



**SMITHS INDUSTRIES**

*Aerospace*

NAVY F/A-18  
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 F/A-18 Crash Survivable Flight Incident Recorder System (CSFIR) integration program. Smiths Industries is developing software for its Voice and Data Recorder (VADR<sup>®</sup>) 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. Since the proposed F/A-18 CSFIR installation does not include a download connector, the existing AN/AUQ-76A will not work without incorporating a different interface cabling scheme. Bill Parillo requested SI provide informal schematics for such an interface cable for the following two configurations: (SI action item #7)
  - The AN/AUQ-76A interfaces to the CSFIR on the aircraft.
  - The AN/AUQ-76A interfaces to the CSFIR off the aircraft and on the bench.
2. Bill Parillo asked China Lake how long they would need the CSFIR VADR<sup>®</sup> assets PMA 209 would soon be providing them. Corey Bales of China Lake recommended that all three of the VADR<sup>®</sup> assets permanently remain at China Lake for long term support of the F/A-18 and AV-8B CSFIR programs.
3. Corey Bales of China Lake requested copies of the F/A-18 ICD and Boeing ECP so he could begin developing his integration lab test setup. Boeing agreed to provide this information to China Lake. These were provided on 18 November.
4. The first F/A-18 Validation/Verification 'A' kit is not scheduled for delivery until March 2000. Since this date is significantly later than the scheduled SI software delivery and subsequent China Lake lab integration testing, Bill Parillo of PMA 209 agreed to investigate if Boeing can support early delivery and installation of one 'A' kit into a flight test aircraft. Otherwise China Lake will have to develop a unique flight test installation 'A' kit at an additional cost to the program. (PMA 209 action item). In turn, Corey Bales of China Lake agreed to provide PMA 209 schedule requirements for each of the two possibilities: (China Lake action item #6)
  - Boeing will supply the first 'A' kit and install it into the flight test aircraft.
  - China Lake will develop their own temporary flight test installation 'A' kit.

5. Corey Bales of China Lake stated that SI should submit a test plan to him requesting SI use of a China Lake F/A-18 integration test station at least three weeks prior to the scheduled testing. Information contained in the test plan should include:
  - List of equipment SI plans to bring to support the testing
  - List of equipment SI will need from China Lake
  - Version of the aircraft mission computer OFP needed
  - Testing dates
  - Specific interface requirements (MIL-STD-1553, power, discrete inputs, etc.)
6. Corey Bales discussed plans he has for developing comparison software which will compare unprocessed downloaded CSFIR data with corresponding MIL-STD-1553 transmissions the VADR uses for data acquisition. Bill Otten of SI agreed to send China Lake a copy of SI's PC DECOMP Reference Manual which documents the format of the unprocessed downloaded CSFIR data. (SI action item #3)
7. SI discussed difficulties in synchronizing F/A-18 CSFIR voice and flight data using the WinVoice software because of the unique features of the DFIRS protocol.
8. Corey Bales stated he doubts the Safety Center currently receives DFIRS data from all DFIRS equipped aircraft on a yearly basis because of the lack of equipment needed to accurately transfer the data from the field to the Safety Center.
9. Corey Bales agreed to provide an electronic version of Mission Computer ICD version 13C on compact disk to SI. This will enable SI to more easily develop their ASCDB needed for decompression of F/A-18 CSFIR mishap data. (China Lake Action Item #2). This was provided on 18 November.
10. SI plans to submit project release versions of the F/A-18 CSFIR software to China Lake until flight testing is successfully completed. The final project software release will serve as the baseline for SI formal lab testing. After the formal lab testing, the software will then be upgraded to a production release version without changing the software part number. China Lake will then conduct a short regression test on the final production software release.
11. Separate ASCDB ground software files will be required for each unique mission computer software load. SI is currently on contract for developing an ASCDB for only the 13C mission computer software load as defined in ICD-F/A-18-18-066. SI will provide PMA 209 a description on how best to support multiple ASCDBs needed for future mission computer software upgrades. (SI action item #1)

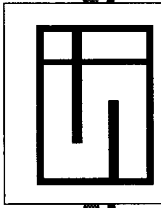
On 18 November Corey Bales conducted a F/A-18 lab tour in the afternoon.

ATTACHMENT #1

<b>Name</b>	<b>Phone Number</b>	<b>E-Mail</b>	<b>Organization</b>
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
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
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**  
**F/A-18 Program Review Action Items**

#	Problem Description	Assigned to	Date Due	Originator	Date Completed	Comments
1	Provide options for adding additional ASCDB's for Mission Computer OFF updates.	SI	1-15-99	PMA-209		
2	Provide ICD-F/A-18-066 soft copy to Smiths Industries.	C. Bales	11-18-98	C. Bales	11-18-98	closed
3	Provide China Lake a copy of the Smiths Industries PC DECOMP Reference Manual.	B. Otten	11-24-98	C. Bales		Sent on 11-23-98
4	Status of '99 funding for China Lake. POC Funding/Program Issues: Steve Sinks (760) 939-9980.	PMA-209	11-30-98	J. Caudill		
5	Possibility of Boeing delivering "A Kit" by 5/99 vs 3/00 as stated in the ECP 573.	PMA-209	11-30-98	B. Parillo		
6	Provide two schedules to PMA-209. 1) First schedule to reflect China Lake designing the mod. 2) The second to reflect the use of Boeing's design.	C. Bales	1-15-99	PMA-209		
7	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.	B. Parillo	12-2-98	SI		Moved from AV-8B action item #3



# US Navy CSFIR Program F/A-18 C/D

## Program Review

November 17, 1998



19981215 100

17 November 1998

F/A-18 CSFIR Program Review

**DTIC QUALITY INSPECTED 4**

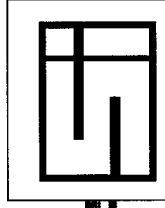
# Agenda

## F/A-18

- » 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 F/A-18 Program Overview

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Develop Flight Software for US Navy F/A-18 C/D aircraft

Develop Ground Software to convert data

Recurring VADR hardware not included in the contract

Specific aircraft variations in this effort are:

» F/A-18 C/D (versions 11C and higher)

# Task Description (F / A-18)

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Develop System / Software Requirement Specification for Flight Software

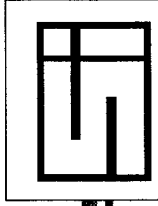
Develop VADR® Flight Software configured for F / A-18

Develop Ground Software to convert F / A-18 data into format compatible with existing Navy Safety Center ground software tools.

Conduct Lab integration testing at China Lake

Test final flight software (Government invited to witness)

Support Navy F / A-18 integration efforts



# Deliverables

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F/A-18 Flight Software (A004)

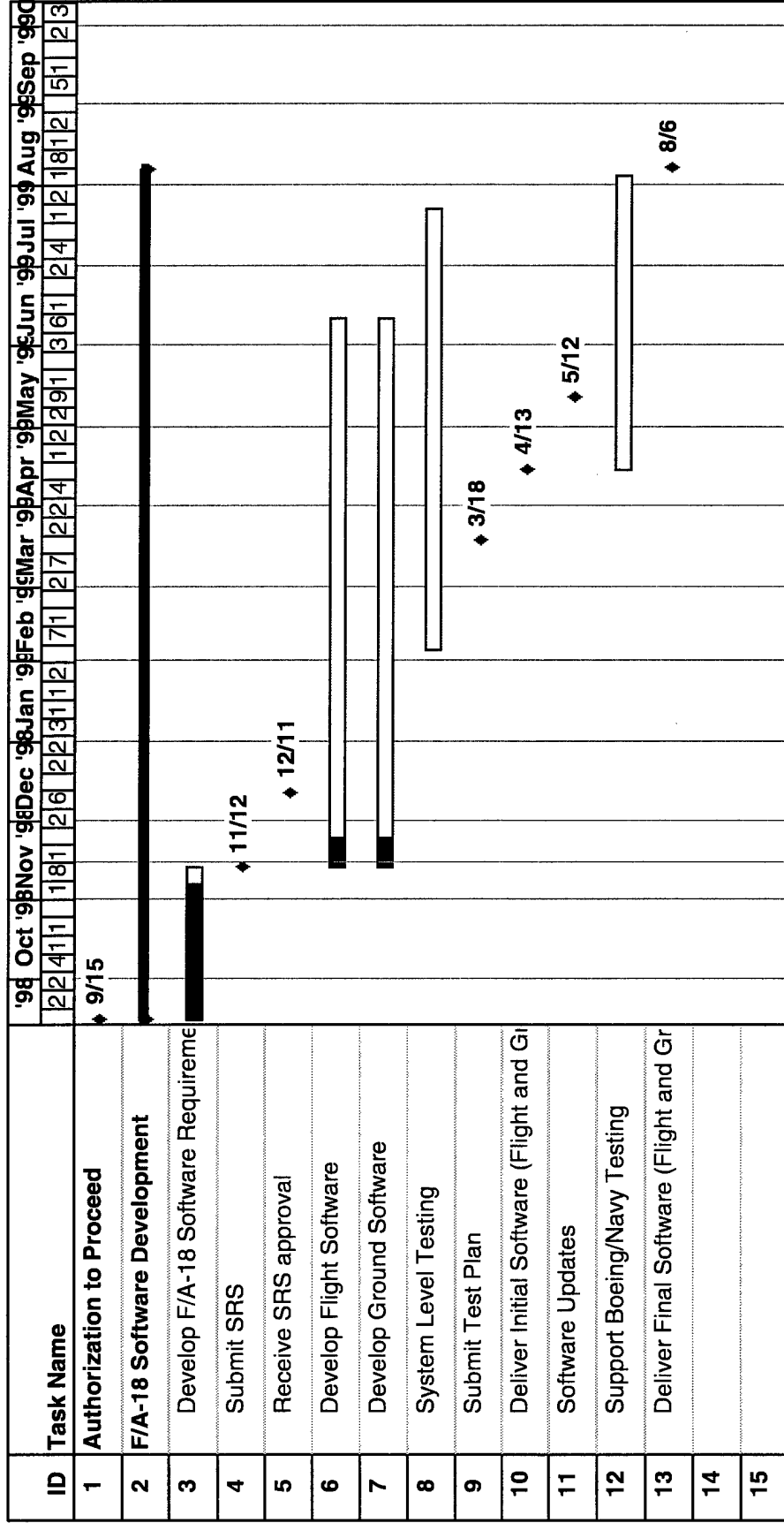
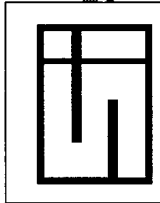
F/A-18 Ground Software (A005)

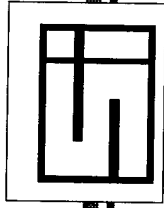
Computer and 1553 Card

Data Items

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

# Schedule



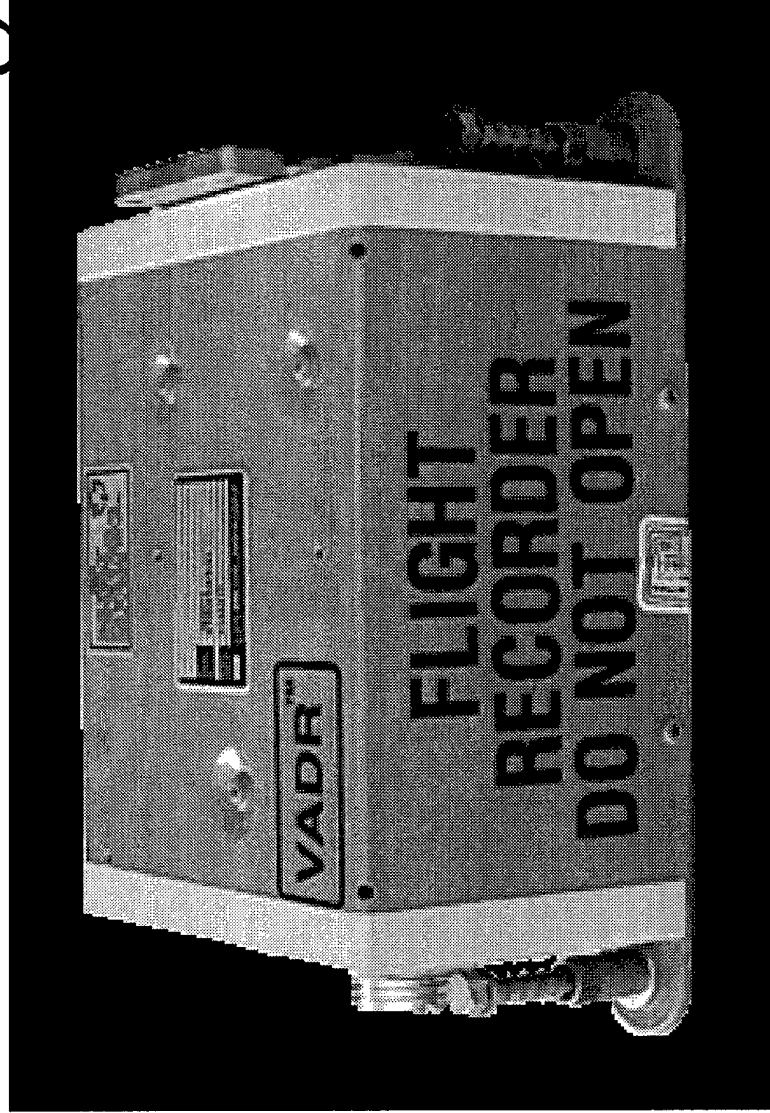


# ICD / ICN Status

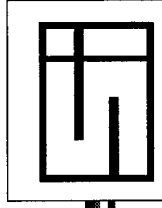
Interface Control Document (ICD-F/A-18-075) approved  
Interface Change Notice (ICN) submitted to Boeing for wiring  
change based on Navy EMI testing.



# VADR Software Design



# VADR Software Design



Overview

Loader Program (LP)

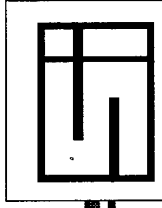
Core Software concept

Control Program and MUX Program design



# Loader Program (LP)

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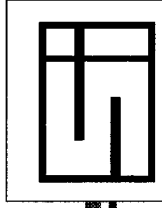
Allows uploading a CP

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

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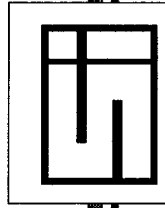
All VADR software functionality contained in core image.

Core software designed to meet application common requirements.

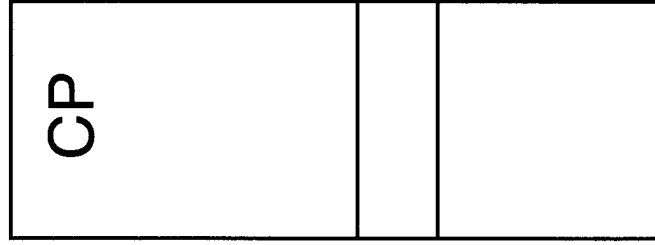
Application specific requirements met by filling configuration data structure with application specific values.

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



config. →  
structure

# Multiplex Program (MP)

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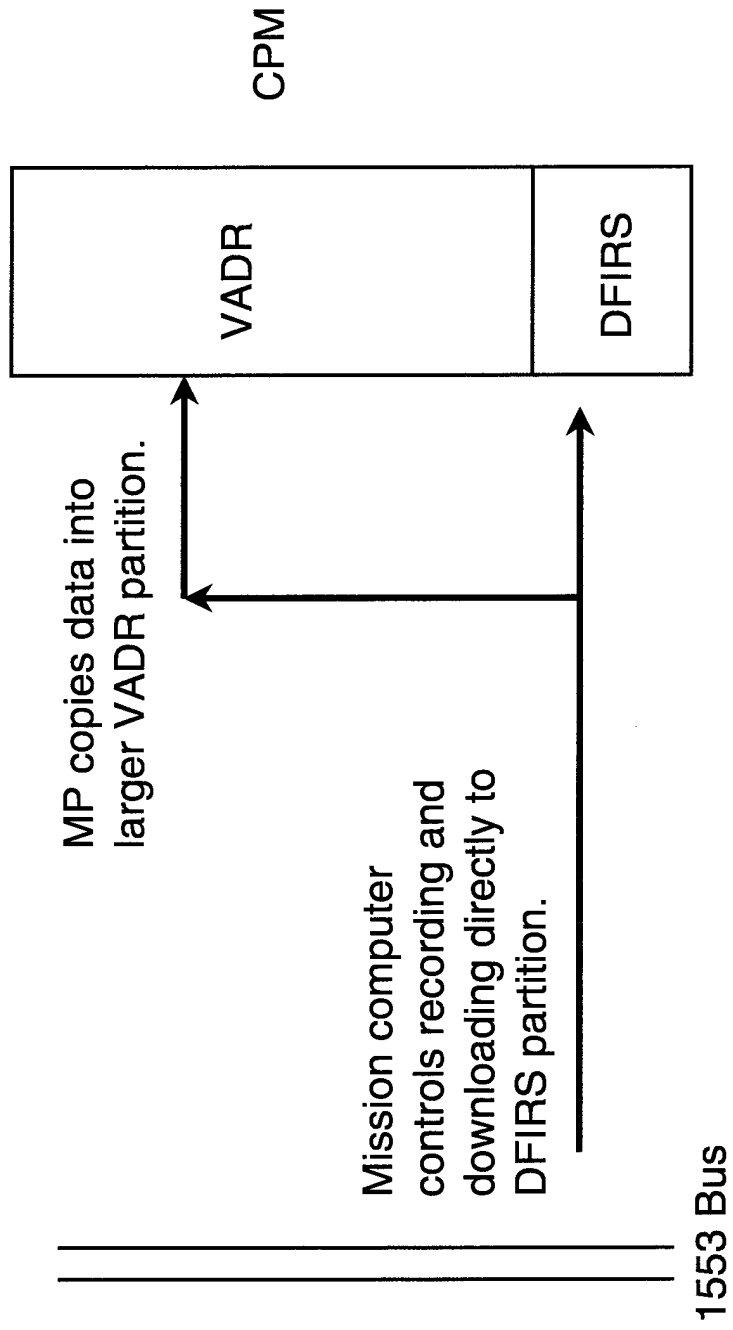
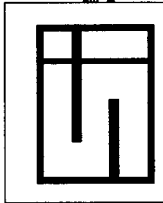
Built from core MP as baseline, but will not contain configurable items.

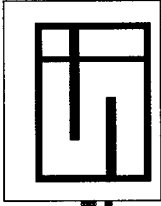
Non configurable because of unique DFIRS protocol.

Designed for download via 1553 bus (DFIRS partition)

Data recorded in MC record code format, not SI proprietary format - requires new ground software decompression tool (DFIRS2DDF)

# Data Recording Scheme

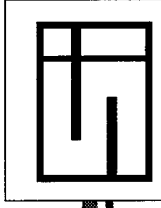




# Systems Software Testing

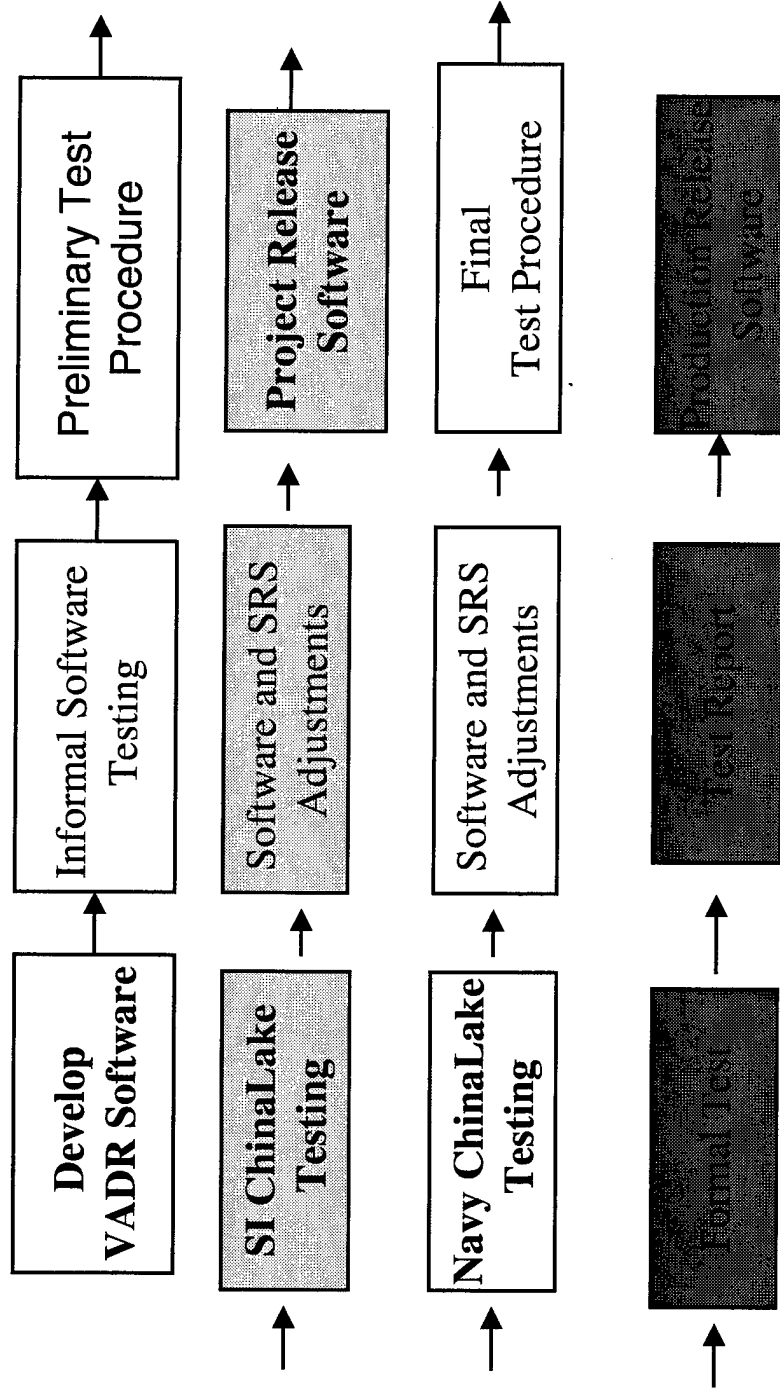
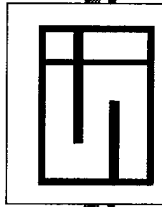
# System / Software Testing

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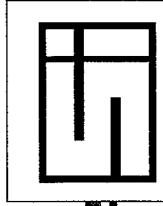


Test Approach  
Application Specific Informal Testing  
Application Specific Formal Testing  
Test Setup

# Test Approach



# Application Specific Informal Test



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

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

Project release VADR software for testing at China Lake

Update SRS and Software based on results

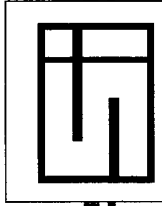
**Test Plan/  
Procedure**

**Informal Testing**

**Project release  
VADR Software**

**Updates**

# Application Specific Formal Test



**Final VADR  
Software**

A finalized version of the VADR  
Software will be used

**Final  
Test Plan/  
Procedure**

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

**Formal Testing**

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

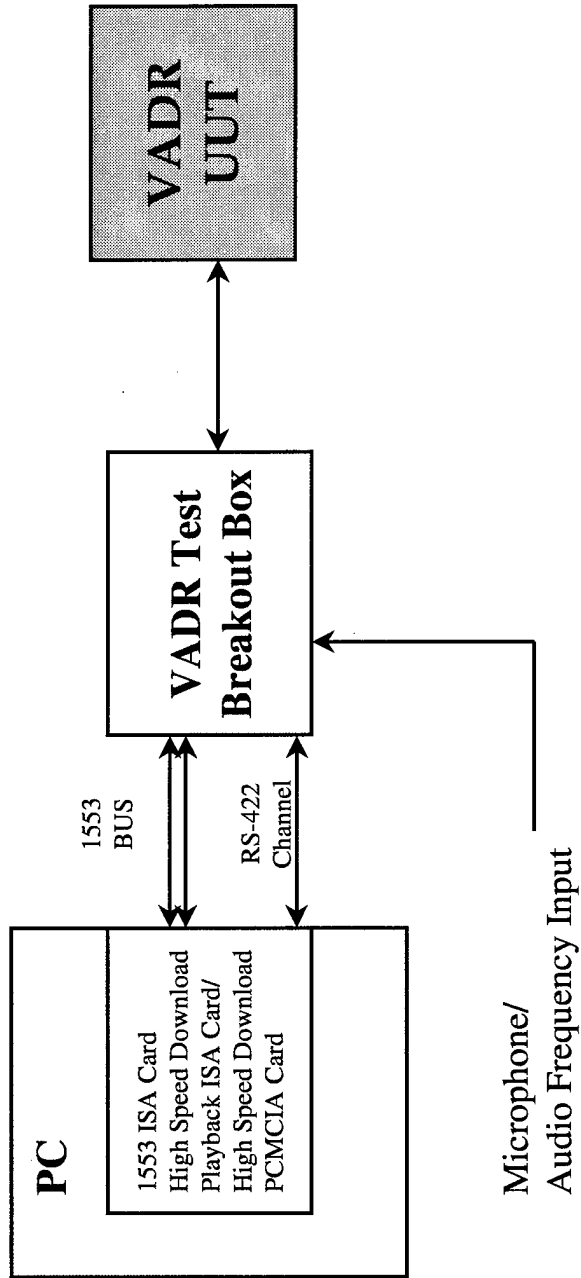
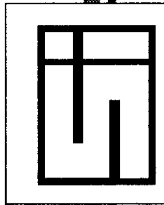
**Test Report**

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

**Production released  
VADR Software**

Production released VADR  
software

# Test Setup

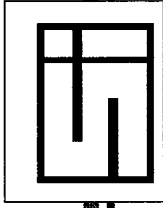


# SRS Review

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- Preliminary version ready for submittal to Navy
- Combines the requirements from the F/A-18 ICD and DFIRS ICD
- Parameters and record rates controlled by Mission Computer.
- Core software functions are not described in the SRS. These requirements are documented in a SI Software Life Cycle Document
- WinDRT display controls need to be added.
- Awaiting electronic version of DFIRS ICD.

# Accomplishments To Date



Contract Signed (15-Sep-98)

Preliminary SRS complete

Computer and 1553 Card procured

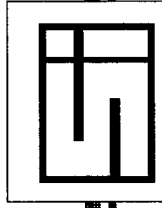
SI Test Environment defined and in debug

Flight software development underway

Ground software development underway

# Planned Activities For Next Two Months

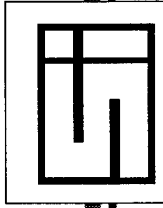
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- Define what support China Lake will need
- Understand what testing China Lake will perform
- Continue software development
- Begin informal system / software testing
- Begin test procedure development

# Issues / concerns

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SI needs electronic copy of ICD-F/A-18-078 (F/A-18 FLIGHT LOADS DATA RECORDER INTERFACE CONTROL DOCUMENT 15C/16E) Boeing sent to PMA-265 on 9/28/98 to be forwarded to SI.

China Lake download equipment / ground software.

China Lake integration requirements and schedule

MIL-STD-1553 Definition