



SM-3 Block 0

Blk 0

FLIGHT
TEST ONLY



Flight Test 2002-2004

- 1-Color Seeker
- Tube and Mono SDACS
- 13.5" 2nd & 3rd Stage
- MK72 Booster
- MK41 VLS Compatible

- Integrates LEAP with Standard Missile and AEGIS Weapon System
- Designed for Operational Use, M1=M2
- Incorporates Flight Test Specific Features that limit service life

- **Five** delivered and expended
- **4** for **5** in flight test

Rev: 140806

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- Terrier LEAP test conducted by BMDO and NAVSEA in 1992-1995 to prove concept of ship based missile defense
 - Two missions with competing kill vehicles achieved all objectives short of intercept
- AEGIS LEAP Intercept (ALI) project chartered to complete intercept proof on path to objective system
 - In place of competition, industry teamed to select best of breed components from LEAP kill vehicles
 - SMCo as Raytheon – Hughes joint venture (later RTN bought Hughes)
- System requirements documented in NTW ORD
 - Remained consistent vision for objective program throughout
- Key missile technical challenges:
 - Solid Divert and Attitude Control (SDACS)
 - Scale up of DACS demo'd in 1993 Hover Test (rhenium characterization)
 - Third Stage Rocket Motor – dual pulse
 - Seeker Particles
- Two successful intercepts concluded ALI
 - Remaining SM-3 Blk 0 missiles used to move rapidly from experiment to operational context



SM-3 Block I

Blk I

RETIRED



Initial Deployment
2004-2009

- 1-Color Seeker
- Sustain Only SDACS
- 13.5" 2nd & 3rd Stage
- MK72 Booster
- MK41 VLS Compatible

- Four year service life
- Initial deployment reqs
- Initial Discrimination Capability
- Nosecone Protection
- Sealed Seeker
- OVD Solid State Relay
- SAASM-compliant GPS
- TSRM Nozzle Upgrade

- **Eleven** delivered
- **3 for 4** in flight test
- Supported initial deployment
- Retired after 4 yr service life
- Retired components supporting SLEP for IA

- SM-3 Blk I in final form not part of original program concept
 - Cancellation of Navy Area in 2001 provided surplus boosters and DTRMs to program
 - To achieve earlier initial capability, original Blk I concept pushed right to IA, interim Blk I inserted
- Technical Challenges
 - Monolithic SDACS in sustain mode only
 - TSRM improved nozzle, but not to design objective inter pulse delay
- Delivery of five rounds in Oct 2004 supported initial AEGIS BMD engagement deployment capability (FACO at WSMR)
- Delivered 6 remaining Blk I rounds at Camden AUR facility
- Upon completion of four year service life, remaining Blk I rounds provide basis for Blk IA service life evaluation program
- “Capability Based” acquisition critical to program progress when majority of requirement achieved
 - Ex: TSRM IPD; SDACS Sustain



SM-3 Block IA

Blk IA



- 1-Color Seeker
- Pulsed SDACS
- 13.5" 2nd & 3rd Stage
- MK72 Booster
- MK41 VLS Compatible

- Eight year service life
- Full IR Discrimination
- RF/IR Data Fusion
- KW on 3rd Stage
- Titanium Nosecone
- Full IPD TSRM
- VECP Plate 3A
- VECP SCS
- VECP TVA

- 167 delivered to date
- 15 for 17 intercepts
- In service in US and Japan
- SLEP efforts recommending service life extension to 12 years

- SM-3 Blk IA integrated all concepts developed during ALI
 - Full deployment requirements, eight year service life
 - Completed initial IR discrimination, including RF/IR discrimination, KW operations on third stage
 - “New” TVA, SCS, and Plate 3A from SM-2 BLK IV
- Technical Challenges:
 - “Full” TSRM inter pulse delay
 - Pulse SDACS
- Workhorse for fleet BMD
 - Majority of US inventory
 - FMS for Japan
 - Burnt Frost, FTM-15
- Due to delays in Blk IB development, Blk IA program restarted and provided two additional years procurement
 - Final Blk IAs in assembly, production line shutdown in progress
 - Teams at major subs disbanding (ATK – SDACS, Boeing – GU)
- During IA production, MDA required to change from incremental R&D to procurement funding, with associated requirements



SM-3 Block IB

Blk IB

**IN RATE
PRODUCTION**



PAA Phase II

2014 Deployed @ Sea
2015 Deploy Land

- 2-Color Seeker
- TDACS
- 13.5" 2nd & 3rd Stage
- MK72 Booster
- MK41 VLS Compatible

- Improved Discrimination
 - Two Color Seeker
 - All-Reflective Optics
 - Advanced Signal Processor
- TDACS
- Upgradable software
- Threat Upgrade = software performance update

- 7 for 9 in intercept test
- 2 for 4 non-intercept test
- 92 delivered to date
- 221 enacted + 194 in FYDP
- Deployed in US Navy
- In rate production

- Balanced Investment Strategy chartered by RADM Paige in 2004 to define path forward for AEGIS BMD
 - Led by CDR Jon Hill, Mr. Don Mitchell (JHU/APL)
 - Defined capability of system discrimination with BMD Signal Processor and two-color, advanced processing seeker on SM-3
 - Became requirements for BMD 4.0 and SM-3 Blk IB
- SM-3 Blk IB development started in 2006
 - Original concept was to be DACS-agnostic
 - Required parallel designs added cost and complexity
 - In 2007, TD directed drop SDACS and focus on TDACS
- Technical challenges
 - TDACS (propellant, pintles)
 - Guidance Unit integration
- Other challenges
 - Contracting, funding, full rate authorization
 - TSRM (FTM-15 cold gas regulator, FTM-16 E2 energetic event)
- Software upgrade capability provides opportunity for performance enhancement, such as IB Threat Upgrade



SM-3 Block IIA

Blk IIA

IN
DEVELOPMENT



PAA Phase III

2018 Deploy
Land and Sea

- Adv 2-color Seeker
- High Divert TDACS
- 21" Clamshell NC
- 21" 2nd & 3rd Stage
- MK 41 VLS Compatible

- Cooperative Project
- Improved Discrimination and BMD Integration
- Increased Missile Vbo
- Bi-Directional Comms
 - SW Download
 - BIT Reporting
- Lightweight Canister
- Extended service life

- CTV-01 and 02 Successful
- First intercept round in assembly
- 17 on contract (post SCD)
- 71 programmed in FYDP

- Initial Joint Cooperative Research Project starts in early 2000s
 - Researches components for future development
 - Culminates in JCTV-01, flight test of POP 13.5" clamshell nosecone
- 19 June 2006: United States and Japan establish SCD project for development and initial flight test of the SM-3 Block IIA
 - Requirements developed jointly
 - Countries develop their components to comply with joint requirements
 - Oversight from Joint and Executive Steering Committees
 - RMS is integrator of components from MOD/MHI
- Technical challenges
 - TDACS, Critical Design Review, Software, Circuit Cards
- Other challenges
 - Cost and scope control, resulting in 2015-16 Overtarget Baseline
 - Changing MHI from joint partner (SCD) to supplier (FY16 production)
 - DoD Acquisition compliance for Japan suppliers
- Flight Test
 - PTV-1, CTV-01, CTV-02 successful, working toward SFTM-01