weapons
- Real Time Spectrum Operations & Battle Management Tools
- Multi-Function Apertures
- Assured Precision Navigation & Timing
- Unmanned/Autonomous EW Platforms
- SSEE Increment G
- SEWIP Block III
- Enhanced Datalinks
- Next Generation Jammer
## How Effective is the U.S. Navy?

<table>
<thead>
<tr>
<th>USN Strengths</th>
<th>USN Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Priority of 3 x CNOs</td>
<td>❑ Insufficient fleet training</td>
</tr>
<tr>
<td>✓ Strong individual training</td>
<td>❑ No EW battle management tools</td>
</tr>
<tr>
<td>✓ Improved:</td>
<td>❑ Fleet not adequately networked</td>
</tr>
<tr>
<td>✓ Concepts &amp; doctrine</td>
<td>❑ Ship/aircraft cyber vulnerabilities</td>
</tr>
<tr>
<td>✓ Wargaming</td>
<td>❑ No counter-space capabilities</td>
</tr>
<tr>
<td>✓ C2 exercises</td>
<td></td>
</tr>
<tr>
<td>✓ Good equipment</td>
<td></td>
</tr>
<tr>
<td>modernization plan</td>
<td></td>
</tr>
</tbody>
</table>
Implications for the Kaijo Jieitai

Use Step-by-Step Approach to Improve

Concepts & Doctrine

1) Develop the Concepts
2) Write & Talk About The Concepts
3) Include EMSO in all Curriculum

Training

1) Focus on Individual Training First
2) Wargame!
3) Emphasize EW in Unit Training
4) Then Move to Fleet Exercises

Equipment

1) Protected Ship/Air Comms
2) Advanced Datalinks
3) Ship EW Improvements
4) Cyber Protection
5) Battlespace Awareness Tools
6) Electronic Attack & Airborne Jammers
Japan’s Current EMSO Environment
Questions?