VIP CLUB
Established in 1980

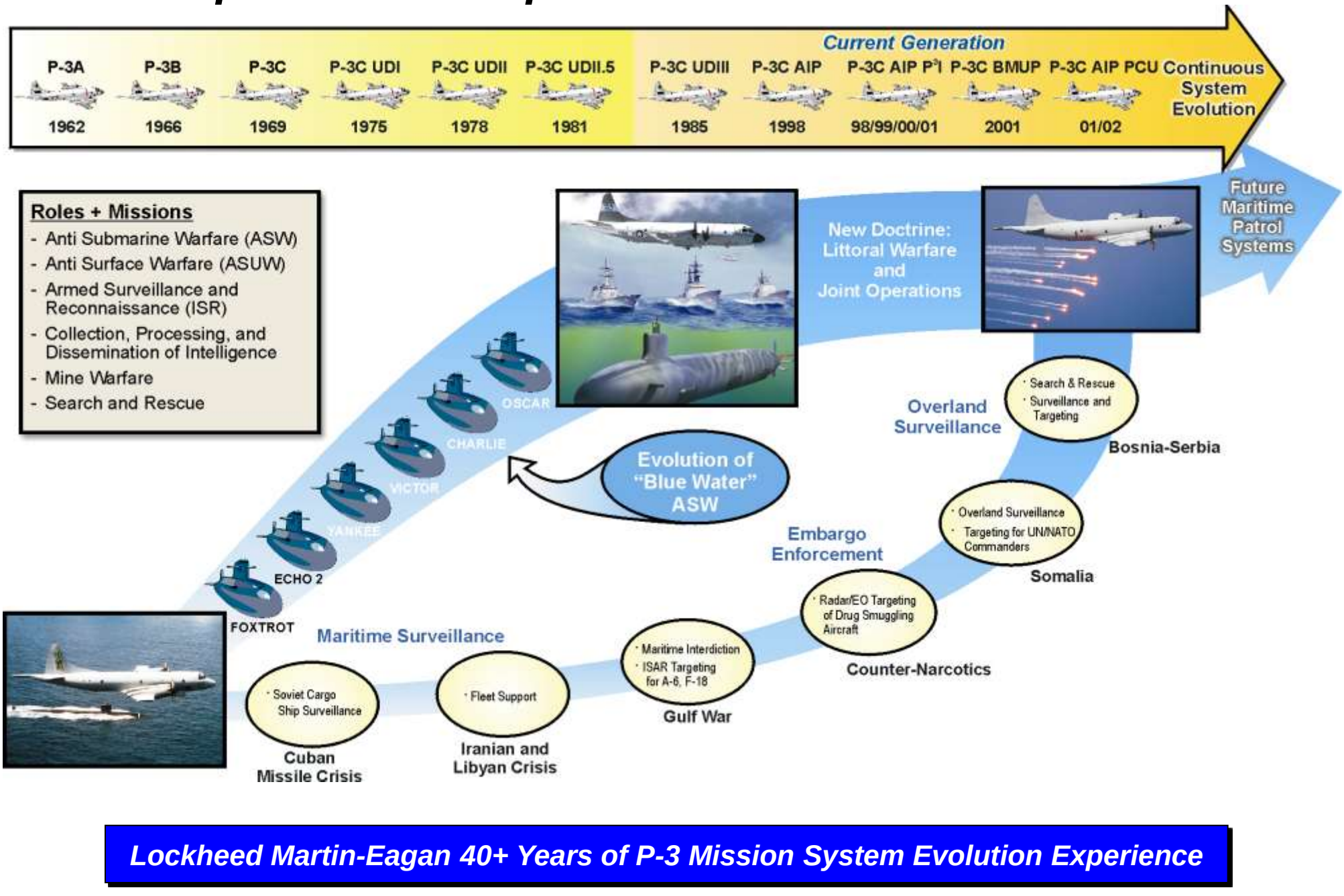
50 Years of Airborne 'ASW'

A Legacy Project Slide Set

This Introduction slide by LABenson – August 2012

1. The next five slides depict 40 years of LMCO/Eagan P3C **A**nti-**S**ubmarine **W**arfare experience, 1962 => 2001 - slides provided by Les Nelson
2. UNIVAC, St. Paul (predecessor of LMCO Eagan) experiences **began in 1963** when we were contracted to deliver a modified airborne ADD 1000 computer to NADC as the first digital mission computer project. We were also contracted to do the mission software.
3. In June 1965 we delivered the CP-823U, an NTDS software compatible airborne computer and an AN/USQ-20A for compiler support.
4. In September 1967 we shipped the 1st CP-901 computer to NADC - S/N 499 shipped in 1992, a 25-year AN/ASQ-114 systems production run!
5. We developed P3C ASW software at St. Paul, MN; Johnsville, PA; Patuxent River, MD and Burbank, CA.
6. LMCO/Eagan involvement 2002-2013 is not public, thus not noted herein.
7. **In 2012** there are still 40 CP-901s flying on Japanese P3C search & rescue missions - Bob Pagac, retired LMCO program manager.
8. Other information is available on our website, http://vipclubmn.org: Systems - Airborne page, Computers – 30 bits page, IT Legacy – Documents page, and several People pages.

P-3 Evolution to Meet Changing Operational Requirements



Lockheed Martin-Eagan 40+ Years of P-3 Mission System Evolution Experience

Nov 2001

System Evolution – AIP and BMUP

AN/ASQ-212: 1994 AIP, P^{3}I → 2000 PCU (AIP Follow-On)

AIP

9/89 - 11/95	1996	1997	1998	1999	2000	2001	2002 →
ASQ-212	→ Baseline	→ Build 1	→ Build 2	→ Build 3/3.5	→ Build 4	→ Build 5	- - - - - - →
~~New~~ Computer with Three Processors ~~VME~~-like/VSB Architecture ~~All~~ Software Written in Ada ~~TMS~~, CORE, and STP	CP-2339 (Computer) ~~Legacy~~ Inter-faces ANEW, D/S, S/D, 1553, 232/422 VDC (Video Distribution Controller) ~~Sensors/Subsystems~~ Provide Only Video to VDC ~~Combination~~ of VSB and COTS VME ~~Introduction~~ of COTS Processors	~~TACCO~~/ NAVCOM ~~Workload~~ Share ~~Color~~ Symbology	• AIMS EO/IR • RDSS from UIP • 10B2 Ethernet • JMCIS Interface (Tactical Data Distribution) • Acoustics 78A • ESM Upgrades	• SS-1 and SS-2 Non-Acoustic Mode • ESM Upgrades • All Station Pointers • Geographic Polylines	~~New~~ Buoy ~~GFS~~ ~~ESM~~ Upgrades	~~SAR~~ On-Line Control via 1553 ~~Imagery~~ Exploitation ~~ESM~~ Upgrades	

BUMP

1998	1999	2000	2001	2002 →
Baseline	→	→ X-Version	→	- - - - - →

DDC (Digital Data Computer)
- ~~21~~-Slot, VME-64 Architecture
- ~~COTS~~: Processor (2 PowerPCs), ANEW, S/D, ARINC 429

VDC
- ~~21~~-Slot, VME-64 Architecture
- ~~COTS~~ Processors

Software
- ~~AIP~~ Build 2 Baseline
- ~~Port~~ of Software to Ada95 and VxWorks Operating System

ASQ-78B
- ~~Addition~~ of ASQ-78B

Software
- ~~AIP~~ Build 3 Software Baseline
- ~~Additional~~ EFDS Functionality

VDC
- ~~X~~-Server Workstation at All 6 Stations
- ~~Connection~~ to External X-Clients via 100BT or 10B2 Ethernet (ASQ-78B)
- ~~Universal~~ Workstations for Acoustics
- ~~Ethernet~~ Switching Hub Allowing Point-to-Point Connection
- ~~Provide~~ Subsystem Interface to Printer via Ethernet
- ~~Internal~~ Hard Drive

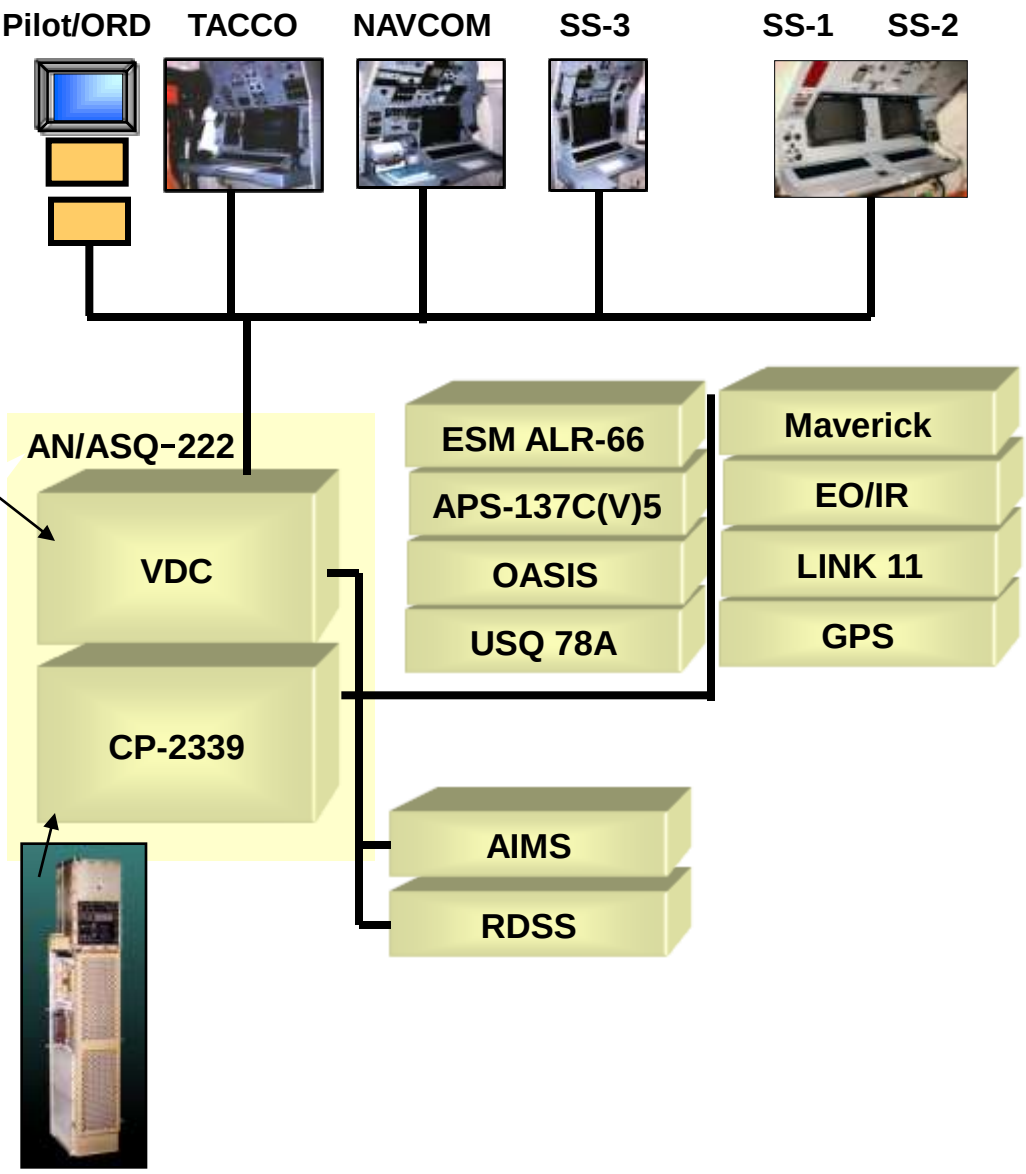
ASQ-78B
- ~~Software~~ Modification Allowing PEP I/O via 100BT (Freeing up PEP Port B at SS-1 and 2 for OASIS)
- ~~Power~~-up Automatic Configuration for Either AIP or BMUP

fig-13.wmf

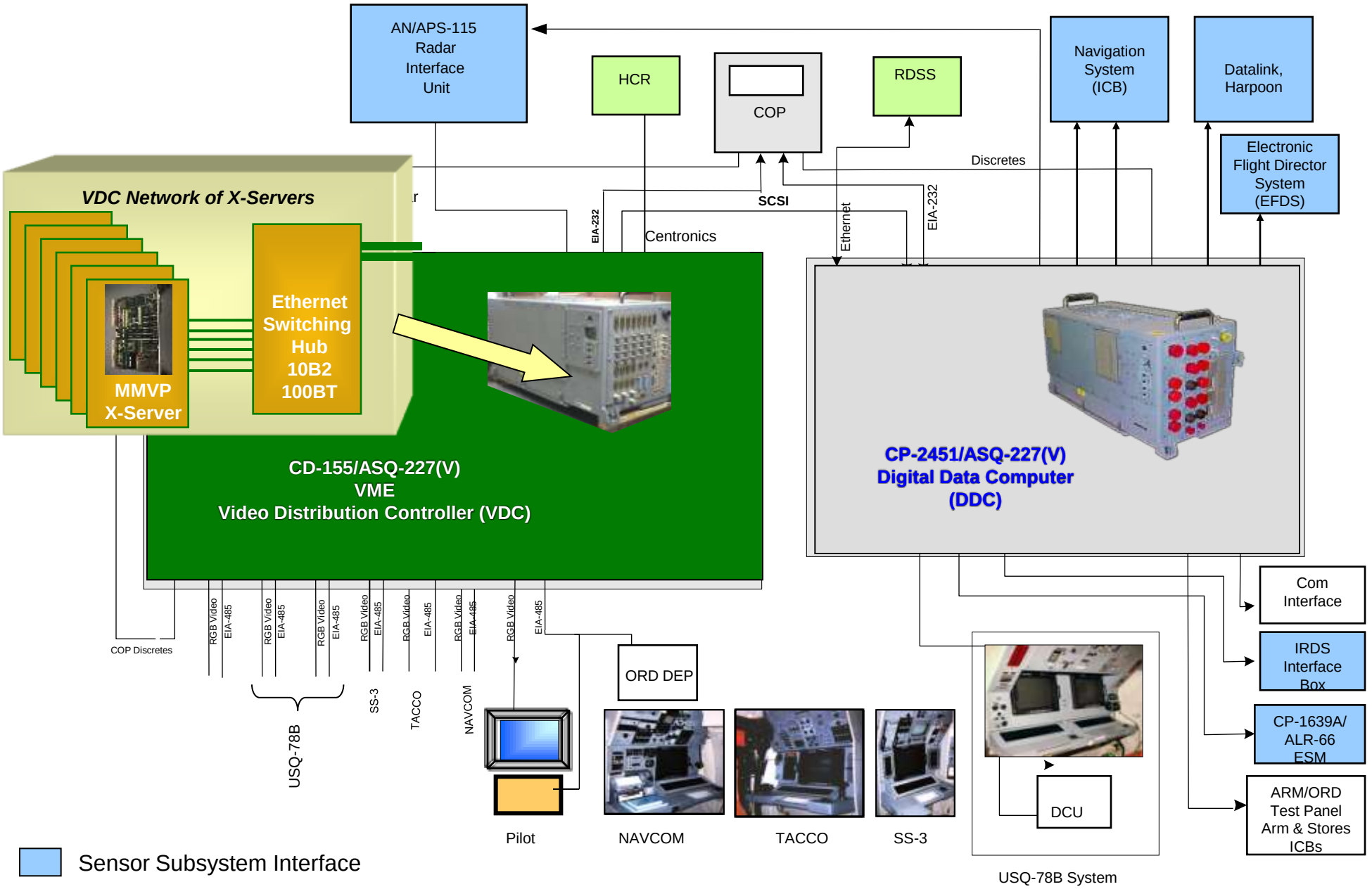
AIP Configuration

AIP System Changes

- *AN/ASQ-212 – Slight Change, Redesignated the AN/ASQ-222*
- *Added Video Distribution Controller (VDC) (VDC Replaced by VME VDC in 2000 (AIP Follow-on))*
- *Color High Resolution Displays (CHRDs) used as Tactical Displays*
- *Digital Entry Panel (DEP), Programmable Entry Panels (PEP) Replaced Keysets*
- *AROs Eliminated*
- *New Trackball and Keyboard*
- *Joysticks to Control Sensors/Armament*
- *Hard Copy Recorder (HCR), Accessible to All Stations*
- *The SS-1 and SS-2 Stations Redesigned, With an Upgraded Acoustic System (USQ-78A)*
- *Replacement Digital Storage System (RDSS) Replaced AN/ASH-33A DMTS*
- *AIMS System Added*
- *Satellite Communications Processing (OASIS)*
- *Inverse Synthetic Aperture Radar (ISAR/SAR) (AN/APS-137B(V)5)*
- *Intercommunication System (ICS) Upgrade*
- *New Missile Control*
- *New Radios*
- *New Software to the AN/ASQ-222 and the VDC*
- *VDC Software – Greenhills Ada Programming Language*
- *VDC Real-time Operating System – VxWorks*



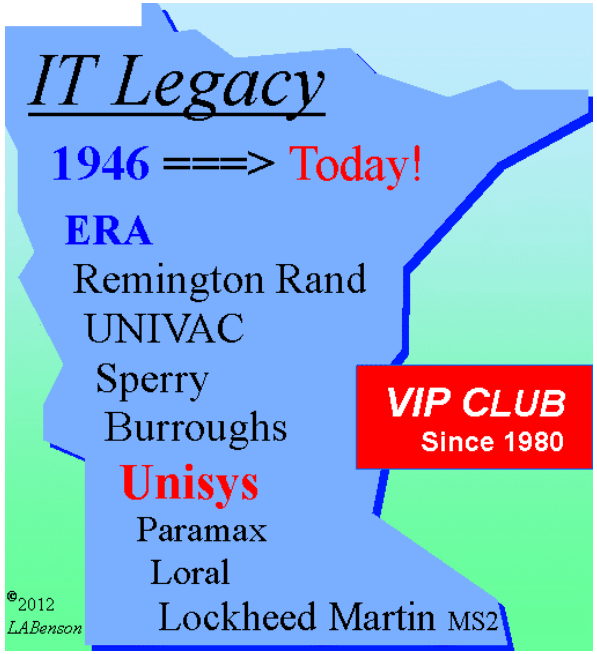
BMUP Configuration – X Version



Nov 2001

Technology Viewpoint (COTS Hardware and Software)

	Processor	Runtime	Compiler	Application Software	Graphics Generation	Interconnect Protocol	Subsystem Integration
AN/ASQ-212	68030	pSOS	TeleGen 2 Rel 2a	Ada 83	Custom (AGP/MDA)	Shared Memory Mailboxes	Standalone
AIP	68030 68060	pSOS VxWorks	Telegen2 (for 68030) Greenhills AdaMulti	Ada 83 C Ada 95 (for VDC)	Custom (AGP/EMDR) (MMP/MMDR)	Shared Memory Mailboxes	Standalone
AIP Follow-on	68030 PowerPC	pSOS VxWorks	Telegen 2 (for 68030) C Code (for PowerPC)	Ada 83 C Ada 95	MMVP	Shared Memory Mailboxes	Standalone
BMUP	PowerPC	VxWorks	Greenhills AdaMulti	Ada 95 C	MMVP	Shared Memory Mailboxes	Partially Integrated
BMUP X-Version	PowerPC	VxWorks Windows NT	Greenhills AdaMulti	Ada 95 C	MMVP X-Server	Shared Memory Mailboxes Middleware	Partially Integrated
LMTS PCU Architecture	Sparc PowerPC Others	Solaris VxWorks DII COE	Greenhills AdaMulti	Ada 95 C/C++	MMVP X-Server NT-Server	Middleware/ CORBA	Fully Integrated



*2013 is the **GOLDEN ANNIVERSARY** of our IT Legacy involvement with the Navy and Lockheed Martin in the airborne **A**nti-**S**ubmarine **W**arfare systems engineering, software, and hardware production.*

Our Airborne ASW history is more than the P3C systems reviewed in the five slides provided by Les Nelson:

- We developed the hardware (AN/AYK-10(1832)) and systems software for the carrier based, Lockheed S3A.
- We developed the software for the Canadian Aurora program which used the P3 aircraft with an 1832 computer.
- We've tailored P3C systems for the Japanese, Australians, Norwegians, Dutch, …
- We proposed an airborne 18-bit computer for the LAMPS helicopter ASW mission, lost to IBM.
- We also developed the software for surface and sub-surface Navy ASW systems.

2013 Celebration!

We plan to recognize the Airborne ASW parts of our IT Legacy at the VIP Club Annual Picnic.

Please send us a paragraph about your personal history with any and/or all of these programs; labenson@q.com & hansonrc@hotmail.com