



SMITHS INDUSTRIES

Aerospace

**NAVY AV-8B
CRASH SURVIVABLE FLIGHT
INCIDENT RECORDER (CSFIR)**

**MEETING MINUTES OF THE
PROGRAM REVIEW
17 November, 1998**

**CONTRACT GS-24F-3027G
DELIVERY ORDER N00019-98-F-0016
DATA ITEM A002
23 November, 1998**

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On 17-18 November 1998, representatives from the Navy, Boeing and Smiths Industries (SI) met at the Naval Air Weapons Development Center, Building P302, China Lake, CA for a Program Review / Technical Interchange Meeting in support of the AV-8B Crash Survivable Flight Incident Recorder System (CSFIR) integration program. Smiths Industries is developing software for its Voice and Data Recorder (VADR[®]) under this contract. A list of attendees is in attachment #1. Attachment #2 lists the resulting action items.

The objective of this meeting was to provide an update on this program including the Program Overview, Task Description, Deliverable Items, Schedule, Status of the Interface Control Document, Software Design, System Test Plans, Software Requirement Specification Review. Attachment #3 is a copy of the briefing material. In addition to the briefing material, the following items were discussed:

1. Major Reese Hines raised concerns again about support equipment plans to upload and download the CSFIR. Bill Parillo of PMA 209 explained the Navy's plan of utilizing the existing AN/AUQ-76A for CSFIR upload and download requirements as an interim solution until a more ruggedized computer can be implemented.
2. The initial SI software delivery, currently scheduled for 4/12/99, will be to China Lake for their lab integration purposes.
3. The China Lake lab / integration facility will conduct the software validation and verification (val/ver) testing because the first aircraft installation kit is not scheduled for delivery until spring of year 2000. This val/ver testing will be conducted in the August/September 1999 time frame and will constitute Navy validation of the final SI production software version. A revised lab integration / testing schedule will be generated by Gene Brewer (action item #8).
4. All CSFIR installations into AV-8B aircraft undergoing re-man production have been canceled. AV-8B CSFIR systems will now be exclusively installed as a retrofit task. A revision to the ECP, TDL and schedule is required based on this change. (PMA-209 action item #4).
5. The earliest an AV-8B CSFIR kit can be installed for CSFIR flight testing is the fall of year 2000.
6. Bill Parillo stated that PMA 209 will provide both the AV-8B and F/A-18 China Lake organizations the following equipment to support their lab integration activities:
 - Production VADR[®] units (two for F/A-18, one for AV-8B).

- Hardened PC computer installed with SI site license software and VADR[®] High Speed Download/Playback ISA kit.
 - AN/AUQ-76A computer.
7. Tom Conquest and Bill Otten of SI stated that SI would provide the following support to China Lake personnel upon initial delivery of the project release software:
 - Set up computers provided by PMA 209.
 - Load the initial project release software into the lab test VADR[®]s.
 - Provide basic operation and ground software training.
 - Support China Lake initial lab integration testing.
 8. Walt Zavich of Boeing expressed concern about SI's recommendations, documented in the ICN, for grounding the shield of all CSFIR audio lines to the CSFIR connector backshell. Gene Brewer of China Lake stated that he doubts such concerns can be adequately addressed during his lab integration testing. Consequently, the earliest the issue can be fully addressed is during flight-testing. PMA-209 agreed to supply a full copy of the EMI test report to Boeing. (action item #1).
 9. PMA 209 plans to direct SI to conduct VADR[®] EMI comparison testing in the next two months in an attempt to resolve differences in EMI RE02 test results between SI and NAVAIR. At the conclusion of the testing, PMA 209 will provide technical direction to Boeing concerning grounding of the audio cable shields. (PMA 209 action item #5)
 10. Gene Brewer of China Lake stated his intention to involve Chip Brown of the Navy Center during his lab integration testing. The Safety Center involvement will verify all recorded data meets their needs in the event of an incident or mishap.
 11. SI stated their intention to deliver the AV-8B CSFIR Software Requirement Specification (SRS) to PMA 209 within one week for their approval. PMA 209 then intends to submit the SRS to the Safety Center for their concurrence. Bill Parillo does not expect any problems getting the document approved within 30 days of submittal. SI was requested to submit electronic versions of the SRS to PMA 209, China Lake, Boeing, and the Safety Center upon submittal of the hard copy to PMA 209. (SI action item #7)
 12. After many questions regarding CSFIR support equipment, Bill Parillo of PMA 209 agreed to coordinate with China Lake and Lakehurst the Navy's plans for integrating all CSFIR support equipment necessary for China Lake integration testing and subsequent fleet operations. (PMA 209 action item #2). SI agreed to provide schematic diagrams for both aircraft and bench upload / download options to PMA-209 (SI action item #3).

13. The F/A-18 and AV-8B will use unique VADR[®] software loads. Since the current F/A-18 and AV-8B CSFIR ICDs reference the same VADR software part number, Bill Otten of SI agreed to submit an ICN to Boeing listing a new VADR software part number for the AV-8B application. (SI action item #6).

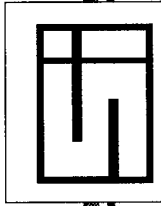
On 18 November Gene Brewer conducted an AV-8B lab tour in the morning.

ATTACHMENT #1

| Name | Phone Number | E-Mail | Organization |
|-----------------|---------------------|-----------------------------------|-----------------------|
| Gene Brewer | (760) 939-5884 | Gene.Brewer@chinalake.navy.mil | 455110D NAWC-WD |
| Kimmie Willard | (760) 939-7915 | Kimmie.Willard@chinalake.navy.mil | 457300D DISI (Boeing) |
| Paul Campbell | (301) 866-0500 | Campbell@sfpsi.com | Boeing |
| Keith Hohl | (314) 233-1959 | KeithHohl@boeing.com | Boeing |
| Leo Smith | (314) 233-2079 | Leo.W.Smith@boeing.com | Boeing |
| Walt Zavich | (314) 234-2203 | Vlado.Zavich@boeing.com | Boeing |
| Cory Bales | (760) 939-3946 | | CTA |
| Jim Caudill | (301) 863-8988 x306 | Jim_Caudill@emainc.com | EMA/PMA-209 |
| Reese Hines | (301) 757-5431 | HinesER@navair.navy.mil | |
| Brian Beitnes | (760) 939-5199 | Brian.Beitnes@chinalake.navy.mil | 413300D NAWC-WD |
| Bill Parillo | (301) 757-6474 | ParilloWA@navair.navy.mil | PMA-209 |
| Tom Conquest | (616) 241-7900 | Conquest_Tom@si.com | Smiths Industries |
| Bill Otten | (616) 241-8928 | Otten_William@si.com | Smiths Industries |
| Jeffrey VanDorp | (616) 241-7213 | VanDorp_Jeff@si.com | Smiths Industries |
| Ted Vermeulen | (616) 241-8264 | Vermeulen_Ted@si.com | Smiths Industries |

ATTACHMENT #2
 AV-8B Program Review Action Items

| # | Problem Description | Originator | Date Due | Assigned to | Date Completed | Comments |
|---|--|------------|----------|---------------------|----------------|---|
| 1 | Provide final EMI test report to Walt Zavich (Boeing). Once reviewed by Boeing coordinate with PMA-209, platform, and Tom for resolution. | J. Caudill | 11-30-98 | PMA-209 | | |
| 2 | Coordinate with China Lake and Lakehurst on MDPS for upload/download into SEMP. Includes an asset (UYQ-76A) and ruggedized PC for voice capability to be used for lab testing at China Lake. SEMP coordinate with platforms. | B. Parillo | 12-4-98 | PMA-209 | | |
| 3 | Provide schematic of T-Cable necessary to support data upload/download for F/A-18CSFIR application using AN/UYQ-76A Computer. Provide schematic designs for both aircraft and bench upload/download operations. | | | | | Moved to F/A-18 action item, #7 |
| 4 | Since production has been halted, need revisions to the following: 1) ECP req ltr change (R. Cohen Ltr 11-12-98) 2) Revise TDL 3) Need new schedule (VALVER) | W. Zavich | 11-17-98 | G. Brewer/ Hines | | |
| 5 | Get resolution of audio shield signal grounding. | W. Zavich | 1-31-99 | PMA-209 | | Boeing EMI Group has concern that proposed shield grounding may introduce noise back into the A/C audio system. |
| 6 | Smiths Industries initiate an ICD change to provide new S/W Part Number. | W. Zavich | 1-31-99 | SI | | |
| 7 | Provide electronic copy of AV-8B SRS to Boeing, PMA-209, NAWC, and Safety Center simultaneously with delivery of hard copy CDRL submittal to PMA-209. | G. Brewer | 11-24-98 | SI | | |
| 8 | Provide lab integration testing schedule based on Smiths Industries S/W delivery. | G. Brewer | 1-7-99 | G. Brewer | | |



U. S. Navy AV-8B CSFIR
Program Review

November 17, 1998



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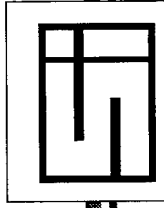
17 November 1998

AV-8B CSFIR Program Review

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Agenda

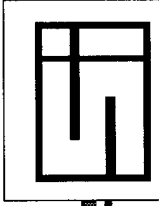


AV-8B

- » Program Overview
- » Task Description
- » Deliverables
- » Schedule
- » ICD / ICN Status
- » Software Design
- » System Test Plans
- » Software Requirement Specification Review
- » Accomplishments to Date
- » Planned Activities For Next Two Months
- » Issues / concerns

USN CSFIR AV-8B Program

Overview



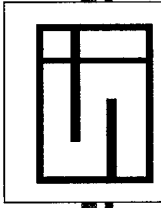
Develop Flight Software for US Navy AV-8B aircraft
Recurring VADR hardware not included in the contract

Specific aircraft variations in this effort are:

- » AV-8B Day / Night Attack
- » TAV-8B (Trainers)
- » AV-8B Radar

Single Flight Software will work for all AV-8B variations above

Task Description (AV-8B)



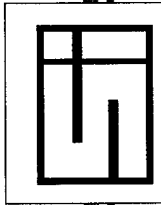
Develop System / Software Requirement Specification for Flight Software

Develop VADR® Flight Software configured for AV-8B

Test final software (Government invited to witness)

Support Navy AV-8B integration efforts

Deliverables

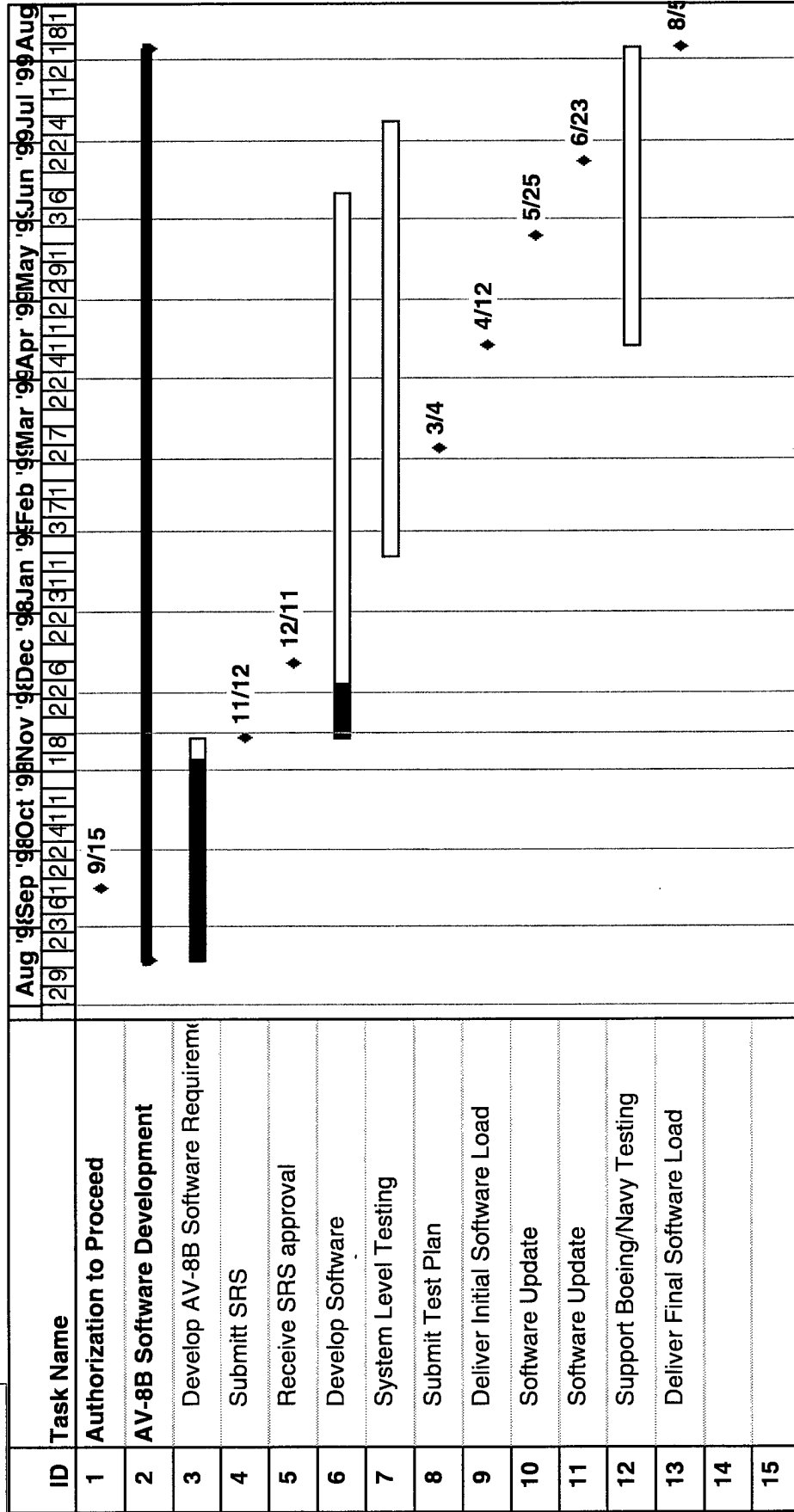
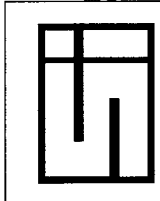


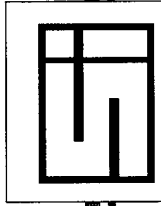
AV-8B Flight Software (A004)

Data Items

- » Meeting Agenda (A001)
- » Meeting Minutes (A002)
- » Software Requirement Specification - Flight Software (A003)
- » SI Test Plan (A006)

Schedule



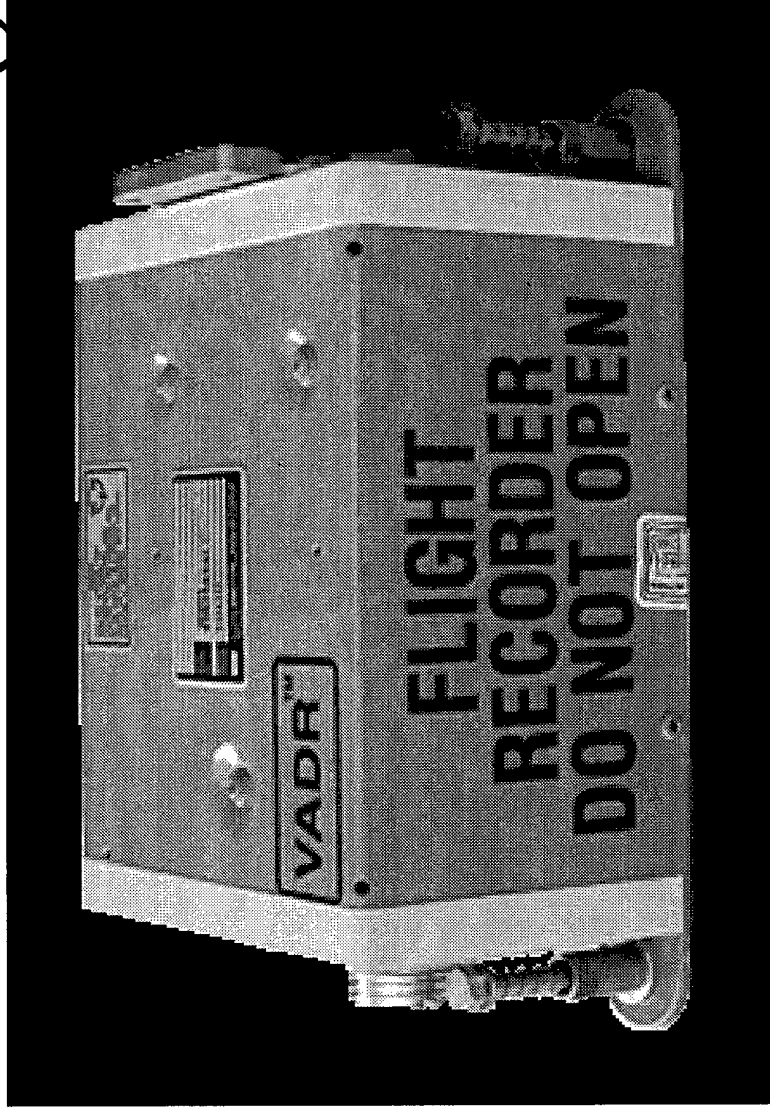


ICD / ICN Status

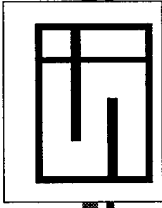
Interface Control Document (MDC 98H0002) approved
Interface Change Notice (ICN) submitted to Boeing for wiring
change based on Navy EMI testing.



VADR Software Design



VADR Software Design



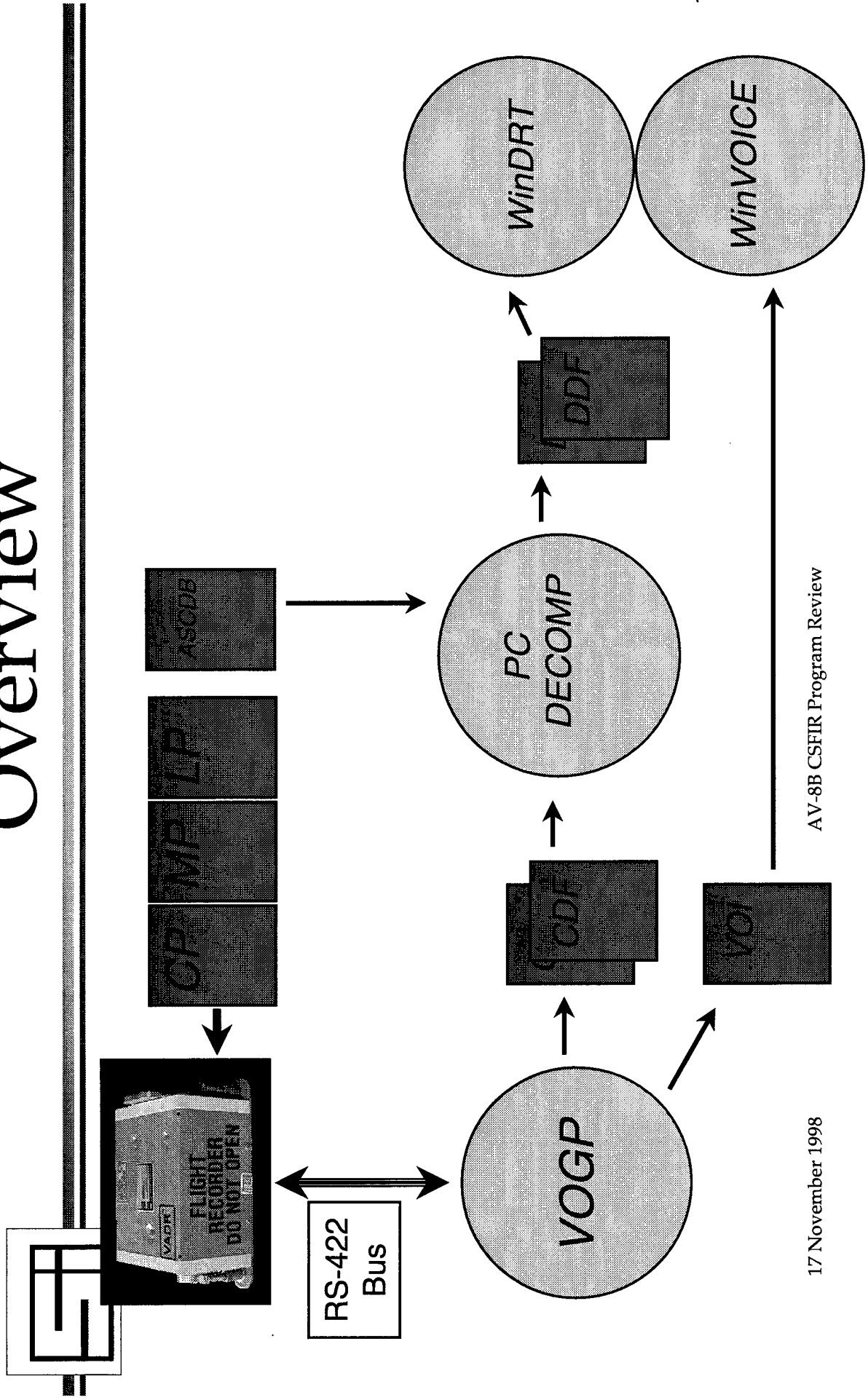
Overview

Loader Program (LP)

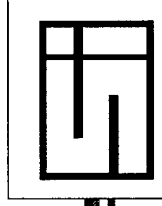
Control Program (CP) and Mux Program
(MP) core concept

Control Program and Mux Program design

Overview



Loader Program (LP)

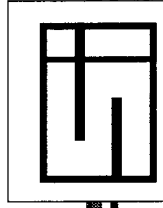


Allows uploading a CP

Transfers control to CP

Plan to use Current released version of LP
(Same version as being used on the C2, C130,
VP-3, UP-3 and VH-3 / 60 applications).

Core Software Concept



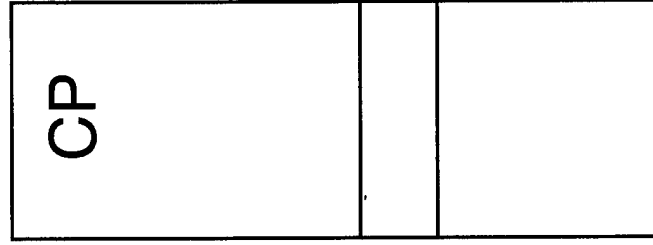
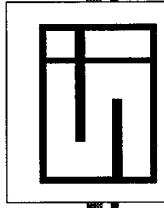
All VADR software functionality contained in core image.

Core software designed to meet application common requirements.

Application specific requirements met by filling configuration data structure with application specific values.

Separate part numbers for Core and Application Software

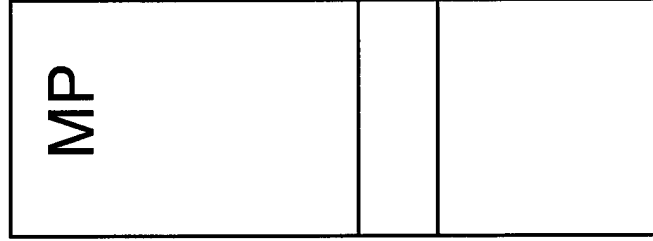
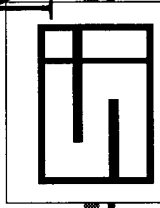
Control Program (CP) Core Concept



Configurable Items:

- Crash Protected Memory (CPM) Size
- CPM Partition Specifications
- Frequency Input Sample Rate
- Audio Channels
- 1553 Card Installed
- VADR RS-422 Address
- Configured CP Part Number
- Record Inhibit Parameters

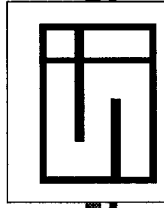
Multiplex Program (MP) Core Concept



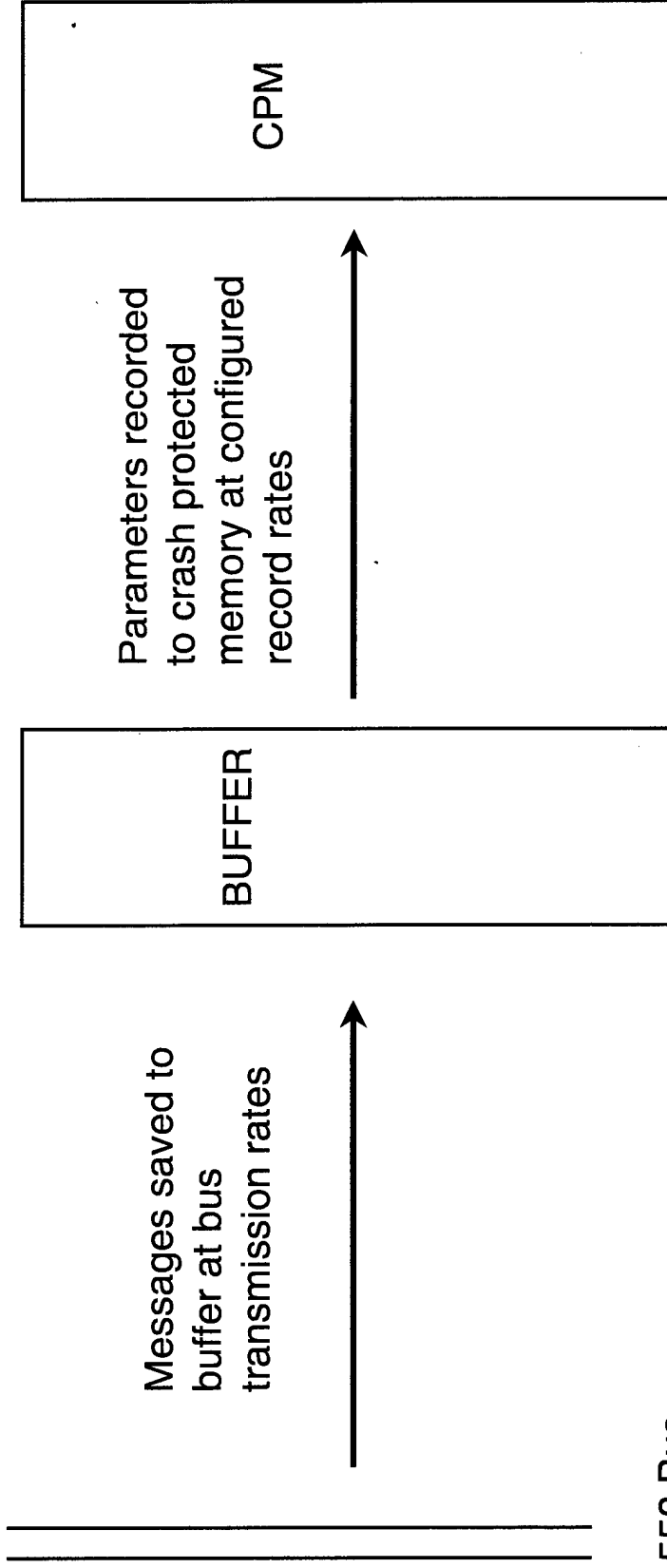
Configurable Items:

- RTA Address if applicable
- Mux bus messages to monitor
- Parameter definitions
- Recording Rates
- Record Start / Stop

Data Recording Scheme



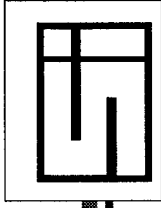
Two processes: Acquire Data, Record Data



1553 Bus

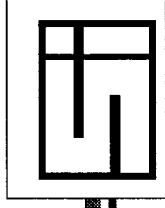
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AV-8B CSFIR Program Review



Systems Software Testing

System / Software Testing



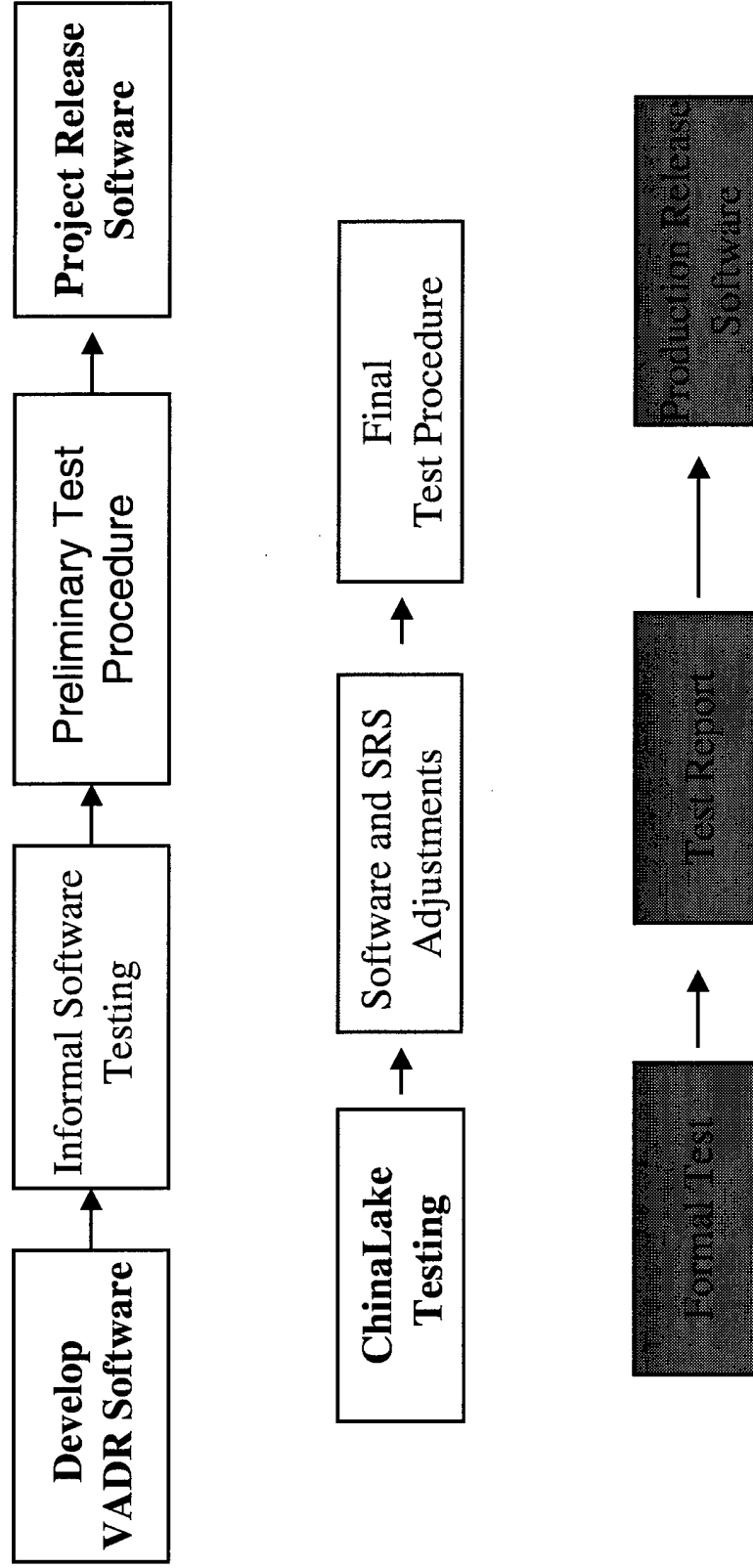
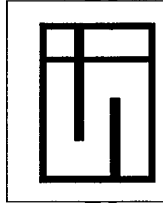
Test Approach

Application Specific Informal Testing

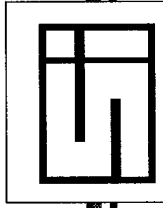
Application Specific Formal Testing

Test Setup

Test Approach



VADR Core Changes

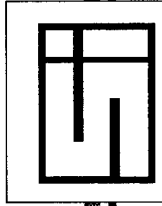


The requirements and test procedure of the existing Core Software Life Cycle Document will be updated for the start/stop requirement and BIT history recording

The Core Software will be updated and Informally tested to ensure the requirements are met

**AV8B
SRS**

| |
|---|
| Core Software Life Cycle Document |
| Requirements Design & Informal testing |
| Requirements Design & Informal testing |



Application Specific Informal Test

**Test Plan/
Procedure**

Generate preliminary test plan/procedure document which will outline the test requirements and procedure

Informal Testing

Perform informal testing to ensure the requirements of the SRS are met

**Project release
VADR Software**

Project release VADR software for testing at China Lake

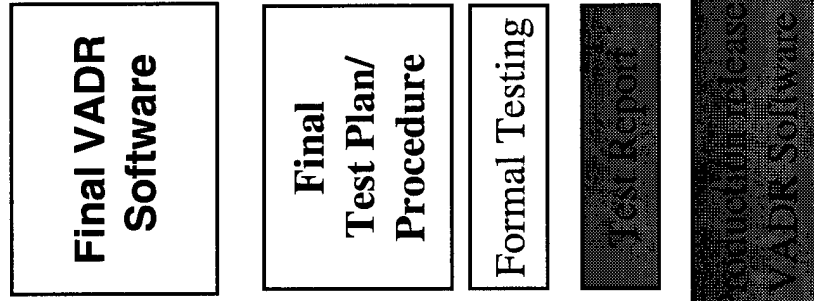
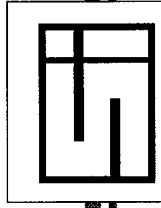
Updates

Update SRS and Software based

on results

AV-8B CSFIR Program Review

Application Specific Formal Test



A finalized version of the VADR Software will be used

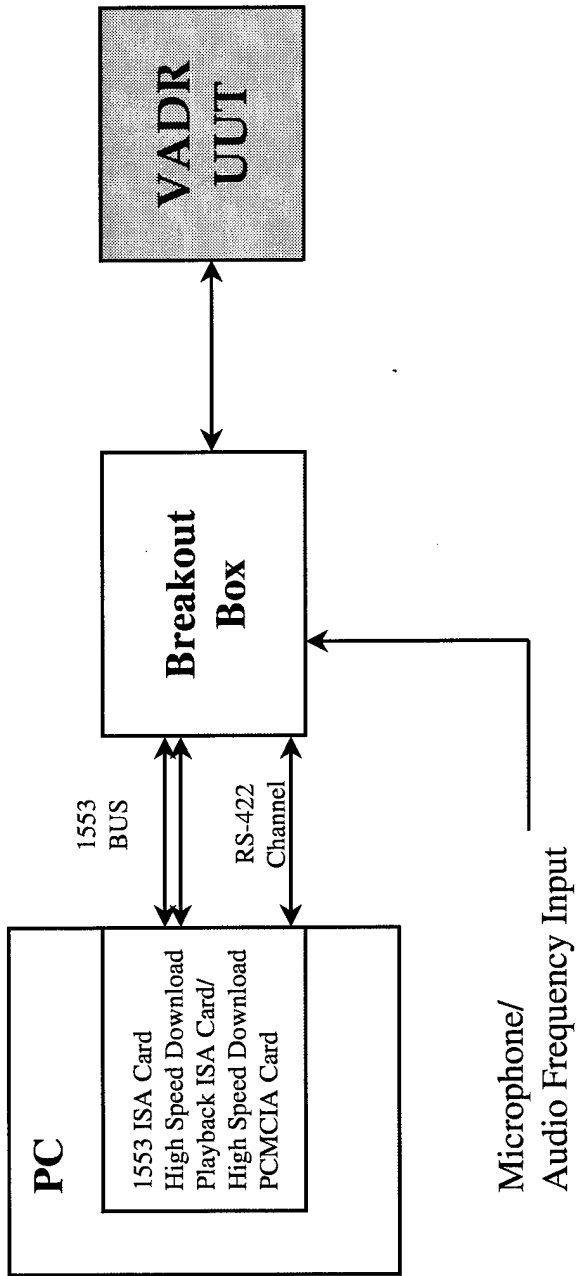
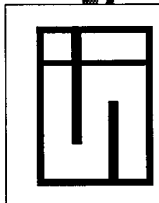
A finalized version of the test plan/procedure will be used

A Smiths Industries Quality Assurance witness will be present during Formal testing

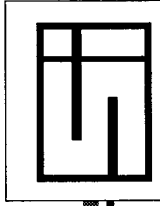
Upon the completion of formal test, a test report will be generated

Production released VADR software

Test Setup



SRS Review



Combines the requirements from the AV8B ICD and the recommended record rates from Naval Safety Center

Not all Recorded parameters were listed in the recommended record rates from Naval Safety Center. Record rates for these parameters were derived from similar parameters and still need review by the Navy

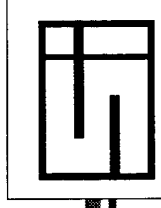
Core software functions are not describe in the SRS these requirements are documented in a SI Software Life Cycle Document

SRS Monitor Message List

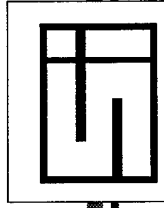
Column Heading Description

- Name :** Parameter Name as found in AV8B ICD
- Remark ICD Label:** Word Label as found in ICD
- Message:** The message that the parameter is located
- WORD:** The word within the message that the Parameter is located
- MSB:** Most significant Bit of the parameter
- LSB:** Least significant Bit of the parameter
- S:** States if the parameter has a sign BIT (Y/N)
- Record Rate:** The rate a which the parameter is recorded in the CPM

SRS Message List Cont.



- Display Label: The name of the parameter as seen in WinDrt
- Display Units: The units of the parameter as seen in WinDrt
- Format Type: The format type of the data as seen in WinDrt
- Print Format: The resolution for the display of the parameter
- Bit Weight (MSB): The value assigned to the MSB used for conversion to engineering units.
- Plot Min and Plot Max: Default setting for the WinDRT graphing tool.



Accomplishments To Date

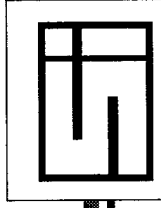
Contract Signed (15-Sep-98)

Preliminary SRS complete

SI Test Environment defined and in debug

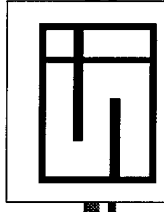
Software development underway

Planned Activities For Next Two Months



- Define what support China Lake will need
- Understand what testing China Lake will perform
- Continue software development
- Begin informal system / software testing
- Begin test procedure development

Issues / concerns



China Lake integration requirements and schedule
China Lake Download equipment / ground software
MIL-STD-1553 definition