DCN 616

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AIR FORCE MATERIEL COMMAND

AIR FORCE DEVELOPMENT TEST CENTER

AFEWES

Air Force Electronic Warfare Evaluation Simulator

AIR FORCE PLANT NO. 4
FORT WORTH, TEXAS

AMC087

This document is designed to introduce the Electronic Combat (EC) test capabilities that the Department of Defense possesses in the Air Force Electronic Warfare Evaluation Simulator (AFEWES).

Basic information is provided on current and future threat simulations (both RF and IR), the vast array of AFEWES support capabilities, and how the simulators are validated and utilized.

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AMC088C

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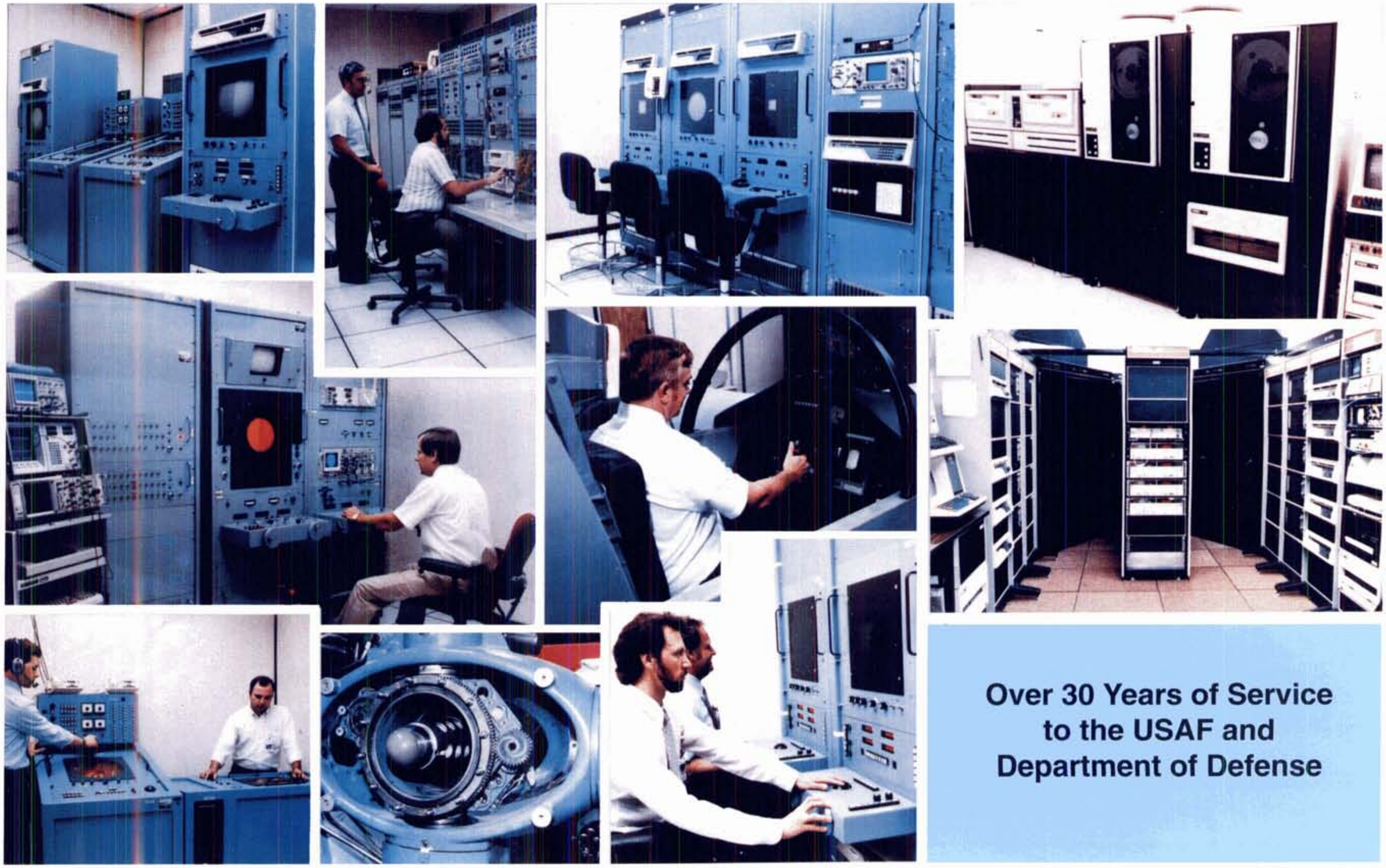
The Air Force Electronic Warfare Evaluation Simulator, or AFEWES, is a major Electronic Combat test facility managed by the Air Force Developmental Test Center. The facility has provided over 30 years of service to the Department of Defense and friendly foreign governments.

MC090

AFEWES

Air Force Electronic Warfare Evaluation Simulator



Over 30 Years of Service to the USAF and Department of Defense

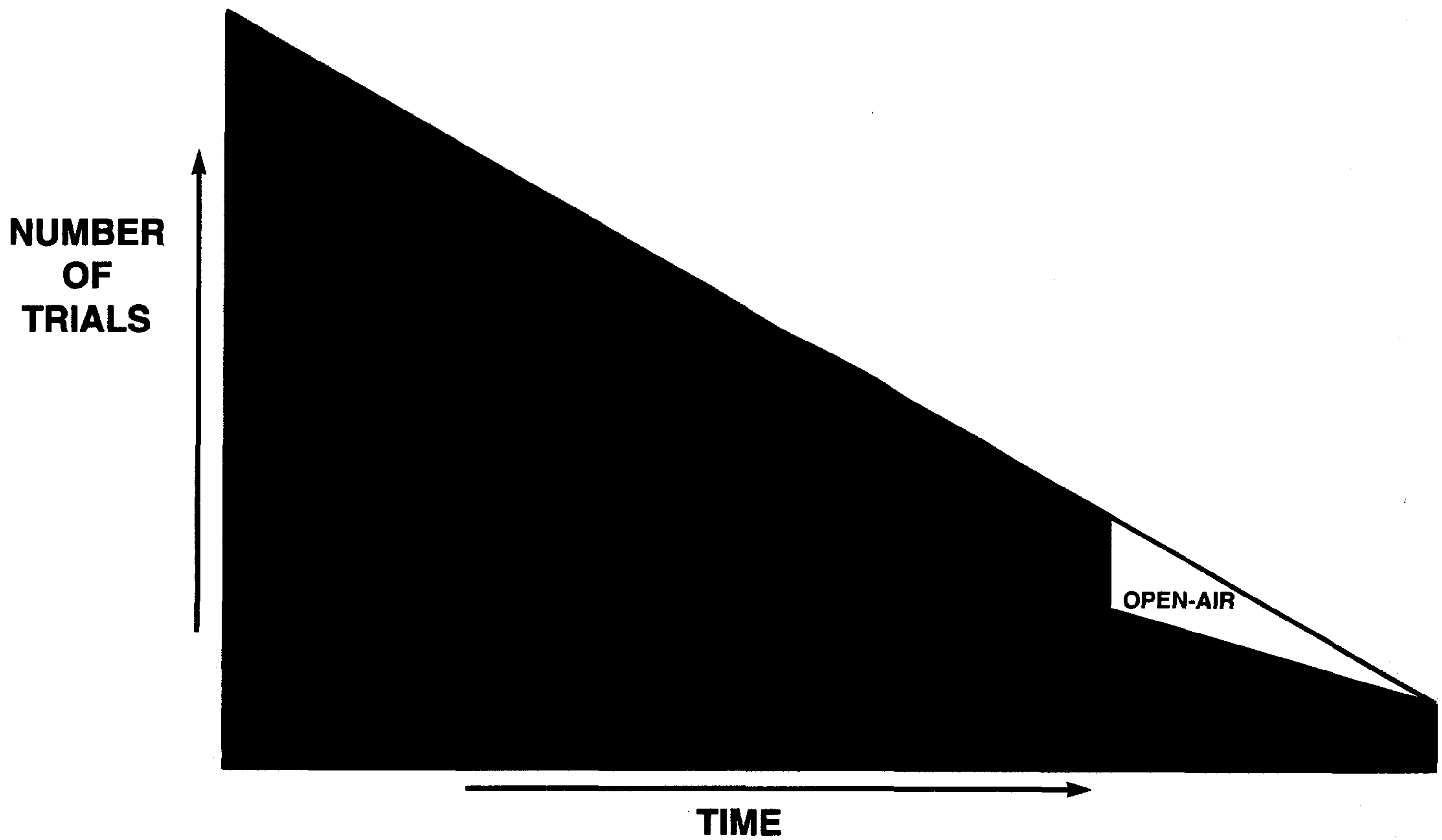
AMC091

In accordance with the Air Force Electronic Combat (EC) Test Process Guide, test trials should be planned for each phase of the acquisition program to support evaluation of the EC system's progress in achieving the required operational capabilities. More complicated testing of the developmental EC system is progressively conducted in five categories of test facilities: Computer Simulation, System Integration Laboratories, Hardware-in-the-Loop Test Facilities, Installed System Test Facilities, and Open-Air Test Ranges.

As system development progresses from brassboard through prototype to production systems, both hardware and embedded software undergo a sequence of tests at the various facilities to establish demonstrated values for system performance and technical parameters. The number of trials required to predict results narrows as the EC system progresses over time toward more expensive, less controllable open-air range testing.

Air Force Electronic Combat Test Process

EC Test Resource Categories



AMC14550

The AFEWES is an integral part of the Air Force EC test process, the objective of which is to standardize and institutionalize a structure for testing EC Systems.

The EC test process emphasizes the structured use of Computer Simulations, System Integration Laboratories, Hardware-in-the-Loop (HITL) Test Facilities, Integrated Test Facilities, and Flight Test Ranges, to thoroughly evaluate EC Systems during their development.

<u>Computer Simulation</u> models are used [illegible] performance and technical parameters, to help structure test trials, and [illegible] measured data to fully evaluate Measures of Performance (MoPs).

<u>Measurement Facilities</u> are typically used [illegible] activities. For example, measuring Radar Cross Sections or Antenna Patterns [illegible] for use at other facilities in the process.

<u>Integration Laboratories</u>, typically at contractor facilities, incorporate [illegible] models of EC and Avionics Systems to evaluate software and hardware [illegible] technologies, components, systems, and entire avionics suites.

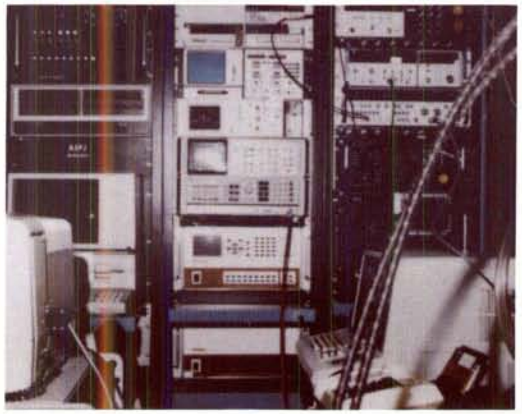
<u>Hardware-in-the-Loop Test Facilities</u> provide the capability to test EC Systems [illegible] against closed-loop threat system simulations.

<u>Installed System Test Facilities</u> provide the capability to test EC Systems while [illegible] integrated with host platforms.

<u>Open Air Ranges</u> provide the capability to test EC Systems while [illegible] integrated with host platforms in an open-air environment.

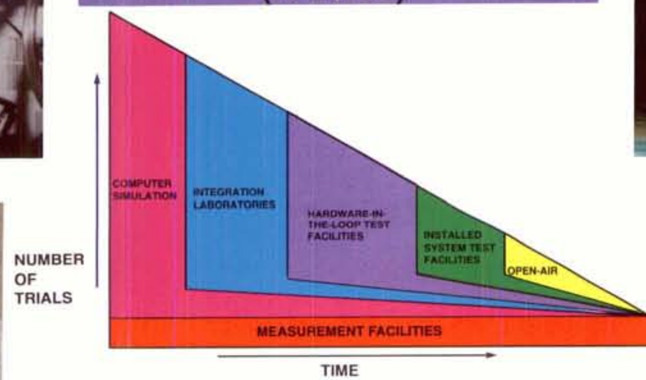
Air Force Electronic Combat Test Process

System Integration Laboratories



Hardware-in-theLoopTest Facilties (AFEWES)

InstalledTest Facilities



Computer Simulations

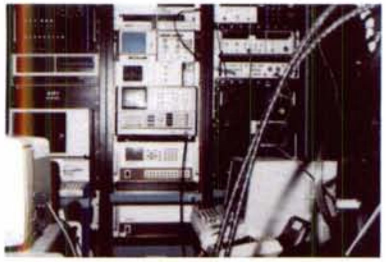
Measurement Facilities

Open-Air Ranges

AMC095B

During the development of an EC System, each of the EC Test Process test resources present certain advantages and limitations to the development agency. <u>No single test resource can provide the total answer.</u> Efficient use of each test resource is the key to a successful EC test and evaluation program.

Complementary Test Resources

	Advantages	Limitations
	Integration Laboratories	
	• Low Cost • Easy Access • Secure	• Unvalidated Emitters • No EC Effectiveness Capability
	HITL Facilities (AFEWES)	
	• Multispectral EC Effectiveness Testing • Validated, Secure • High Emitter Density • Large Sample Size • Cost Effective	• Not Installed Configuration • System Test Excludes Antennas
	Installed Test Facility	
	• Installed Configuration Including Antennas • EMI/EMC Testing	• Non-Operational Environment • Limited EC Effectivenes Evaluation • Not Multispectral
	Open-Air Ranges	
	• Installed Configuration • Real-World Phenomena • Highly Responsive • Validated • Operational User Credibility	• High Cost • Emission Security • Limited Sample Size • Low Emitter Density • Limited Scenarios

AMC097A

The Role of the AFEWES is to provide technical evaluations of EC Systems (ECM Systems, RWRs, Decoys, etc) and Techniques in a simulated threat environment.

The AFEWES has been used by all services and allies in every phase of the EC System Life Cycle, from concept definition through operational changes (i.e., concept and brassboard EC effectiveness evaluations, developmental test and evaluation, operational test and evaluation, and any modifications that may be made to EC Systems during their life cycles.)

The key features of AFEWES provide: actual frequency, real-time, and man-in-the-loop testing with the capability to evaluate effectiveness in a dense background environment.

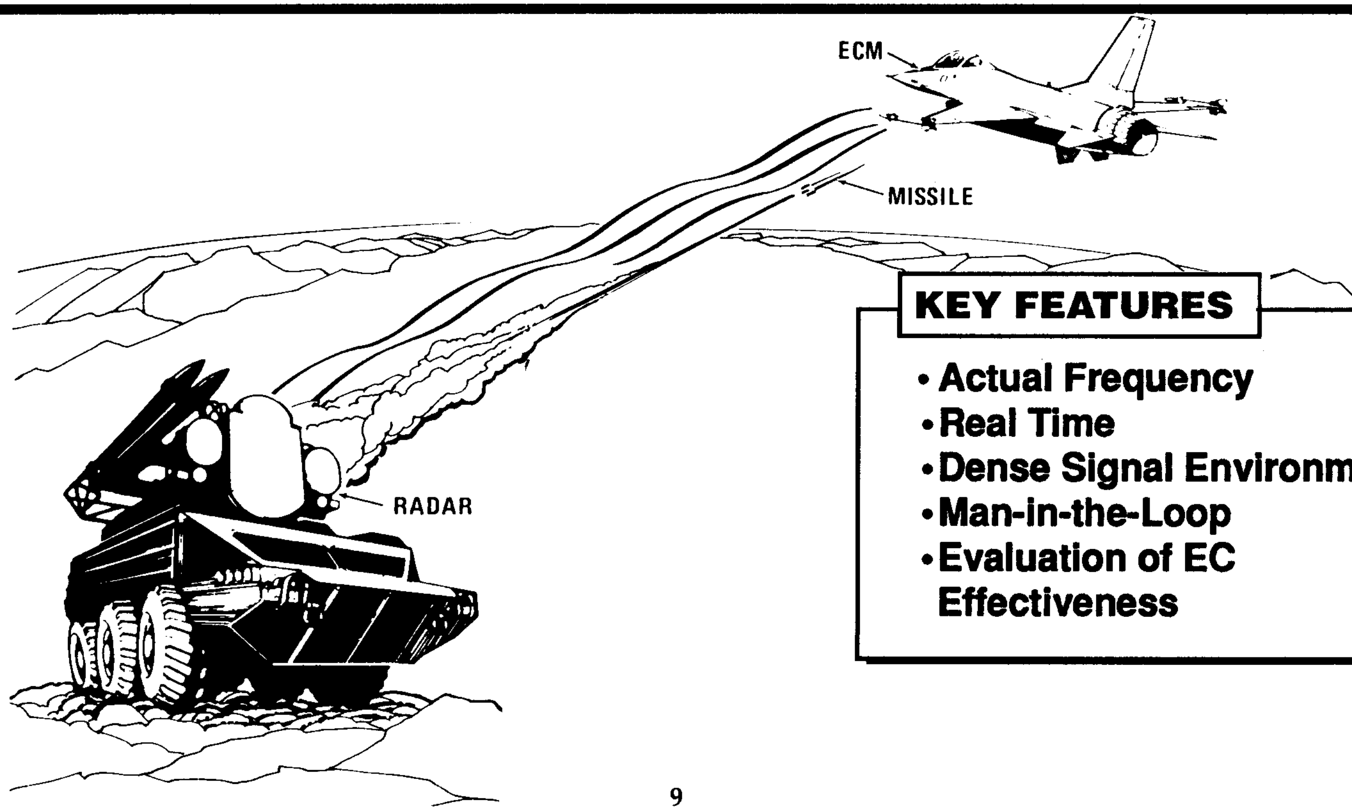
AMC092

Air Force Electronic Warfare Evaluation Simulator

AFEWES

MISSION: Provide Technical Evaluation of the Performance of Electronic Combat Systems and Techniques in a Simulated IR and RF Threat Environment.

USAGE: By All Services and Allies in Every Phase of the EC System Life Cycle – From Concept Definition Through Operational Changes.



KEY FEATURES

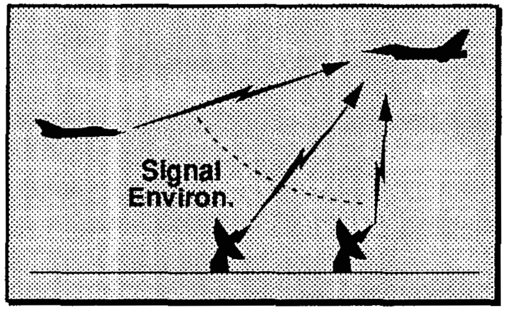
- Actual Frequency
- Real Time
- Dense Signal Environment
- Man-in-the-Loop
- Evaluation of EC Effectiveness

AMC093

AFEWES simulations can be categorized as one of two types: Open-Loop or Closed-Loop. Open-Loop simulations, such as the Multiple Emitter Generator (MEG), provide a one-way path from the simulator to the EC System and are used to evaluate EC receivers/passive receivers in a dense emitter environment. Closed-Loop simulators, such as the SA-6 simulation, provide a two-way path between the threat simulator and the EC System and are used to develop/optimize EC techniques, and evaluate low observables, maneuvers, and terrain masking/clutter effects.

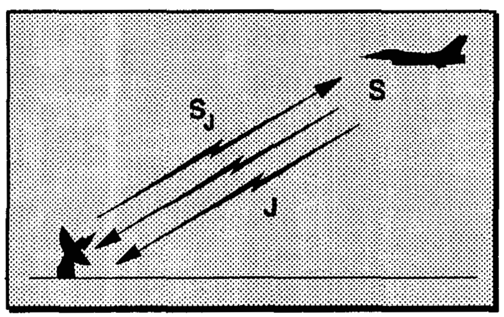
<u>Integration of both Open- and Closed-Loop Simulations is how AFEWES performs dense signal environment EC effectiveness testing.</u>

OPEN-LOOP SIMULATION



- One-Way Path from Simulator to EC System
- Used to Evaluate EC Receivers/Passive Sensors
- Cannot Measure EC System Effectiveness

CLOSED-LOOP SIMULATION



- Two-Way Path Allows Effectiveness Evaluation
- Man-in-the-Loop Tracking
- Used to Develop/Optimize Specific EC Techniques

AMC099

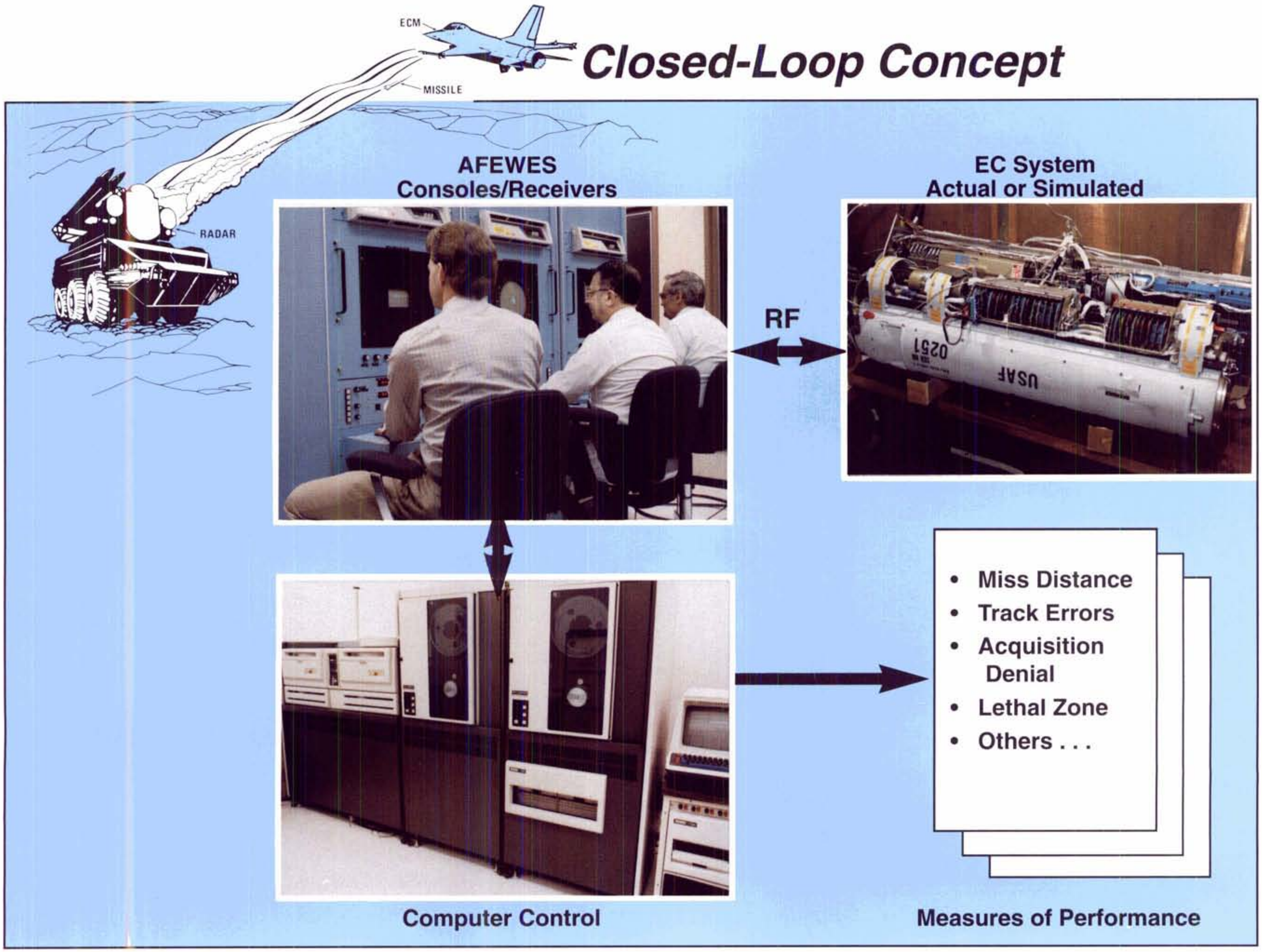
ECM or RWR systems (or simulated ECM systems) are placed in a shielded room and interfaced to the AFEWES simulations through waveguide. The AFEWES simulators are hybrid simulations, that is, a mixture of hardware and software components. The simulators operate in real time at actual Radio Frequency, have operators at the radar consoles and provide closed-loop evaluations of ECM systems and their techniques.

One of the primary reasons that EW systems have been brought to the AFEWES is to optimize ECM techniques against the [illegible] that are available. In recent years, however, [illegible] (ECM + chaff) effectiveness, expendable [illegible] effectiveness and low observables [illegible].

Aircraft [illegible] are simulated in [illegible] by the testing agency and any [illegible]. The testing agency also provides appropriate antenna patterns to be [illegible] software.

The primary output or Measures of Performance (MOPs) provided during AFEWES testing is Miss Distance data. The radar operators fire simulated missiles [illegible] simulated aircraft and the miss distance will be based upon the effectiveness of the ECM system and/or [illegible]. To further evaluate ECM system effectiveness, [illegible] tracking error data is also provided so that the tester can determine which radar circuits the ECM is effecting. Other MOPs used by testers include: target acquisition/track denial, and missile engagement zone reduction.

Closed-Loop Concept

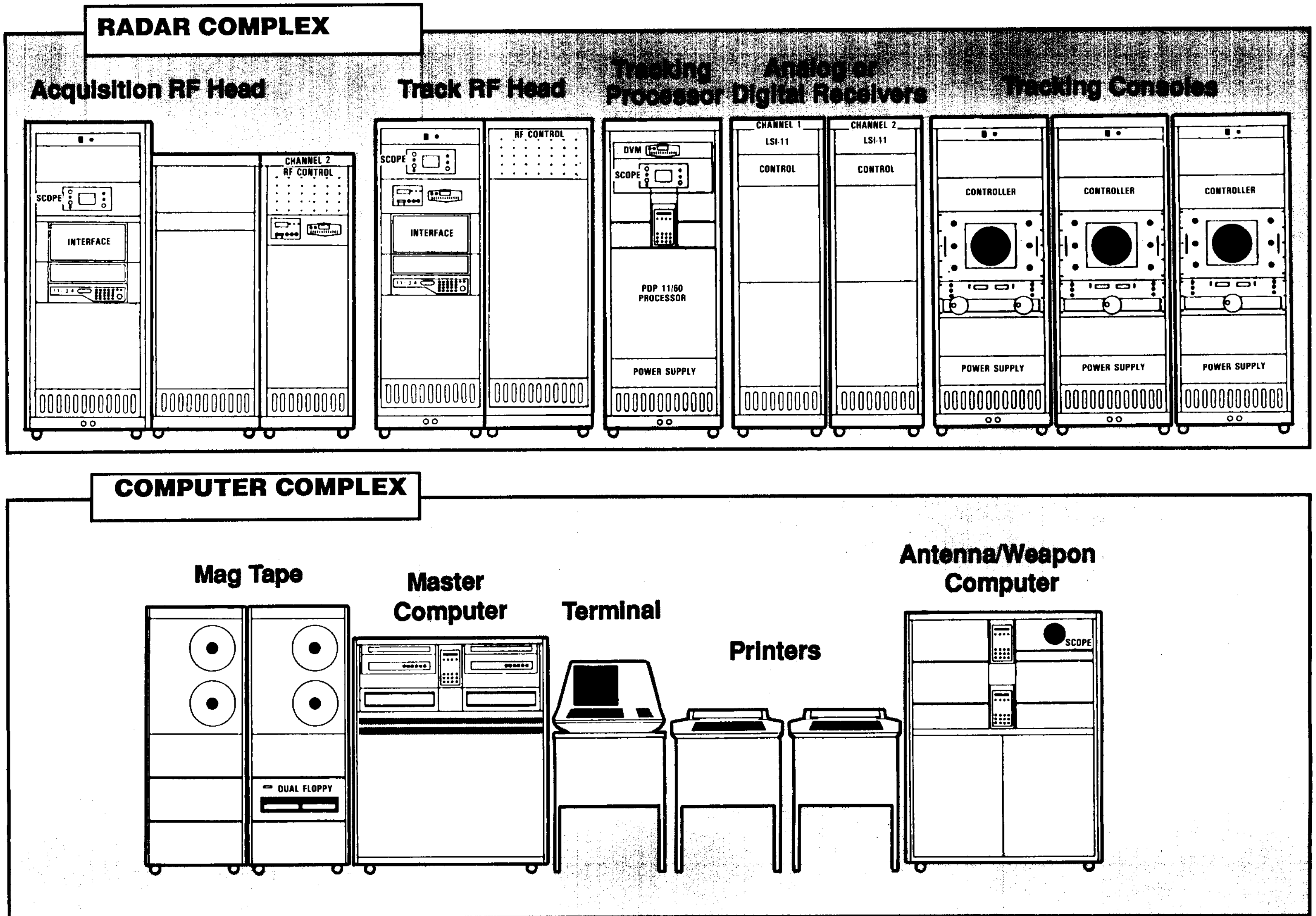


There are many elements that make up the typical AFEWES simulation.

The radar complex is made up of tracking consoles, analog or digital receivers, tracking processors, track radar RF heads, and acquisition radar RF heads.

The computer complex consists of a weapons computer to simulate the missile or AAA projectile, the radar antenna pattern generator computer and the master computer, which controls the overall simulation.

Typical Simulator Configuration



AMC103

The AFEWES has a large group of Surface-to-Air Missile, Airborne Interceptor, IR Missile, Early Warning/Acquisition Radar, Comm/DL, C^4 and AAA "Closed-Loop" Simulations available for Jammer/Receiver evaluations.

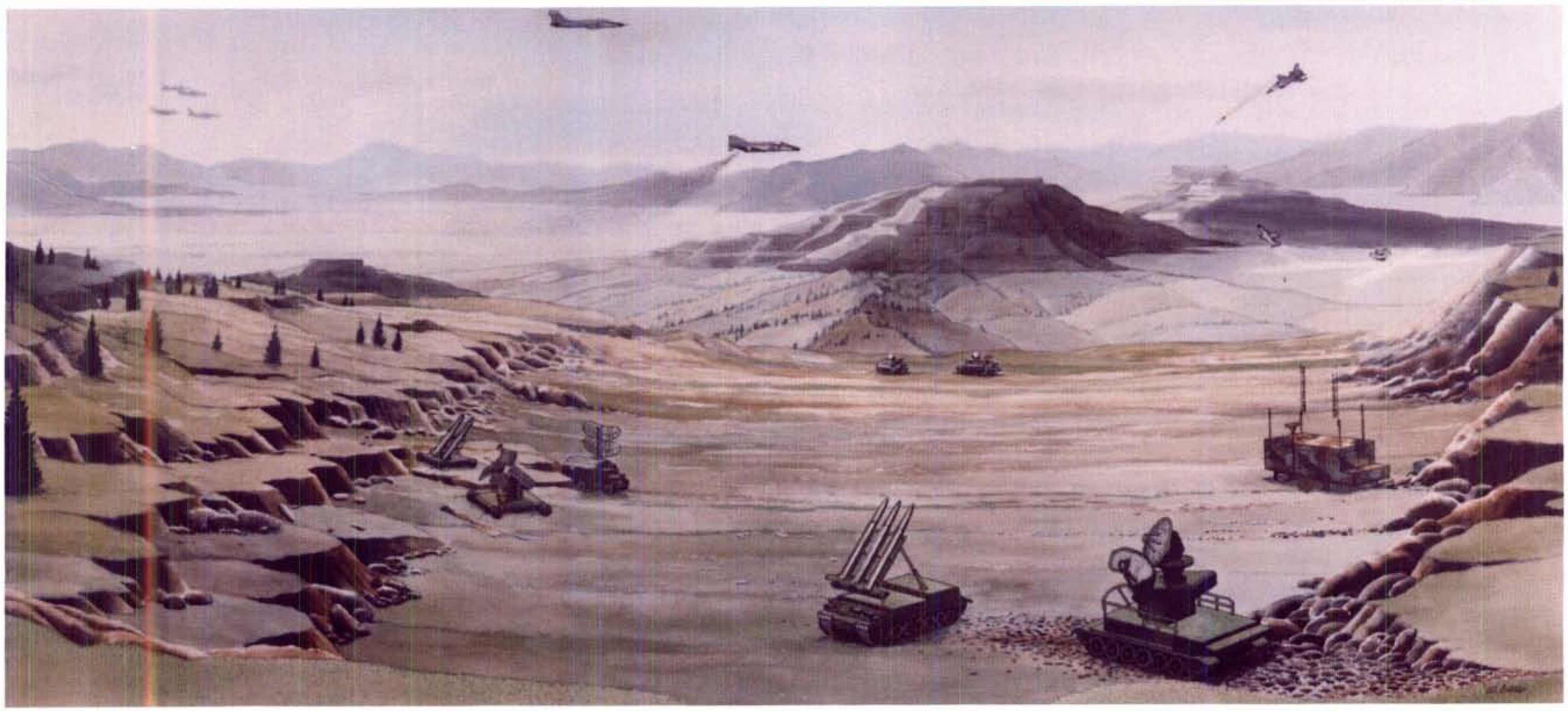
Upgrades to AFEWES simulations are an ongoing process. Modification of existing systems as well as development of new simulations will provide an expanded test capability in the future.

C104

Closed-Loop Simulations

SA-2	SPIN SCAN	AIM-9L	GUN DISH
SA-3	JAY BIRD	AIM-9M	FLAP WHEEL
SA-4	FOX FIRE	RED EYE	LONG TRACK
SA-6M	GENERIC PD	STINGER BASIC	COMM/DL
SA-8	FLANKER*	SYMPTOM ARES	WILD CARD
SA-10	FULCRUM*	SA-7A, B	TACAN
SA-11M	FOXHOUND*	SA-13	IFF
SA-12*		SA-14	C^3 (4, 8)
		SA-16	

** Upgrades*

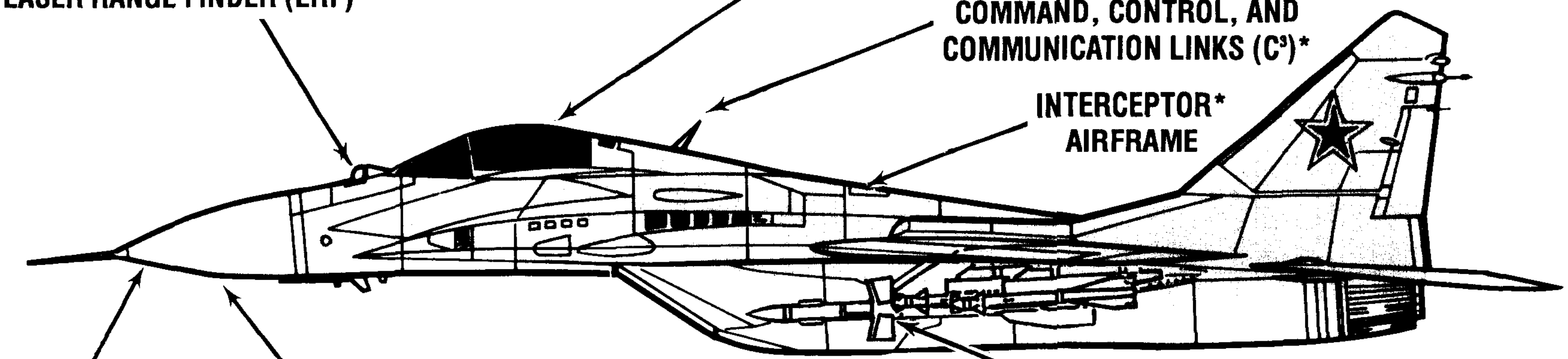


AMC105C

The Reconfigurable Airborne Interceptor (RAI) simulation will have the capability of providing high fidelity simulations of the following Airborne Interceptors: Fulcrum, Flanker, and Foxhound. The simulation will include the appropriate radar, missiles, cockpit/controls and displays, plus digital representations of an Infrared Search/Track Set (IRST), IFF, C^3, Laser Range Finder, and Airframes.

The simulation will have the capability of being operated RF only, IR only, or full-up. Additionally, the simulation will be interfaced with the planned Airborne Clutter Generator to provide realistic ground clutter.

Reconfigurable Airborne Interceptor Simulation



FUNCTION

- **Provide Realistic Simulation of Threat Weapon Systems**
- **Evaluate Effectiveness of Integrated Electronic Combat Systems**
- **Can Be Operated RF Only, IR Only, With or Without C^3 and IFF, or Full-Up**

CAPABILITIES

- **Initial AI Configurations**
  - **Fulcrum, Flanker, or Foxhound**
- **Reconfigurable Receivers/Transmitters**
- **Multispectral**
- **Clutter Capable**

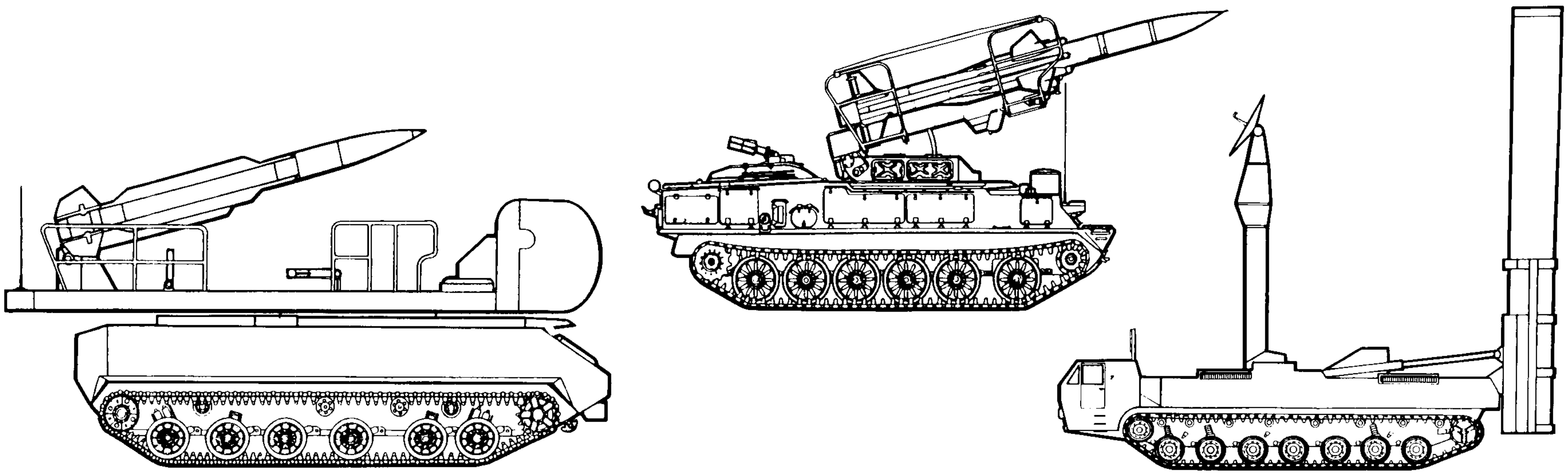
* *Digital Representations*

AMC109

The [illegible] and [illegible] functions for [illegible]

The [illegible] with [illegible] threat [illegible]

SA-12 Simulation



- **Chief Operator, Acquisition Operator and Tracking Operator Functions for Multiple Simultaneous Targets**
  - **Two High Fidelity RF Targets With GLINT, Scintillation, and JEM Lines**
- **Reconfigurable Nature of Hardware/Software Allows Future Advanced Threat Simulations**

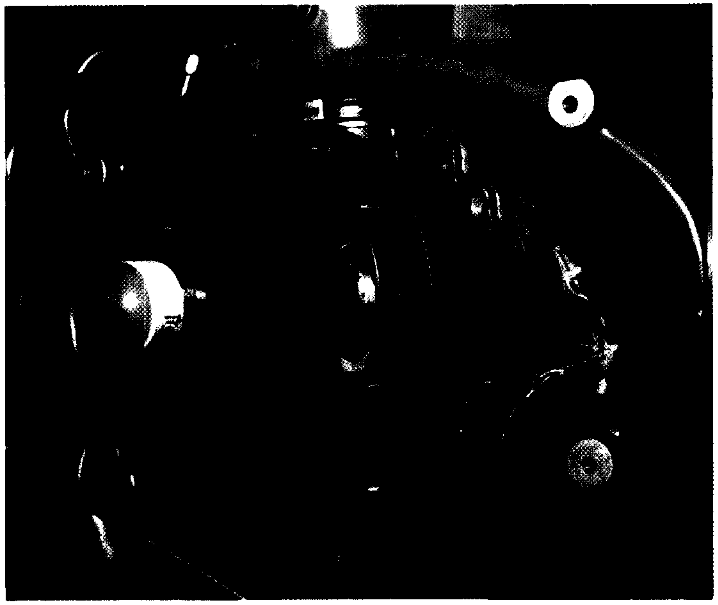
AMC111B

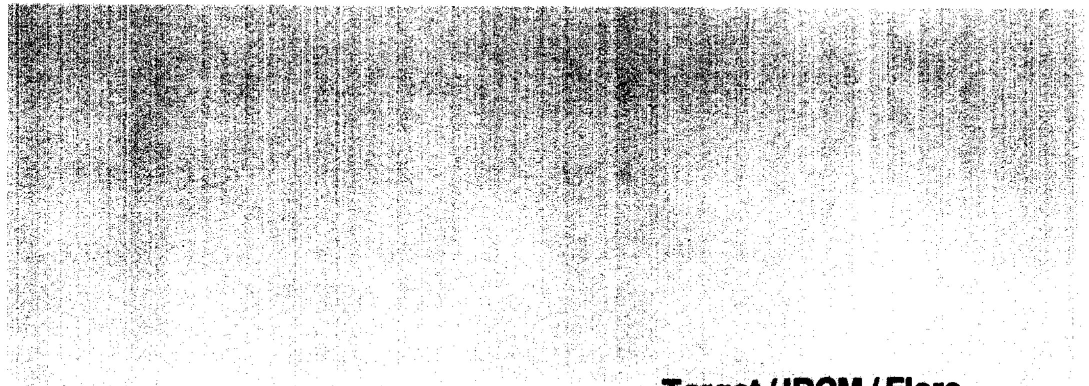
The Infrared Laboratory was built to evaluate IRCM [illegible] and flare effectiveness against [illegible]. The Target Simulator is used to simulate the aircraft engine [illegible]. The IR emissions from these sources [illegible] onto tracking mirrors and finally onto the [illegible] seeker [illegible] on the motion table.

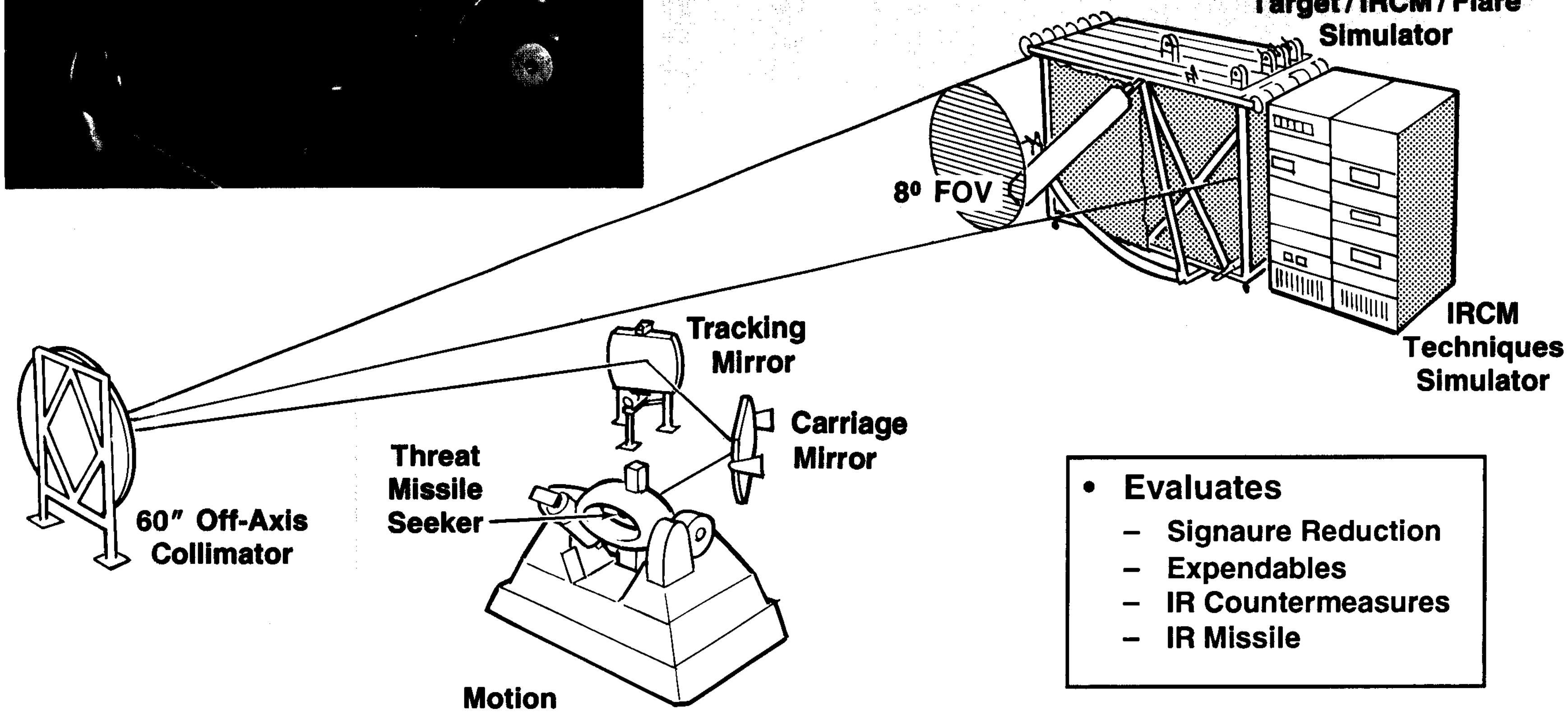
Actual IR seekers are used in this laboratory [illegible] actual seekers are used as surrogates to simulate other [illegible].

Infrared Laboratory

Actual Seekers







- Evaluates
  - Signaure Reduction
  - Expendables
  - IR Countermeasures
  - IR Missile

AMC113B

The enhanced Infrared Laboratory has the following capabilities:

(1) There are eight movable sources along the X and Y axes,

(2) The IR Background Generator can simulate IR, near IR, or visual backgrounds, external sources, and spectral discrimination,

(3) The flight table provides support and real-time flyout motion for guidance units ([illegible]), and avionics packages/pods ([illegible]),

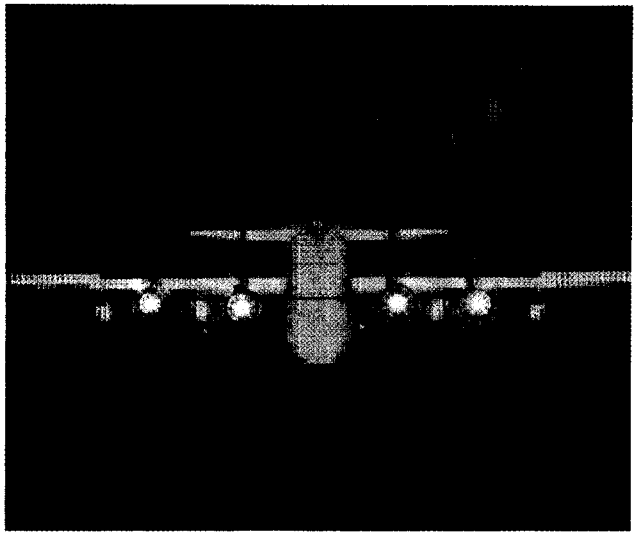
(4) [illegible], and

(5) [illegible]

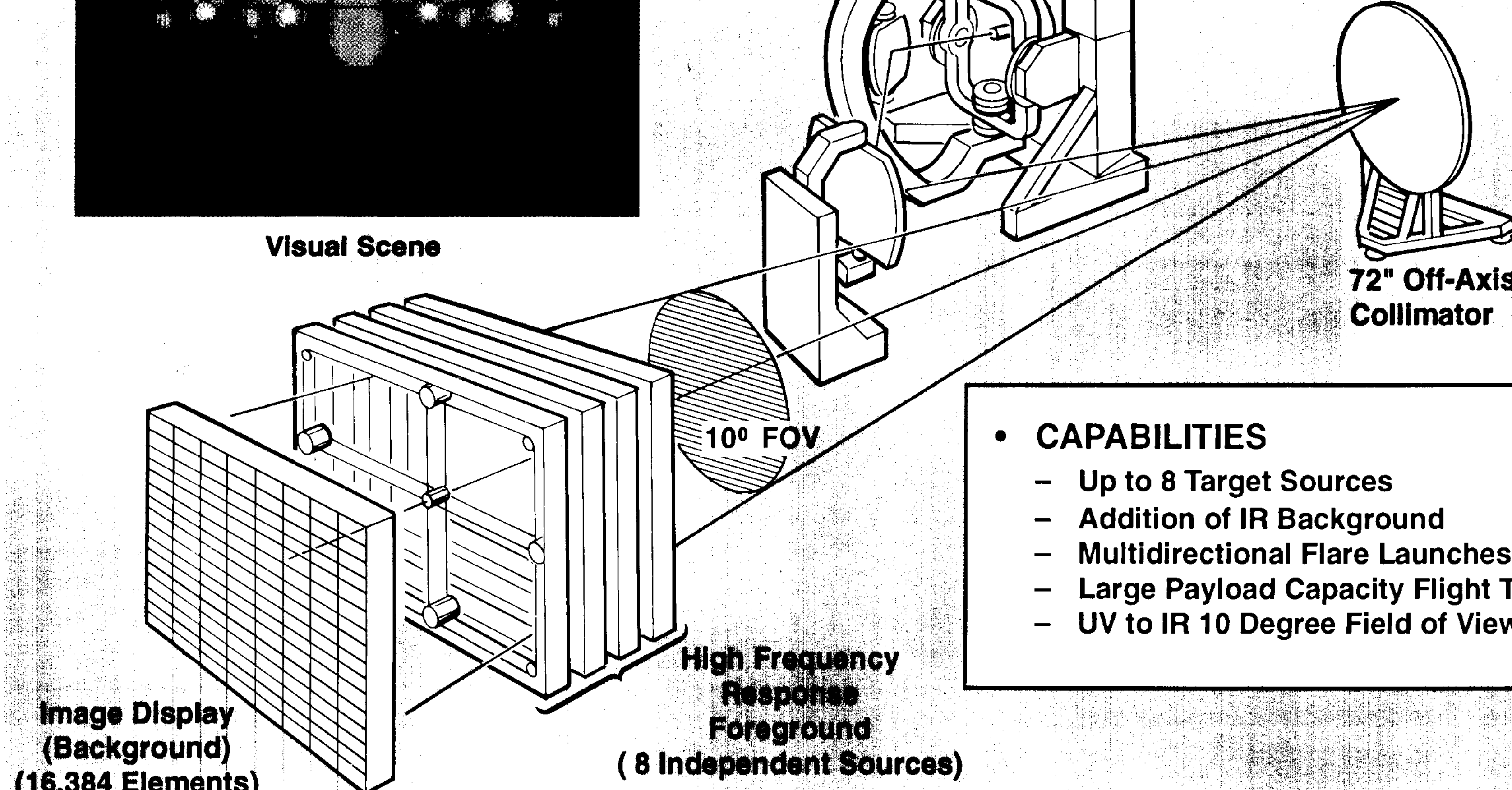
a. multidirectional flare launches
b. non-linear expansion
c. aerodynamic flares
d. dropping up to seven flares at a time

The IR Lab will interface with the Reconfigurable Airborne Interceptor and Reconfigurable Surface-to-Air Missile simulations. The IR/EO aspects of these simulators will be modeled on the background so that a threat warning receiver would see their plumes and declare them when detected.

Enhanced Infrared Laboratory



Visual Scene



- CAPABILITIES
  - Up to 8 Target Sources
  - Addition of IR Background
  - Multidirectional Flare Launches
  - Large Payload Capacity Flight Table
  - UV to IR 10 Degree Field of View

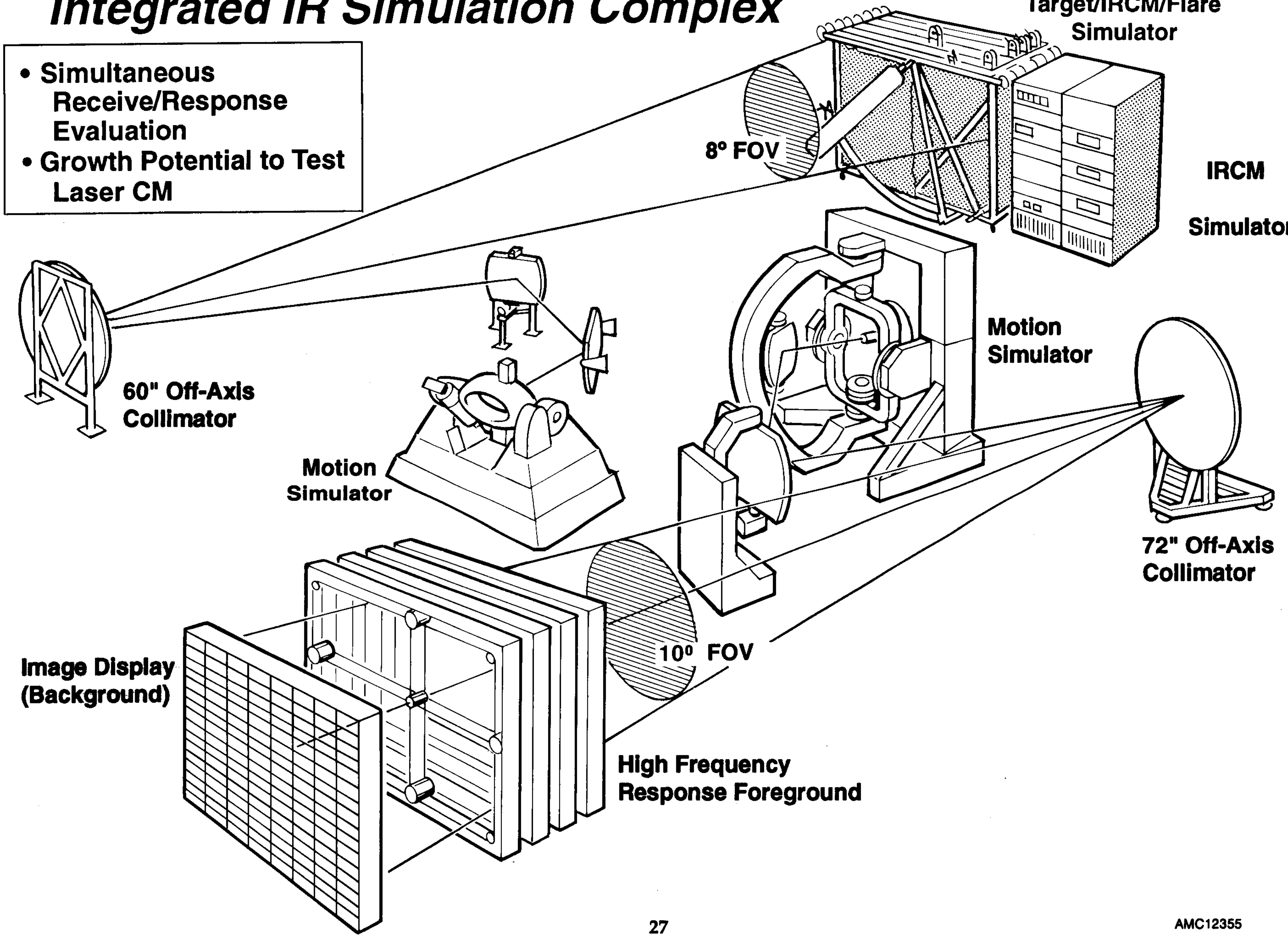
BV31138

The original IR equipment has been relocated next to the Enhanced Laboratory to form an integrated IR Complex. Having two optical paths complete with separate motion systems and target generation systems greatly enhances the possible test configurations in an IR engagement. One such instance is the simultaneous evaluation of a Threat Warning Receiver used to cue a response to a CM system working a threat simulated in the adjacent optical path.

Another important scenario is the ability to "fight" one [illegible] the other. An air defense system could be mounted on the [illegible] table and the optical battle between it and a seeker on the [illegible] could be played out.

Integrated IR Simulation Complex

- Simultaneous Receive/Response Evaluation
- Growth Potential to Test Laser CM



AMC12355

The Multiple Emitter Generator (MEG) is an Open-Loop Simulator built to evaluate radar warning receivers and/or power managed ECM systems. The MEG can generate realistic dense RF emitter environments not achievable on flight test ranges and can be operated in a stand-alone mode or in conjunction with the Closed-Loop radar simulations.

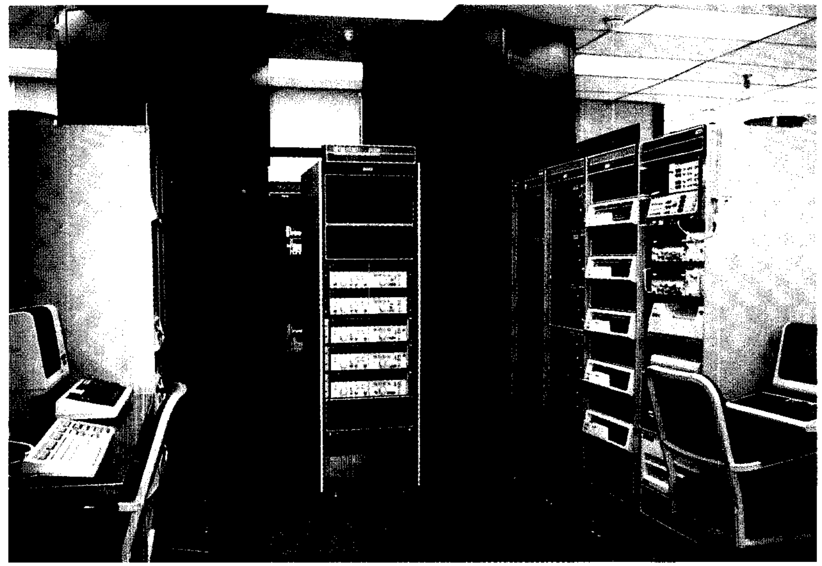
The MEG has continuous RF coverage from 0.5 to 18.0 GHz with millimeter wave coverage at 30-40 GHz and 90-100 GHz. The MEG can produce an instantaneous RF environment of 73 emitters at 64 sites which can expand to 217 emitters at 195 sites by multiplexing the sources.

The MEG instrumentation system can be used to measure such EW system performanace data as Emitter Detection, Identification, Frequency Measurement Accuracy, PRI Measurement Accuracy, Receiver Response Time, and ECM Resource Allocation.

Multiple Emitter Generator (MEG)

DESCRIPTION

- Open-Loop Simulation
- High-Fidelity Dense RF Signal Environment
- Evaluates Radar Warning Receivers and Power Managed ECM Systems
- Operates Stand-Alone or In Conjunction With Closed-Loop Simulators



MEG CAPABILITIES

- 73 Dedicated Instantaneous Sources/Emitters
  - Up to 20 Complex Waveform (PD) Sources
  - Multiplexing Expands Capability to 217 Emitters
- RF Coverage 0.5 to 18.0 GHz plus MMW (30-40; 90-100 GHz)
- Up to 8 RF Outputs to System Under Test
- Terrain Masking of Emitters Available
- One-Half Second Scenario Update Rate
- Vast Array of Scenario Instrumentation Options

AMC119A

The Multiple Emitter Generator (MEG) is capable of generating a wide variety of red, blue, and gray emitters, such as the signal examples listed on this chart.

The MEG can be programmed to generate many additional emitters, limited only by equipment parametric constraints.

Sample MEG Threat Simulations

RED SIGNAL SIMULATIONS

- Back Net
- Back Track
- Ball Gun
- Bar Lock
- Bass Tilt
- Big Bird
- Big Nose
- Clam Shell
- Dog Ear
- Drum Tilt
- Fan Song B
- Fan Song E
- Fire Dome
- Fire Wheel
- Flap Lid
- Flap Wheel
- Flash Dance
- Flat Face
- Flat Jack
- Fox Fire
- Gin Sling
- Gun Dish
- Grill Pan
- Hawk Screech
- Head Light
- High Fix
- High Lark
- High Sleve
- Hot Shot
- Jay Bird
- Kite Screech
- Land Roll
- Long Track
- Low Blow
- Low Sleve
- Muff Cobb
- Odd Pair
- Owl Screech
- Pat Hand
- Peel Group
- Pop Group
- Prok Trough
- Rock Cake
- SU AWACS
- Scan Fix
- Sean Odd
- Side Net
- Skip Spin
- Slot Back
- Spin Scan
- Spoon Rest
- Square Pair
- Squat Eye
- Straight Flusht
- Sun Visor
- Team Work
- Thin Skin
- Tin Shield
- Tube Arm
- Twin Scan
- Whiff
- Wild Card
- Yo Yo
-
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-

GREY SIGNAL SIMULATIONS

- Crotale
- Cyrano
- Fly Catcher
- Fox Hunter
- Rapier
- Super Fledermaus
- Sky Guard
-
-
-
-

BLUE SIGNAL SIMULATIONS

- AN/APG-63 (F-15)
- AN/APG-66 (F-16)
- AN/APQ-113 (A-7)
- AN/APQ-120 (F-4E)
- AN/APQ-126 (F-111)
- ANAWG-9 (F-14)
- I-Hawk
-
-
-
-
-

Programmable To Generate Additional Emitters Limited Only by Equipment Parametric Constraints

The Jammer Technique [illegible] provide the capability [illegible] to simulate an additional [illegible] Used [illegible] hardware [illegible] Doppler [illegible] simulate Chaff, Jet Engine Modulation (JEM) lines, and [illegible]

JammEr Technique Simulator (JETS)

DESCRIPTION

- Simulate EC Concepts and Systems
  - ECM, Chaff, Decoys, JEM Lines
- Noise or Pulse Repeater Capability
- Frequency Coverage Continuous From 2 to 18 GHz
- Multiple Simultaneous ECM Systems

TECHNIQUES AVAILABLE

TRACK WHILE SCAN

- Range & Angle Walkoff
- False Targets
- Inverse Gain
- Sweep Deception
- Noise Deception

CONICAL SCAN

- Continuously Varying Phase Shift
- Countdown
- Inverse Gain
- Range Deception

DOPPLER

- Velocity Gate Deceptions
- Countdown
- FM Range Deception
- Constant Duty Cycle With Swept PRF

MONOPULSE

- Range Gate Walkoff
- Cooperative Jammers

AMC123

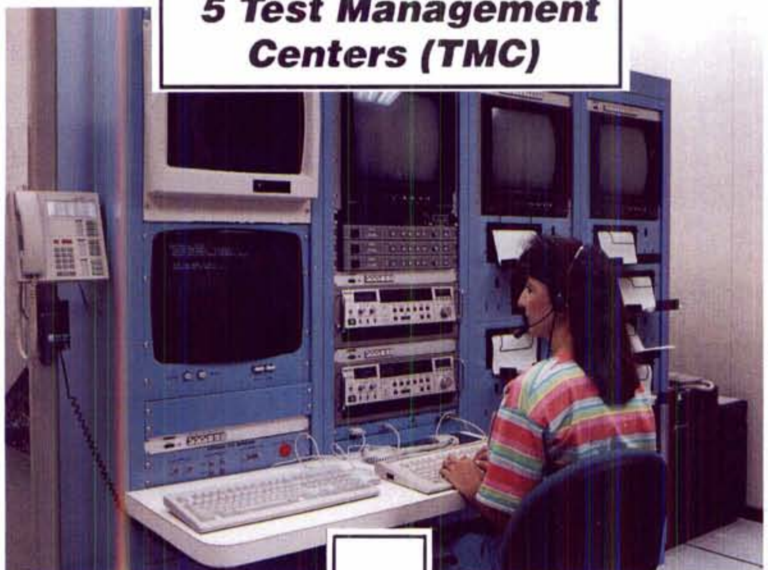
The Test Director System (TDS) will provide improved test control and data analysis capabilities at the AFEWES. It will also facilitate rapid simulator asset reconfiguration between test shifts. The TDS is tied together via audio, video, and digital networks, and will consist of five Test Management Centers, one Test Observation Center.

The Test Management Centers (TMCs) will consist of eight digital strip chart recorders (four channels each), five video monitors, and two video recorders. The TMCs can be connected in a master/slave configuration to direct large complex test scenarios.

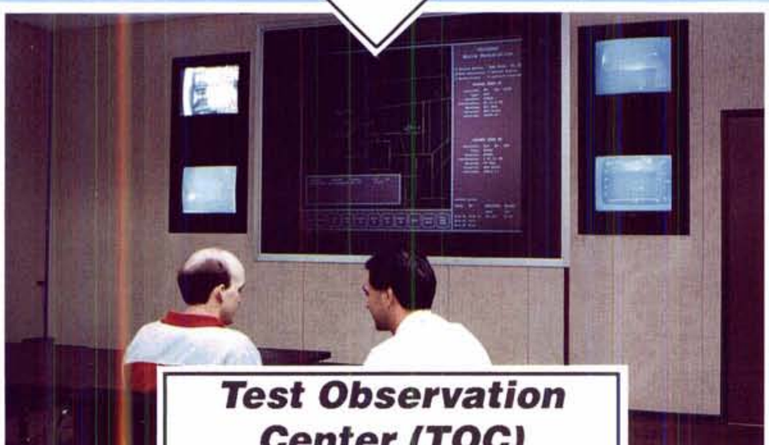
The Test Observation Center will consist of a large screen display and four video monitors. The Observation Center is a monitoring facility only and would not be used for test direction.

Test Director System

5 Test Management Centers (TMC)



AFEWES Simulator Assets



Test Observation Center (TOC)

- Centralized Test Management
- Audio, Digital, Video Networks
- Improved Data Collection and Analysis
- TMCs Networked for Multiple Simulator Scenarios
- Large Group Passive Monitoring in TOC

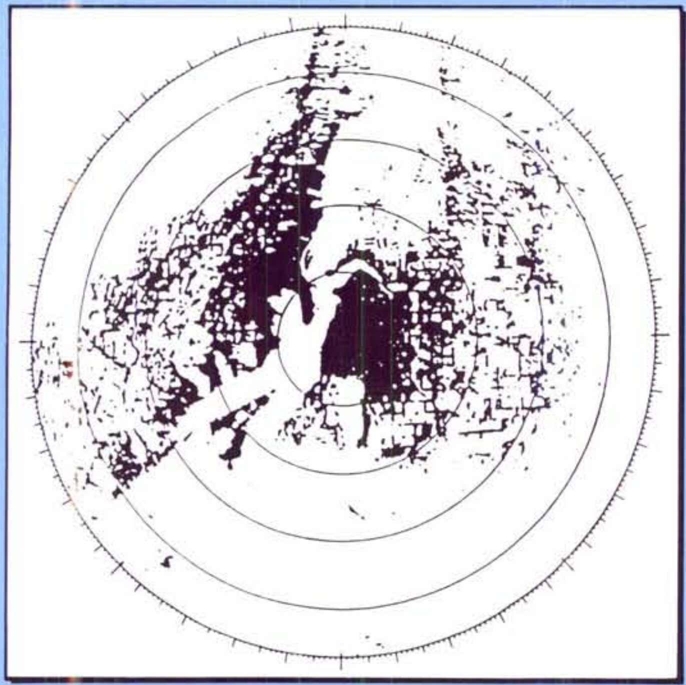
AMC125A

AFEWES is able to provide more realism in testing EC Systems with the completion of the Generic Pulsed Surface Radar (GPSR) clutter generator. Realistic ground clutter interfaces with the SA-4, SA-8, and SA-10 simulators. Future plans call for this site specific clutter capability to be interfaced with the RSAM.

Upon completion of the Generic Semi-Active Radar (GSAR), realistic clutter generation will be available for semi-active systems and other airborne platforms.

Simulated Clutter Generation Capability

- Generic Pulsed Surface RADAR (GPSR)
  - Ground-Based Threat Clutter
  - Current Interface with SA-4 and SA-8 Simulations
  - Future Tie With SA-6, -10, -11, and -12 Simulations
  - Site-Specific Clutter Maps
- Generic Semi-Active RADAR (GSAR)
  - Planned Future Capability
  - Threat Clutter for Airborne Platforms/Missiles



AFEWES

Actual Site

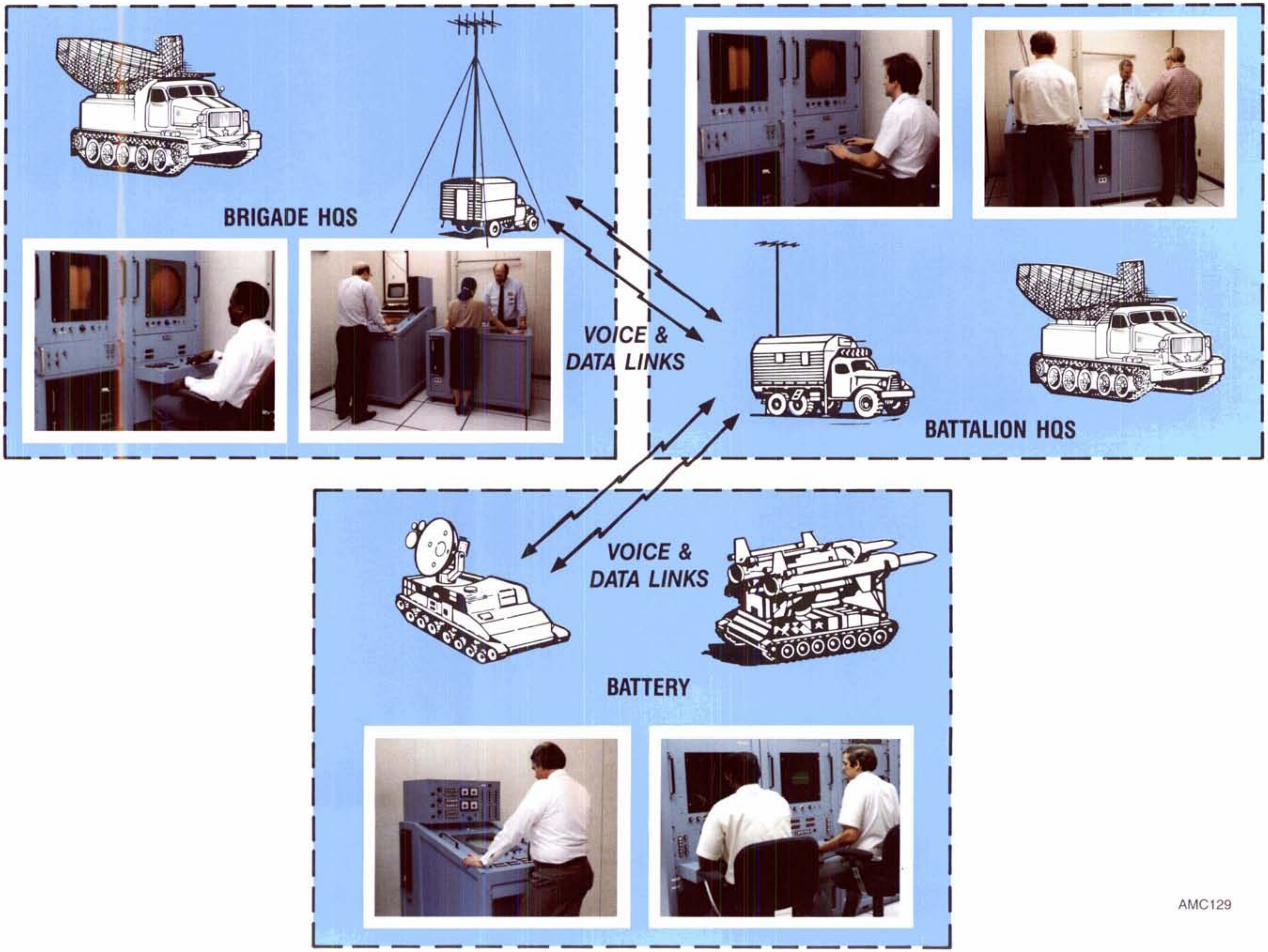
AMC127A

The AFEWES Tactical Command, Control, and Communication (C^3) simulation is capable of simulating a threat Brigade or Regiment Integrated Air Defense System. In the Brigade example shown the Brigade Headquarters includes the Brigade Commander, his trackers, and the Acquisition Radar tied into the Brigade headquarters. The Battalion Headquarters include the Battalion Commander, his trackers, and the Acquisition Radar tied into the Battalion Headquarters. The Battery includes the Battery Commander and the Terminal Tracking Radar. The Communication and Data Links between the Brigade and Battalion Headquarters and those between the Battalion and Battery Headquarters are also simulated.

This C^3 capability can be used to evaluate various approaches to countering a C^3 system such as jamming the Communication/Data Links, jamming the Acquisition or Tracking Radar, or jamming collectively all of these components.

AMC128

Tactical C^3/SAM Simulation

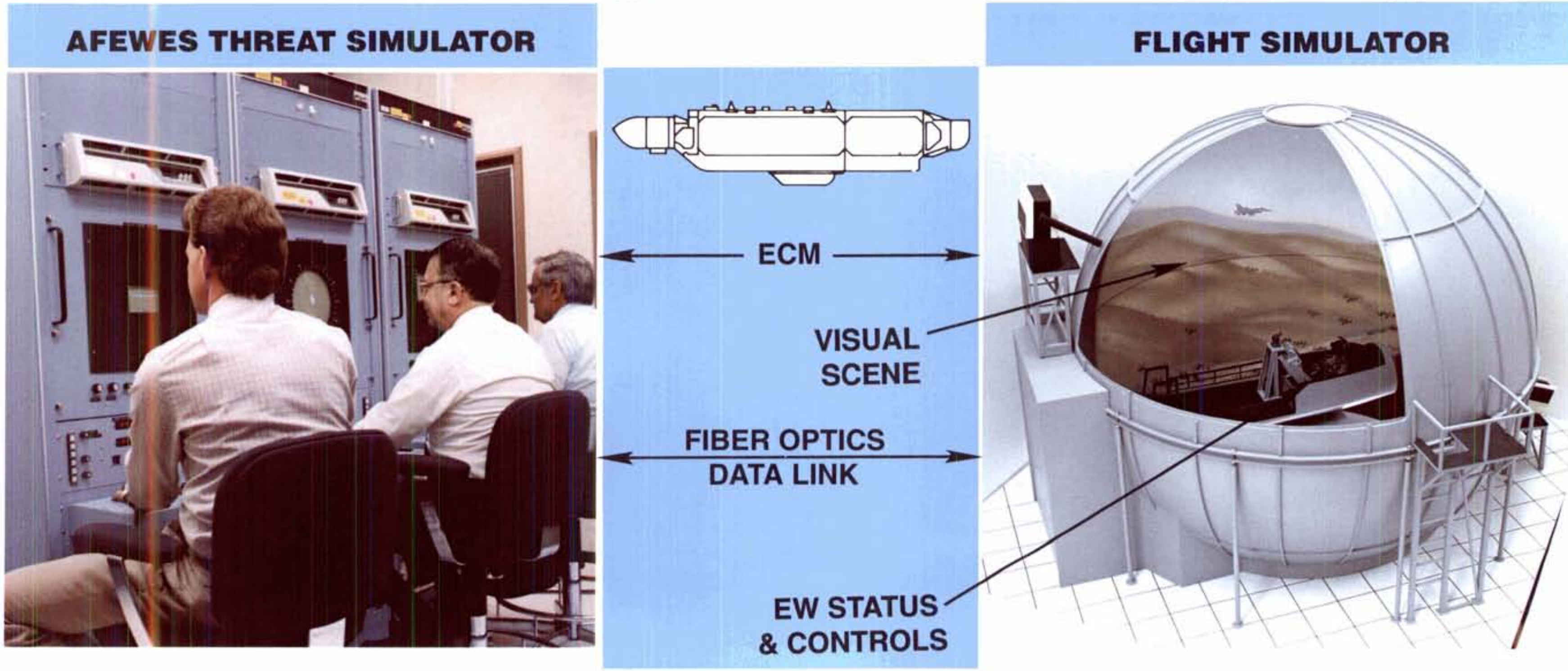


AMC129

Several AFEWES simulations are interfaced to the contractor-owned domed flight simulators complete with visual scene to enhance engagement realism, if required. For instance, this capability allows a pilot in the F-16 cockpit to fly real time against the AFEWES simulation.

When the AFEWES threat radar operators launch a missile at the flight simulator, the pilot in the cockpit sees the missile flashes off the ground and the body of the missile as it flies toward the aircraft. The pilot can attempt to outmaneuver the missile, or use ECM and/or chaff to counter the radar and missile. At the same time, AFEWES radar operators track the F-16 as it flies through its reactive scenario.

AFEWES/FSL Integrated Simulations Capability



- FSL Cockpits Are Linked to AFEWES
  - Provides a Reactive Aircraft Capability
  - Integrated With SA-4, -8, and -10 Simulations
  - Capability To Satisfy Tactical EC Objectives

Red/Blue Man-in-the-Loop Interactions Enhance Engagement Realism

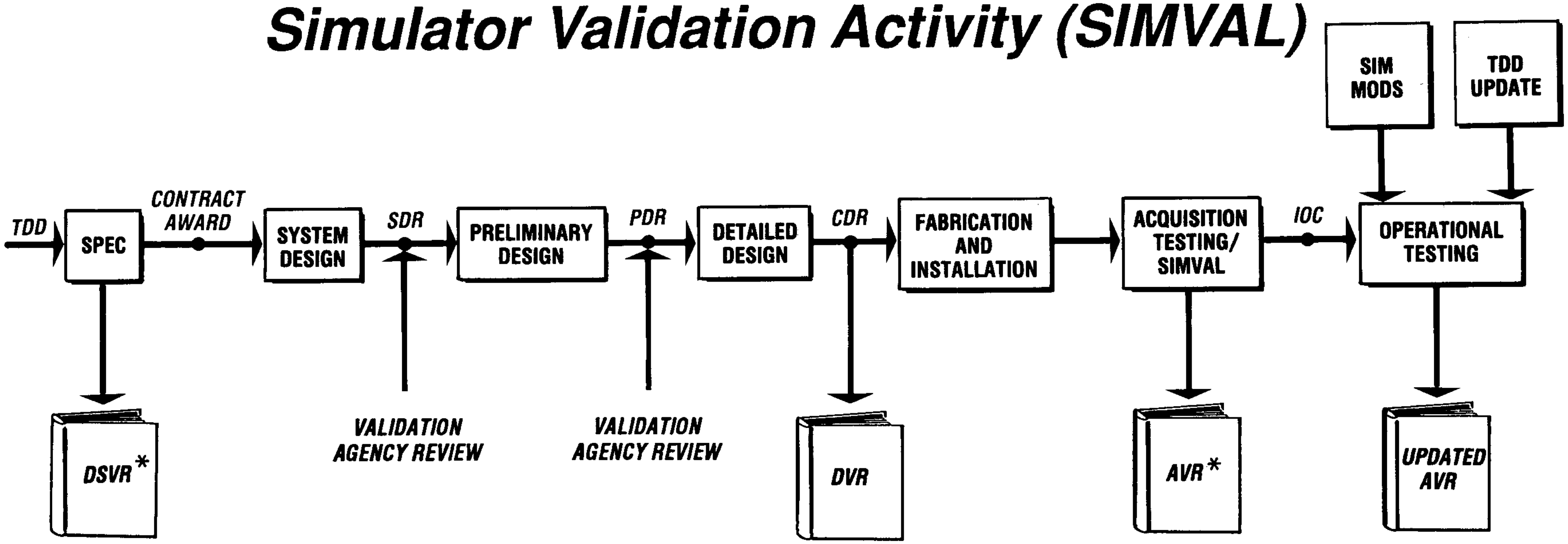
AMC131

The Simulator Validation (SIMVAL) program is integrated into the simulator development process from the beginning. DIA approved Threat Description Documents (TDDs) are used by the Air Force's validation agency, the National Air Intelligence Center (NAIC), to validate specifications in the Design Specification Validation Report (DSVR)

As a simulation proceeds through it's development cycle, a Design Validation Report (DVR) is published comparing the Critical Design Review (CDR) data with the "current" intelligence baseline; when the new simulator undergoes formal acceptance/SIMVAL testing, an Acquisition Validation Report (AVR) is published which compares the simulator to the latest "current" intelligence data and highlights any differences.

Throughout it's life cycle the simulator will be revalidated every time it is updated to reflect "current" intelligence data.

Simulator Validation Activity (SIMVAL)



** CROSSBOW-S/EXCOM Review/Approval*

COMPLETE						PROJECTED	
SA-2B	(1975)	SA-8	(1991)	Fox Fire	(1981)	SA-12	FOXHOUND
SA-3	(1987)	SA-10	(1994)	Jay Bird	(1984)	SA-14	AA-9
SA-4	(1989)	SA-11M	(1994)	TACAN	(1984)	SA-16	AA-10
SA-6M	(1986)	MEG	(1994)	C^3	(1983)	FLANKER	STINGER
SA-7	(1992)	Gun Dish	(1989)	IFF	(1982)	FULCRUM	SYMPTOM ARES
SA-13	(1993)	FlapWheel	(1978)				

AMC133C

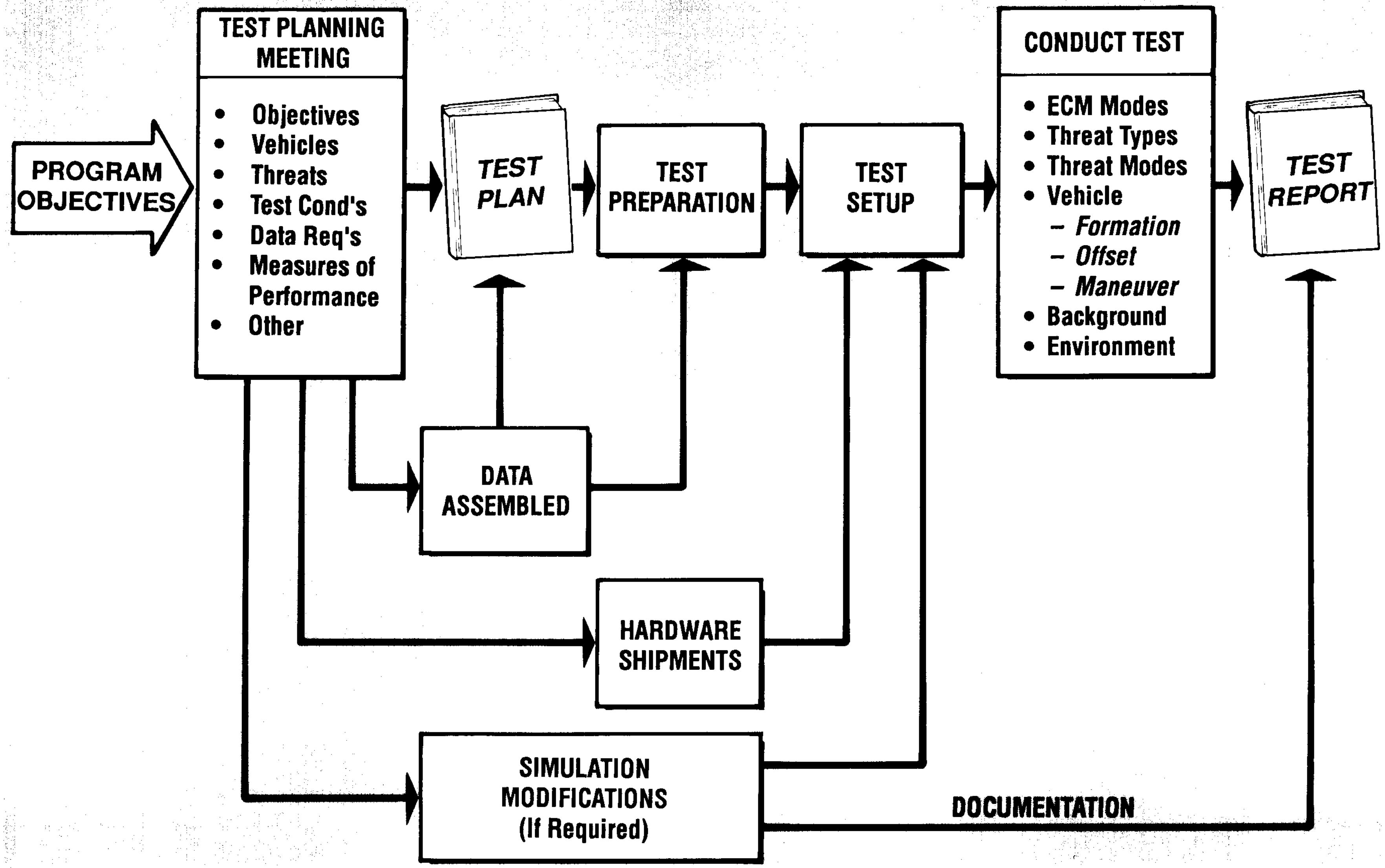
Use of a proven systematic test methodology assures timely support of AFEWES test customers. The process starts with the test customer and the program objectives he is attempting to satisfy. Typically one or more test planning meetings are held to discuss AFEWES capabilities, test objectives, the aircraft to be simulated, AFEWES threat systems required for the test, test conditions, data requirements, and measures of performance.

Once requirements are determined, a test proposal is prepared and presented to the potential user. Then, if the user is [illegible], the test preparation phase begins, which [illegible] two months [illegible] test requirements. During this phase a test plan is written, [illegible] are [illegible] the AFEWES format, and [illegible] modifications are made, if required.

The test phase begins with a dedicated test-in week during which the [illegible] will be thoroughly checked out and interfaced with the EC system. The length of the test will naturally vary depending on test requirements.

After the test has been completed, a test report will be published approximately four weeks after the test, documenting the test results.

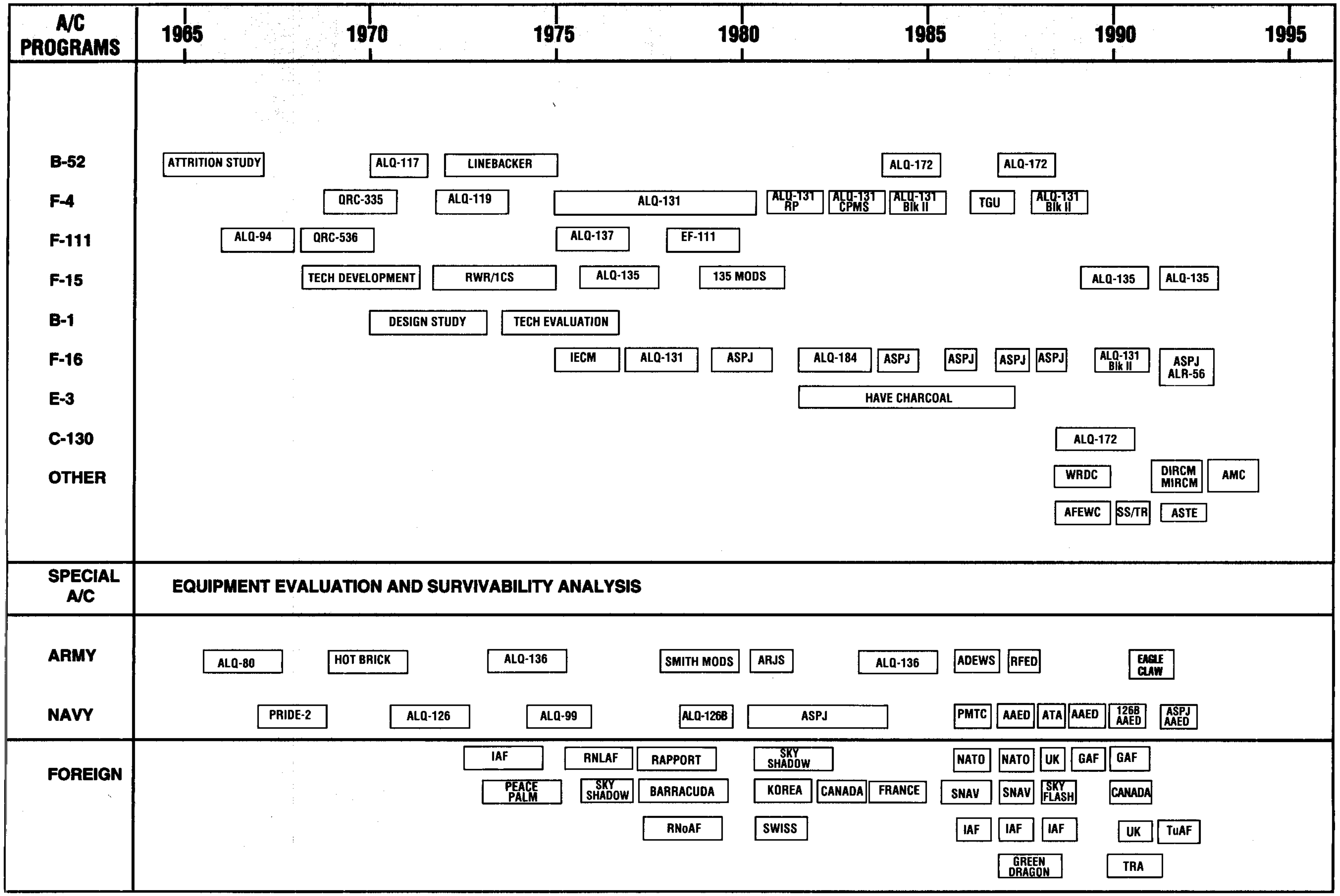
AFEWES Test Cycle



Since its inception in 1958, to support the B-58 program, AFEWES has played an important role in weapon system development. As a totally Air Force-owned facility, the Air Force has been the primary user but AFEWES is also heavily utilized by the Army, Navy, friendly foreign governments, and special access programs.

Many Electronic Combat systems utilize the facility repeatedly over the years as their system developmatures or as the simulations are upgraded to later intelligence baselines.

AFEWES Involvement in Weapon System Development



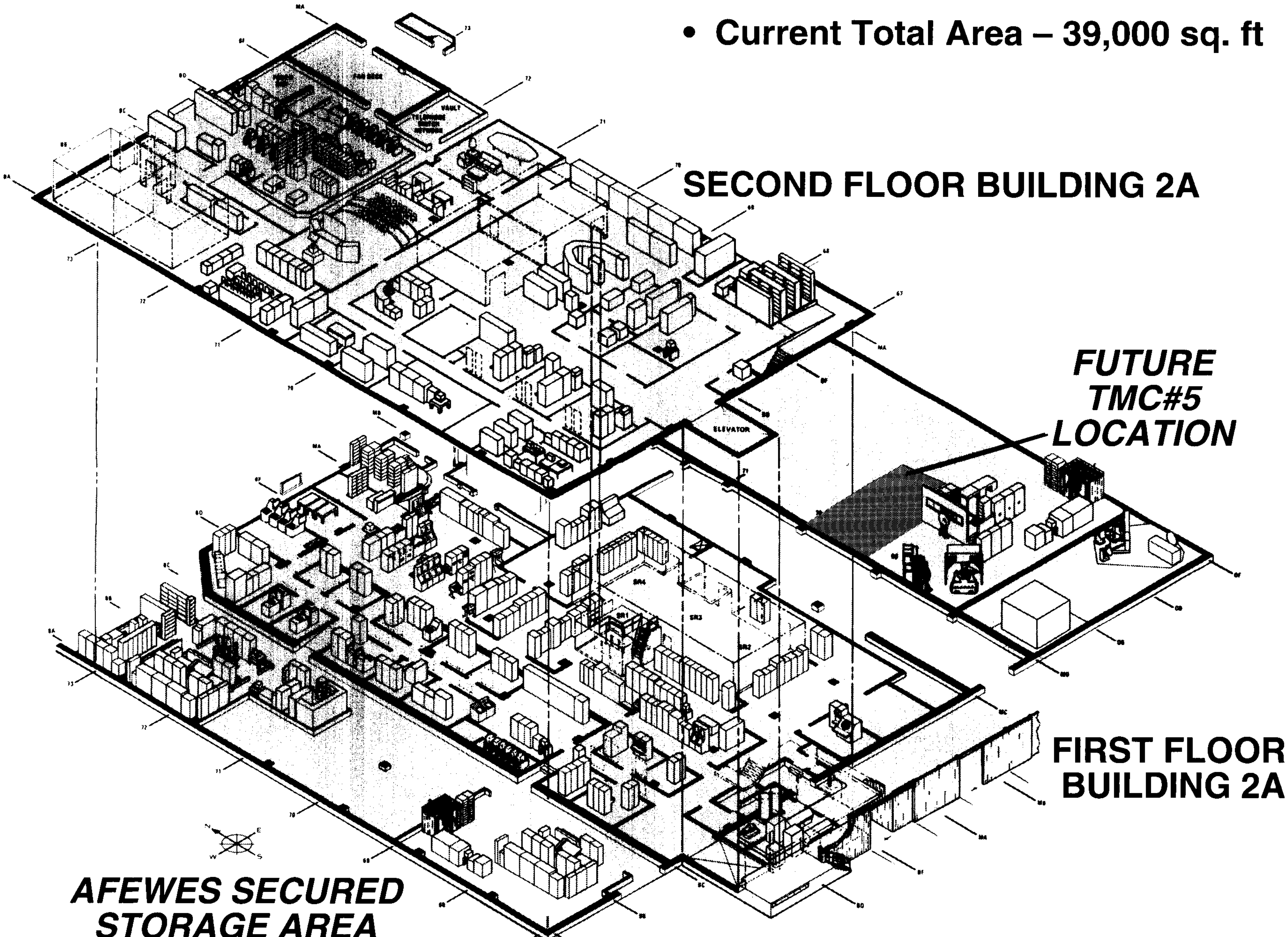
AMC137A

The AFEWES currently encompasses 36,000 square feet of floor space in Air Force Plant No. 4. In addition to the threat simulators, floor space has been provided for four screen rooms for the test items (average size 400 square feet), four test customer conference rooms, and an elevator for floor-to-floor movement of hardware.

AMC138A

AFEWES Floor Plan

- Current Total Area – 39,000 sq. ft



AMC139A

Over the years AFEWES has made significant contributions to ECM development. AFEWES has been involved in parameter sensitivity studies, development of tactical flight profiles, optimizing ECM techniques, DT&E, OT&E, and modifications to equipment after they have operationally deployed, to name a few.

AMC140

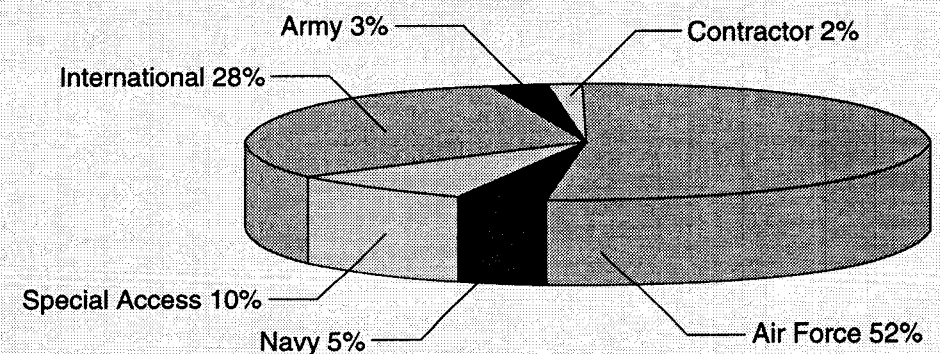
Summary

- AFEWES Is a National Asset with Over 30 Years of Service
- Used by All Services and Allies
- Performs a Key Role in All Phases of EC System Development Cycles, From Concept Through Operational Deployment
- High Fidelity Simulators and Dense Signal Environment
- Cost Effective, Secure, Instrumented Facility
- Significant Upgrade Program To Provide Multispectral Environment To Test Integrated EC Weapon Systems

Document Separator

AIR FORCE ELECTRONIC WARFARE EVALUATION SIMULATOR

- **A Unique Laboratory For Testing Effectiveness of Aircraft Defensive Countermeasures.**
- **Created in 1958 as a Cost-Effective Alternative to Flight Testing B-58 Electronic Countermeasures.**
- **Market – Driven/Needs-Driven Growth:**
  - **39,000 Sq. Ft.**
  - **39 Weapon Systems Simulations**
  - **\$325M in Assets**
- **Used by Air Force, Navy, Army, International Allies and Industry From Aircraft Design Through Wartime Operations.**

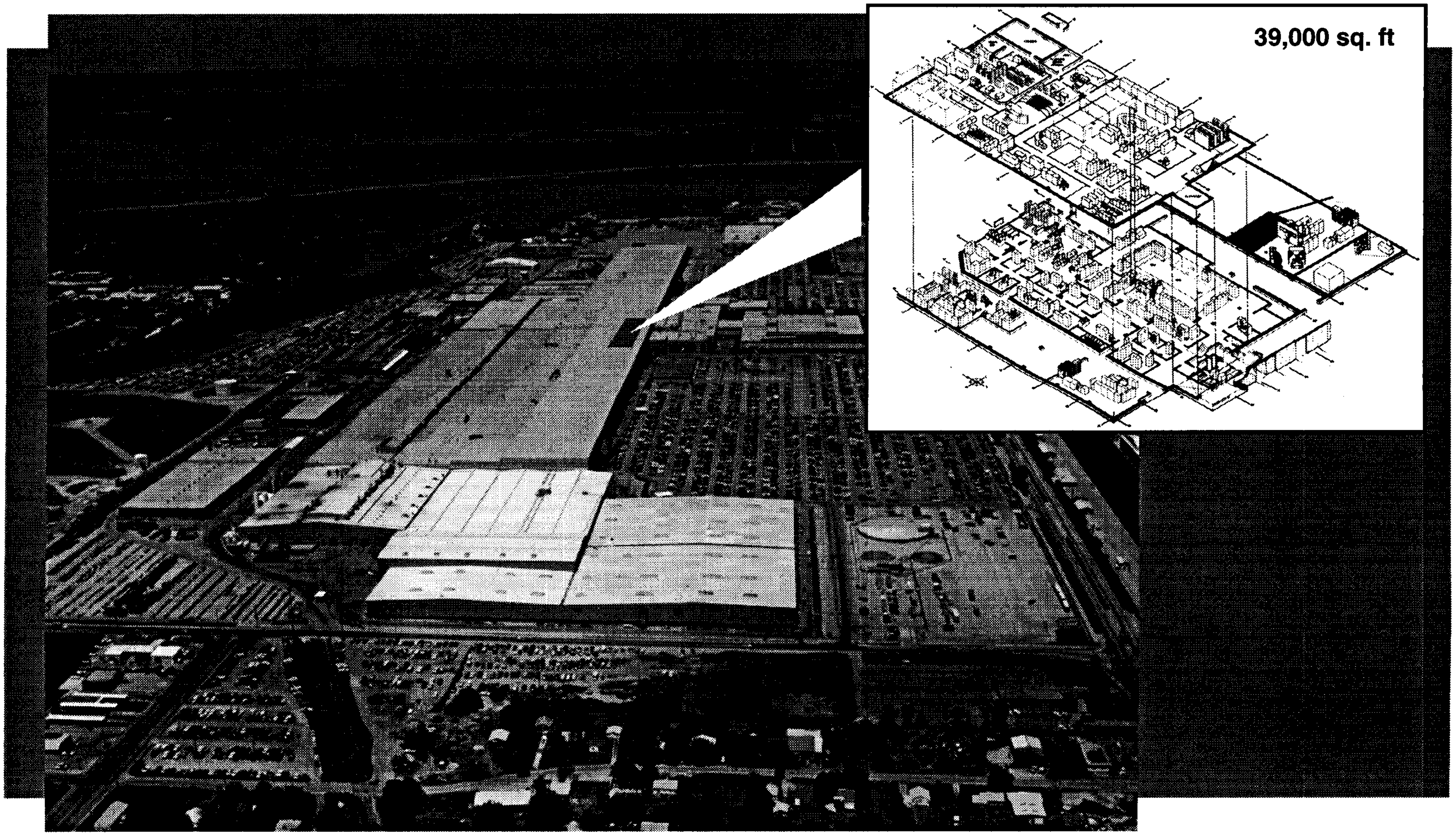


AFEWES Customer Base
1990-1994

AFEWES Is a DOD and International Asset. Successfully Designed and Operated Under Civilian Contract for 37 Years.

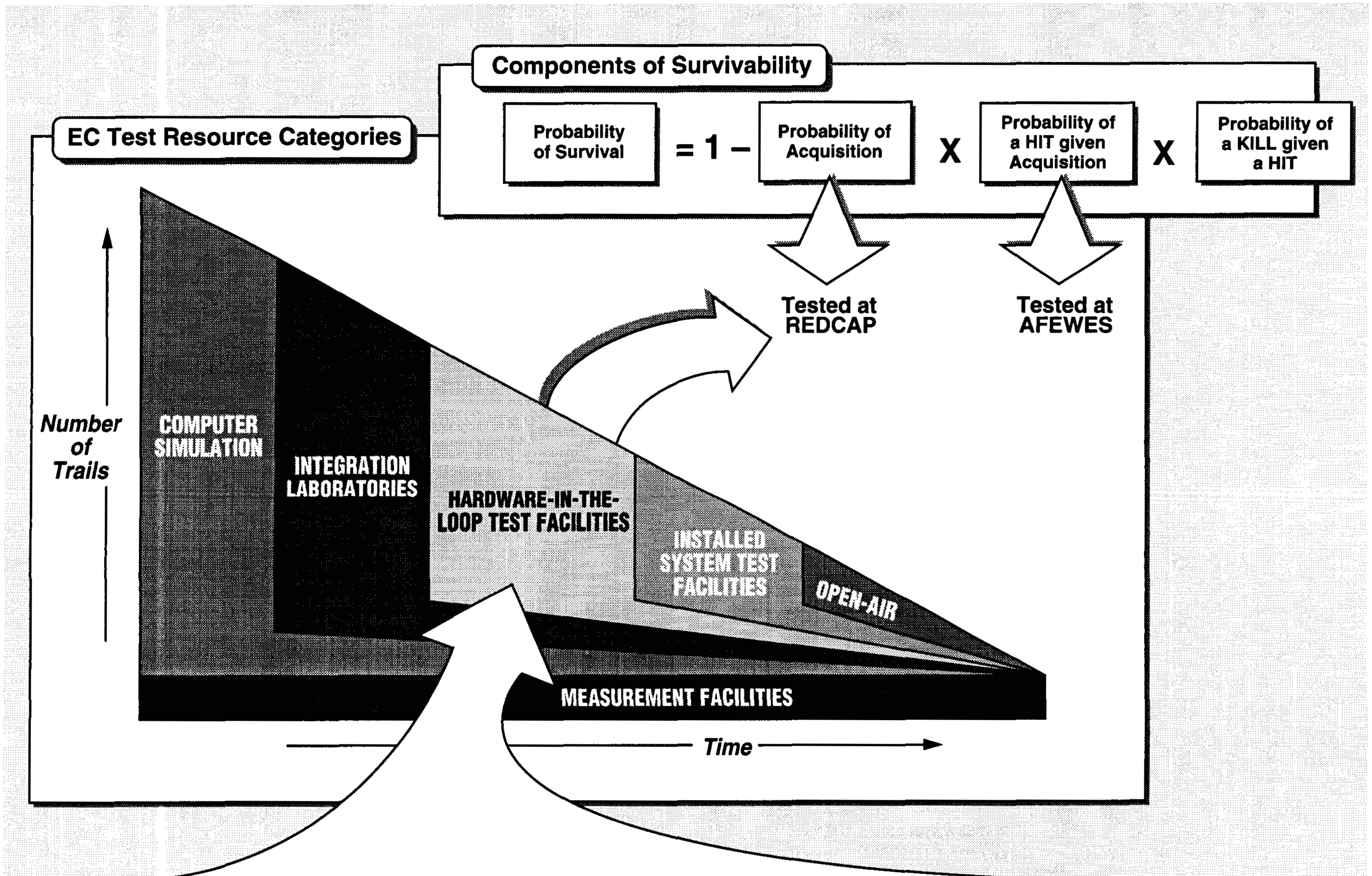
A03216

AFEWES
Air Force Electronic Warfare Evaluation Simulator
Located Within Air Force Plant #4 and Operated by Lockheed Fort Worth Company



AO3216-1

The Electronic Combat Test Process



AFEWES Is a Unique Piece of the Nation's Electronic Combat Test Process

A03217

DOD BRAC Recommendations

Air Force Electronic Warfare Evaluation Simulator Activity, Fort Worth, Texas

RECOMMENDATION:	**Disestablish the Air Force Electronic Warfare Evaluation Simulator (AFEWES)** Activity in Fort Worth. Essential AFEWES Capabilities and the Required Test Activities Will **Relocate to the Air Force Flight Test Center (AFFTC),** Edwards AFB, California. Workload and Selected Equipment From AFEWES Will Be Transferred to AFFTC. AFEWES Will Be Disestablished and Any Remaining Equipment Will Be Disposed of.
JUSTIFICATION:	The Test and Evaluation Joint Cross-Service Group (JCSG) Recommended That AFEWES's Capabilities Be **Relocated to an Existing Facility at an Installation Possessing a Major Range and Test Facility Base (MRTFB) Open Air Range.** Projected Workload for AFEWES Was Only **28 Percent of its Available Capacity.** Available Capacity at AFFTC Is Sufficient To Absorb AFEWES's Workload. AFEWES's Basic Hardware-in-the-Loop **Infrastructure Is Duplicated** at Other Air Force Test and Evaluation Facilities. This Action Achieves Significant Cost Savings and Workload Consolidation.
RETURN ON INVESTMENT:	The Total Estimated One-Time Cost To Implement This Recommendation Is $5.8 Million. The Net of All Costs and Savings During the Implementation Period Is a Cost of $2.6 Million. **Annual Recurring Savings After Implementation Are $0.8 Million** With a Return on Investment Expected in Seven Years. The Net Present Value of the Costs and Savings **Over 20 Years Is a Savings of $5.8 Million.**
IMPACTS:	Assuming No Economic Recovery, This Recommendation Could Result in a Maximum Potential Reduction of **9 Jobs** (5 Direct Jobs and 4 Indirect Jobs) Over the 1996-to-2001 Period in the Fort Worth-Arlington, Texas Primary Metropolitan Statistical Area, Which Is Less Than 0.1 Percent of the Economic Area's Employment. This Action Will Have Minimal Environmental Impact.

The Facts Dictate A Closer Look . . .

A03218

Collocation At An Open Air Range

DOD

- "The Test and Evaluation Joint Cross-Service Group (JCSG) Recommended That AFEWES Capabilities Be Relocated to an Existing Facility at an Installation Possessing a Major Range and Test Facility Base (MRTFB) Open Air Range."

FACTS

- There Is No Technical Advantage to Being Near an Open Air Range.
- No Significant Increase In Capability From "One Stop" Shopping.
  - *EC Systems Rarely Move Immediately From a Hardware-in-the-Loop Test to Flight Testing*
- Networking Is the Technical and Economical Alternative
  - *Networking of AFEWES Has Been Demonstrated and Proven Technically Feasible*

A03219

AFEWES Workload

DOD

- "Projected Workload Was Only 28 Percent of Its Available Capacity."

FACTS

- Average Workload for CY 93 and CY 94 Was 90% (Based on a 16-Hour Day). Workload Has Actually Been Increasing Because New Capabilities Have Been Coming On-Line.
- Workload Is Projected To Continue at the Same Level. Currently Planned Tests Include:

1995
C17
B-2
Band IV Infrared Countermeasures (IRCM)
Advanced Tactical IRCM - Army
Directional IRCM - UK/USSOCOM
Sweden
Germany
DOD Special Access

1996 and Beyond
B-1
B-2
F-22
ALQ-135
Advanced Tactical Radar Jammer - Army
Advanced Missile Warning Receiver - Army
Integrated Defensive Electronic Countermeasures System - Navy
Sweden
United Kingdom
Italy

- The Multiple Emitter Generator Expansion (1995) and Reconfigurable Airborne Interceptor (1996) Will Also Spur Increases in Workload.

A03220

AFFTC Capacity

DOD

- **"Available Capacity at the Air Force Flight Test Center Is Sufficient To Absorb AFEWES Workload."**

FACTS

- **AFFTC May Have the Capacity To Replace The Nine Government Positions (Five Direct, Four Indirect).**
- **AFFTC Does Not Presently Have the Personnel To Operate/Maintain and Upgrade the AFEWES:**
  - ***LFWC Positions To Be Replaced: Approx. 50 Engineers/Technicians in Support of Operations/Maintenance and Approx. 50 in Support of Upgrades***
  - ***AFFTC Will Have To Contract for This Work***
- **AFFTC Currently Has No Hardware-in-the-Loop Simulation Capability, Consequently, Test Users Must Accept AFEWES Testing "GAP" Until the Transition Is Complete.**

A03221

AFFTC Building Requirements

FACTS

- **The AFEWES Must Be in a Shielded Building With Raised Floors (To Allow Electrical Interconnections), Lowered Roof (To Allow for RF Interconnections),Special Power and Special Air Conditioning. The IR Portion Requires SEISMIC Stability.**
- **AFFTC Has Two Options:**
  - **Build a New Facility**
    - √ **100% Replacement Would Require at Least 40,000 SQ. Ft.**
    - √ **Moving Only the Newest, Highest Utilized Simulations Will Still Require a 36,000 Sq. Ft. Facility**
  - **Remodel the Existing Building Surrounding the Benefield Anechoic Chamber**
    - √ **Remodeling the West Area (Now Essentially Vacant) of the Building To Have a SEISMIC First Floor Section (900 Sq. Ft) and Adding a Second and Third Floor Within the Shell Could Make About 36,000 Sq. Ft. Available**
    - √ **Based on Historical AFEWES Costs, Estimated Remodeling Would Cost Over $5M**

AFEWES Duplication

DOD

- "AFEWES Basic Hardware-in-the-Loop Infrastructure Is Duplicated at Other Air Force Test and Evaluation Facilities"

FACTS

- AFEWES Has 39 Simulations. Two (Built By AFEWES Personnel) Are Duplicated at Other Air Force and Army Locations. Four Other Simulations (Older and Unvalidated) Exist at Other Air Force and Navy Locations.

- AFEWES Is Used by Air Force, Navy, Army, International Allies, and Industry Because It Is Unique in the World.

  * Australia
  * Canada
  * France
  * Germany
  * Israel
  * Italy
  * Korea
  * Netherlands
  * Norway
  * Sweden
  * Switzerland
  * Turkey
  * UK
  * Belgium

- It Is Contradictory To Claim Duplication and Then Make Plans To Move the Capability.

A03223

Return on Investment

DOD

- "The Total Estimated One-Time Cost To Implement This Recommendation Is $5.8M."

FACTS

- The Following Simulations/Support Systems Have Essential Military Value and Would Have to be Moved:

SA-4	Fulcrum	Data Processing Facility
SA-6M	Foxhound	Residual Inventory/Spare Parts
SA-8	Clutter Generator	Jammer Technique Simulator
SA-10	Basic Infrared Lab	Bus Snapshot Analyzer
SA-11	Enhanced Infrared Lab	Test Equipment
Flap Wheel	Multiple Emitter Generator Basic	Software Development Facility
Flanker	Multiple Emitter Generator Advanced	Test Director System
Gun Dish		

- Generation of the Documentation Is Essential:
  - *Drawings for 186 Racks*
  - *O&M Manuals for 17 Simulations/Support Systems*
- A More Realistic Estimate of Cost To Implement:

– *Drawings*	*$ 8,949,360*
– *Software and Hardware O&M Manuals*	*8,428,539*
– *Phase In/Phase Out/Training/Overlap*	*12,924,117*
– *Disassembly/Move/Reassembly/Demonstrate*	*6,495,263*
– *Facility Preparation (36,000 Sq. Ft. @ $140/Sq. Ft)*	*5,040,000*
– *Replacement of LFWC Owned Assets*	*2,100,000*
Total Cost for Minimim Move	*$43,937,279*

A03224

Return On Investment

DOD

- **"Annual Recurring Savings After Implementation Are $0.8M With a Return on Investment Expected in Seven Years. The Net Present Value of the Cost and Savings Over 20 Years Is a Savings of $5.8 Million."**

FACTS

- **The DOD Assessment Significantly Underestimates the Cost of Implementation and the Discount Rate. The More Likely Outcome Is:**

	LIKELY	DOD
Cost	$ 43.9M	$ 5.8M
NPV (Over 20 Years)	$ (27.7)M	$ 5.8M
Break-Even	53 Years	7 Years

- **$0.8M in Annual Savings Can Be Realized by Simply Reducing Government Oversight of AFEWES.**

A03226

The AFEWES Can Be Operated and Maintained For Less Expense If Left In Fort Worth

Because of the Contractor's Experience

- Conceived and Developed the AFEWES Closed-Loop, Real-Time, Actual RF Threat Simulation In 1958.
- The Only Experience Available in AFEWES Operation (37 Years).
- Corporate Memory and Easy Access to Simulation Designers Enhances Maintenance and Minimizes Down Time.
- Resources Necessary to Link AFEWES With LFWC Test Assets (Flight Simulator) and Other DOD Test Assets (Open Air Ranges, REDCAP).

Because the Contractor Is Organized to Accommodate a Variable Work Load

- Government Required Simulator Work Load Is Highly Variable.
- An Easily Varied Cadre of Skilled Manpower Means the Customer Only Pays for Support As Needed.

A03228

CONCLUSION

- *Military Value* – AFEWES' Unique, Cross-Service Support of Electronic Warfare Development and Readiness Would Be Degraded By Relocation.

- *Return on Investment* – AFEWES is a More Cost Effective Asset if Retained Within AF Plant 4 in Fort Worth Versus Relocation to AFFTC.

- *Impact* – AFEWES Economic Impact on Fort Worth is Approximately 10 Times Greater Than Stated in the DOD Recommendation (100 Engineering Jobs).

The Proposed AFEWES Move Fails DOD's Criteria for Closure or Realignment On All Three Counts.

A03229

Recommendations

- **Keep AFEWES at Fort Worth**
  - *Least Cost to the Taxpayer*
  - *Continuous Support for Users*
  - *Full Test Capability*

"Had we attempted to conduct this entire process by means of a field test, which for all practical purposes, would have been impossible, we would have used over 200 flying hours, 100 test range hours, and 4000 MJU-23/B flares at a cost of five million dollars above the cost to accomplish the process at AFEWES. Our high degree of confidence in the simulation coupled with the ability to collect a large amount of relatively inexpensive data in a short amount of time allowed us to focus our efforts in the field test. Through a combination of using digital modeling, hardware-in-the-loop simulation, and flight testing, we found a way to increase the odds that the B-1B can perform its mission and get its crew home safely."

**-513 Engineering and Test Squadron
Presentation at 1995
Infrared Countermeasures
Specialty Group Meeting**

A03227

Lockheed
Fort Worth Company
P.O. Box 748, Fort Worth, Texas 76101

STATEMENT BY

CHARLES A. ANDERSON

VICE PRESIDENT, SPECIAL PROGRAMS

LOCKHEED FORT WORTH COMPANY

BEFORE THE

DEFENSE BASE CLOSURE AND REALIGNMENT COMMISSION

REGIONAL HEARING

DALLAS, TEXAS

19 APRIL 1995

The Integration of Modeling and Simulation Into An Operational Flight Test

513 Engineering And Test Squadron

June 1994

In 1992 the 513 Engineering and Test Squadron (513 ETS) joined several other DOD organizations in planning for a comprehensive test of US infrared countermeasure (IRCM) capabilities when employed against any of several missile systems. These systems all have a designed capability to discriminate flares from the aircraft dispensing them. The first phase of the test program, known as the Infrared Band IV Countermeasures Joint Test and Evaluation, began in June 1993 at the Naval Air Warfare Center Weapons Division at China Lake, California, and concluded in December 1993 at the McGregor Test Range at Orogrande, New Mexico. ("Band IV" refers to a specific portion of the infrared spectrum in which much of the radiation emitted by aircraft occurs.)

Aircraft supplied by 513 ETS included the B-1B and the B-52H strategic bombers. The B-1B flew two, two-hour missions in December 1993, and the B-52H flew one, two-hour mission in June 1993 and two, two-hour missions in December 1993. The June test was a quick look effort designed to give all participating organizations preliminary data that would assist them in setting up the subsequent tests at McGregor.

Each missile system in this test has some degree of infrared counter-countermeasure (IRCCM) processing, and a single flare very likely cannot overcome the IRCCM logic. Because of this, the test organizations examined IRCM techniques consisting of combinations of multiple flare drops and maneuvering tactics. With only two missions per aircraft allotted for the December test, we decided to conduct a hardware-in-the-loop simulation prior to that test in an attempt to identify promising IRCM techniques. Given a high level of confidence in the simulation and a sufficient amount of data gathered during the simulation, we could make valid decisions to focus the December flight test.

We chose the Air Force Electronic Warfare Evaluation Simulator (AFEWES) at Fort Worth as the facility in which to conduct the simulation. The enhanced infrared laboratory at AFEWES has the capability to reproduce realistic infrared signatures of aircraft and flares and can also simulate the dynamics of an aircraft dispensing flares while in flight. The hardware portion of the simulation is completed by placing the infrared missile seeker on a motion table that is gimbaled to allow the seeker to experience the lateral forces of flight while tracking the simulated aircraft or flares. To simulate missile closure during flight in a closed loop evaluation, the intensity of the simulated aircraft and flares increases, and the separation of the components of the aircraft signature (such as multiple engines) as well as the flare distance from the aircraft increases.

Although we conducted simulations for both aircraft, the following discussion covers only the B-1B since it had the higher priority.

The simulation of the aircraft consisted of two parts, the infrared signature and the flight dynamics. To develop an infrared signature, we used a validated digital model with inputs based on the actual test conditions we expected at the McGregor Test Range. Inputs to the model included the operating parameters of the aircraft as well as factors from the test environment that could affect the infrared signature, such as test site location, date, and time of day. The AFEWES engineers then used the output of the model to drive the intensity levels of the infrared lamps that simulated the aircraft in the laboratory. The aircraft flight simulation consisted of movement of the infrared lamps to mimic the flight profiles planned for the field test at McGregor.

The AFEWES simulator also uses movable lamps to simulate flares. To model the flare intensities and burn times as closely as possible to reality, we used actual data gathered from a previous test. Those data were then used to drive the lamp intensities and to force the movement of the lamps to simulate the flare trajectories.

The AFEWES engineers also accounted for atmospheric attenuation of the infrared radiation emitted by both the aircraft and the flares by using the industry standard atmospheric transmission model, LOWTRAN7. The lamp intensities for both the aircraft and the flares were then modified by applying attenuation factors based on the distance of the aircraft and flares from the missile test site.

The final part of the simulation consisted of actual missile hardware mounted on the motion table. We selected our highest priority missile from the flight test as the one on which to concentrate in the laboratory simulation. Although the motion table has the capability of simulating missile flight, we decided to hold the missile fixed in the gimbal system and to allow it only to track either the aircraft or the flares without simulating flyout. We did this in order to approximate as closely as possible the setup at the test range in which the missile seekers are fixed to a tracking mount, and the tracking mount is forced by a human operator to follow the aircraft. The seeker, which is gimbaled within the missile body, is then free to lock onto and track any infrared sources in its field of regard.

The test process consisted of spinning up the missile seeker, allowing the seeker to lock onto the simulated aircraft signature, and deploying a specific pattern of flares. The test analyst then recorded whether or not the flare deployment decoyed the seeker. We conducted enough of these individual deployments to draw conclusions regarding decoy effectiveness and to determine statistical differences in the performance of different flare patterns.

Our purpose in conducting this simulation was to evaluate several candidate countermeasure techniques in an attempt to identify only a few for follow-on evaluation during the December flight test. The variables with which we were concerned in the laboratory were the number of flares within a technique, the timing of the release of the flares, and the seeker-to-aircraft aspect. We needed to gather a large amount of data because of the number of combinations of variables and the need to draw statistically significant conclusions. The laboratory environment at AFEWES gave us the capability to collect the data in an efficient manner. We also found that we had the time within the laboratory setup to evaluate the data and make significant changes to subsequent countermeasure techniques. This is something that would have been difficult to do during the flight test.

At the conclusion of the AFEWES simulation we were able to identify a single technique that performed much better than all the other techniques we simulated in the lab. We decided to concentrate on that technique for the subsequent flight test. In conducting the flight test, which included the real aircraft dispensing real flares against real missile systems, we found that the countermeasure technique identified during the hardware-in-the-loop simulation had a significant degree of success against our top priority missile.

Had we attempted to conduct this entire process by means of a field test, which for all practical purposes, would have been impossible, we would have used over 200 flying hours, 100 test range hours, and 4000 MJU-23/B flares at a cost of five million dollars above the cost to accomplish the process at AFEWES. Our high degree of confidence in the simulation coupled with the ability to collect a large amount of relatively inexpensive data in a short amount of time allowed us to focus our efforts in the field test. Through a combination of using digital modeling, hardware-in-the-loop simulation, and flight testing, we found a way to increase the odds that the B-1B can perform its mission and get its crew home safely.

Document Separator

EO / IR TEST PROCESS
R.O.M. FACILITY COSTS

	GTSIMS DIGITAL SIMULATION (Full Plume)	AFEWES IR LAB HITL SIMULATION	GWEF / PRIMES IR TWSTE*	OPEN AIR RANGE TESTING**
DATA PASSES PER MONTH	4000	3200	900	100
MONTHLY O & M COST	$ 15K	$ 335K	$ 200K	$ 400K
COST PER DATA PASS	$ 4	$ 105	$ 225	$ 4,000

**10 MISSIONS

* TOTAL WEAPON SYSTEM TEST ENVIRONMENT (PROJECTED)

ELECTRO-OPTICS

1995 Meeting of the IRIS Specialty Group on Infrared Countermeasures

3-6 April 1995

Applied Physics Laboratory/JHU

Laurel, MD

Sponsored by

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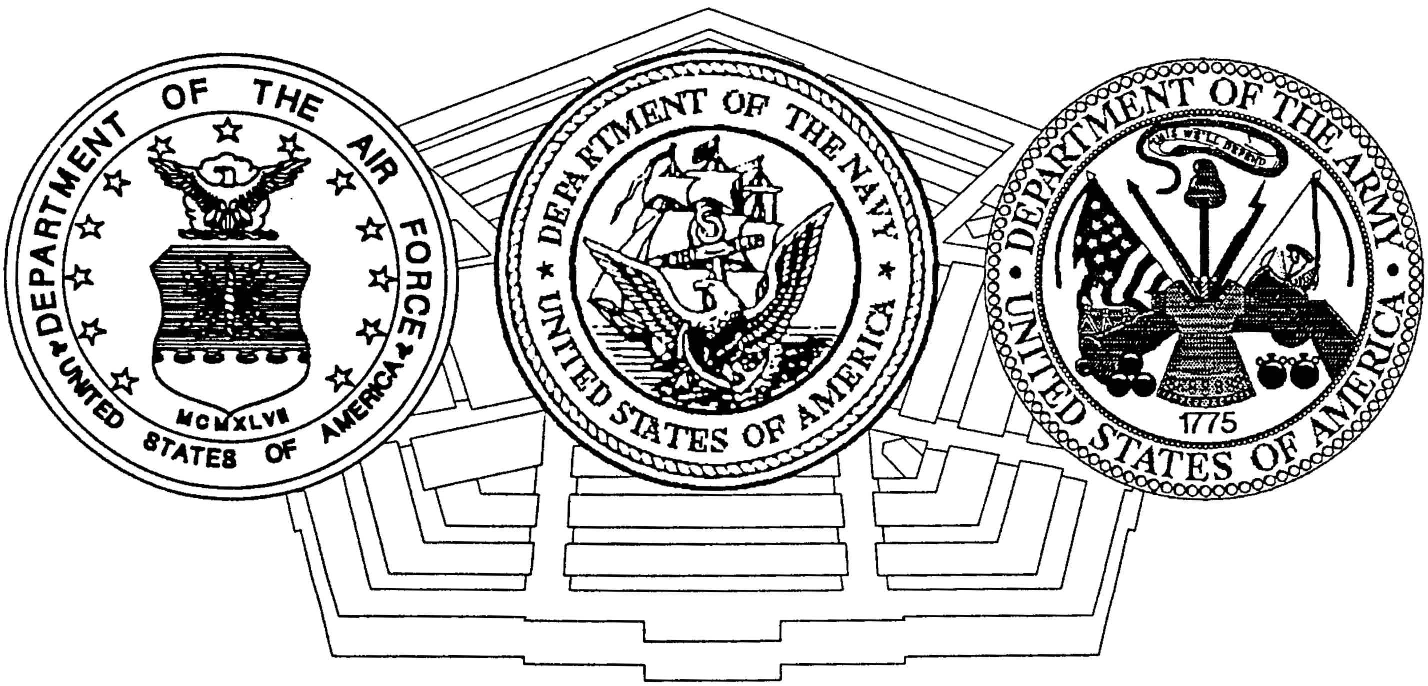


BoOD STUDY

ELECTRONIC COMBAT

EC HITL / ISTF CONSOLIDATION STUDY

HARRY BANKS
HITL/ISTF SUB-GROUP LEAD
4 February 1994

HITL CONSOLIDATION ISSUES

AFEWES Move to BAF or ACETEF

EDWARDS AFB

Advantages

- o Reduces risk of performance in installed configuration
- o Reduces testing logistics to one location
- o Provide common stimulation source and expertise of system under test from breadboard through installed configuration
- o Requires HITL/ISTF chamber interface waveguides and IR signal executive
- o ECSEL capability integrated at ISTF
- o Closed loop effort at Point Mugu is terminated
- o Supports growth of ACETEF to a category I facility

Disadvantages

- o Costs $50 - $60 Million to move selected systems
- o Loss of capability and expertise of personnel who don't move
- o Requires 12 -18 months of down time to move facility starting in FY98
- o Move completion FY99 at the earliest (MILCON 2 YRS + 1 YR AFEWES MOVE)
- o Move will effect T&E programs starting in FY96 with any AFEWES move
- o Cost to move ECSEL capability to BAF or ACETEF

Issues

- o Loss of availability for F-22 and F-18E/F in Fy97/98
- o Recompetition of AFEWES contract in FY96
- o Peak testing of F-22 avionics in FY98/99would cause slippage in other programs
- o Cost of MILCON for new building to house AFEWES costs $8 million

COMMISSIONER MONTOYA,

MY NAME IS CHARLIE ANDERSON. I AM THE VICE PRESIDENT FOR SPECIAL PROGRAMS AT LOCKHEED FORT WORTH COMPANY.

LET ME BEGIN BY THANKING YOU FOR THIS OPPORTUNITY TO PRESENT TO YOUR COMMISSION THE CASE FOR RETAINING THE AIR FORCE ELECTRONIC WARFARE EVALUATION SIMULATOR (AFEWES) IN FORT WORTH. OUR CASE IS SIMPLE: (1) THE AFEWES IS OF SIGNIFICANT CROSS-SERVICE AND INTERNATIONAL MILITARY VALUE WHICH

WOULD BE DEGRADED BY RELOCATION; (2) AN AFEWES MOVE MAKES LITTLE FINANCIAL SENSE, AND (3) AN UNNECESSARY (AND UNDERSTATED) COMMUNITY IMPACT CAN BE AVOIDED.

FIRST, YOU NEED TO KNOW THAT THE AFEWES IS A LABORATORY THAT OCCUPIES ABOUT 39,000 SQUARE FEET OF FLOOR SPACE WITHIN AIR FORCE PLANT 4 IN FORT WORTH. IT IS OPERATED BY LOCKHEED FORT WORTH COMPANY. IT EXISTS TO TEST THE ABILITY OF ELECTRONIC AND INFRARED ELECTRONIC WARFARE EQUIPMENTS TO PROTECT OUR AIRCRAFT UNDER BATTLE CONDITIONS.

DURING DESERT STORM, THE COUNTERMEASURES EQUIPMENT ONBOARD EVERY US AND COALITION AIRCRAFT HAD BEEN TESTED AT AFEWES.

AFEWES IS NEEDED BECAUSE IT CAN TEST EW EQUIPMENT AT EVERY STAGE OF DEVELOPMENT FROM CONCEPT THROUGH FINAL PRODUCT. IF YOU WAIT UNTIL THE EQUIPMENT IS FLYABLE, YOU MAY FIND (AS THE B-1 DID) THAT YOUR EQUIPMENT DOES NOT PERFORM UP TO EXPECTATIONS. AFEWES IS A CRITICAL PIECE IN THE ELECTRONIC TEST PROCESS.

AFEWES IS NEEDED BECAUSE IT IS LESS EXPENSIVE THAN FLIGHT TEST. I HAVE HERE A PAPER PRESENTED BY THE 513TH TEST SQUADRON FROM OFFUTT AFB TO AN INFRARED TESTING SYMPOSIUM EARLIER THIS MONTH THAT SAYS AFEWES TESTING DID THINGS IMPOSSIBLE TO DO IN A FLIGHT TEST, SAVED $5M, AND INCREASED THE ODDS THAT THE B-1 CAN PERFORM ITS MISSION AND GET ITS CREW HOME SAFELY. AT THE SAME SYMPOSIUM, THE AIR FORCE "SINGLE-FACE-TO-THE CUSTOMER" OFFICE AT EGLIN AFB REPORTED THAT THE COST OF AFEWES TESTING WAS LESS THAN 3% OF FLIGHT TESTING. AFEWES TESTING DOES NOT

ELIMINATE THE NEED FOR FLIGHT TESTING BUT IT CAN MINIMIZE THE AMOUNT OF EXPENSIVE FLIGHT TESTING REQUIRED.

NOW LET'S REVIEW THE INFORMATION IN THE DOD BASE CLOSURE AND REALIGNMENT REPORT. IT SAYS THAT AFEWES PROJECTED WORKLOAD IS ONLY 28%. IN FACT, OUR UTILIZATION HAS BEEN AROUND 90% THE LAST FEW YEARS AND BASED ON AVAILABLE DATA, WE EXPECT IT TO CONTINUE TO BE HIGH THROUGHOUT THE FORESEEABLE FUTURE. THIS YEAR WE HAVE ALREADY CONDUCTED A C-17 TEST AND AN AIR FORCE SPONSORED TEST THAT VERIFIES THAT LINKING AFEWES TO

OTHER TEST FACILITIES AND RANGES IS FEASIBLE. THAT OPTION, I MIGHT ADD, IS FAR LESS COSTLY THAN RELOCATING THE LABORATORY. ADDITIONAL TESTS ARE PLANNED THIS YEAR FOR THE B-2, A PRIORITY 1-1 SPECIAL ACCESS REQUIRED PROGRAM, NUMEROUS OSD SPONSORED INFRARED COUNTERMEASURES TESTS, A TEST OF THE ARMY'S ATIRCM SYSTEM, AND TESTS FOR SWEDEN, GERMANY, AND THE UNITED KINGDOM.

FOR 1996 AND BEYOND, WE HAVE, TO DATE, BEEN CONTACTED ABOUT TESTING THE B-1, B-2, F-22, AND F-15 AS WELL AS MAJOR TESTS

FOR THE US ARMY, US NAVY, JAPAN, GERMANY, SWEDEN, ITALY, AND THE UNITED KINGDOM. OTHER TESTS WILL MATERIALIZE AS THOSE YEARS APPROACH. AFEWES USAGE IS HEALTHY, AND IT IS SUPPORTED BY MILITARY NEED.

THE DOD REPORT STATES THAT OUR CAPABILITY IS DUPLICATED ELSEWHERE. THAT IS UNTRUE. WE ARE UNIQUE IN THE WORLD. THAT IS WHY THE AIR FORCE, ARMY,NAVY AND FOREIGN GOVERNMENTS TEST THEIR EQUIPMENTS HERE REGULARLY.

THE DOD REPORT STATES THAT ONLY NINE JOBS ARE AFFECTED, BUT THOSE NUMBERS REFLECT ONLY THE AIR FORCE JOBS THAT OVERSEE THE AFEWES. IN FACT THERE ARE ABOUT 100 CONTRACTOR JOBS AFFECTED. THE AIR FORCE RECOMMENDATION ACTUALLY CALLS FOR TWO MOVES: ONE OF THE AIR FORCE PERSONNEL WHO MANAGE THE AFEWES AND ANOTHER OF THE LABORATORY ITSELF.

THE SMALL SAVINGS PRESENTED IN THE REPORT ARE ENTIRELY DUE TO THE MOVE OF THE AIR FORCE MANAGEMENT FROM FORT WORTH AND EGLIN AFB TO EDWARDS AFB. WE

DO NOT OPPOSE THIS MOVE. IN FACT THE AIR FORCE CAN ACHIEVE THE SAVINGS WITHOUT MOVING THE LABORATORY.

THERE ARE NO SAVINGS ASSOCIATED WITH THE MOVE OF THE LABORATORY. THIS MOVE IS VERY COSTLY. THE AIR FORCE'S ESTIMATE OF $5.8M IS UNDERSTATED. THE REAL COST IS APPROXIMATELY TEN TIMES GREATER. I PRESENT TO YOU EXCERPTS FROM A MULTI-SERVICE STUDY COMPLETED LAST YEAR THAT ESTIMATED THE COST OF MOVING A SELECTED PORTION (NOT ALL) OF AFEWES EQUIPMENTS TO EDWARDS AFB TO BE IN THE $50-60M RANGE. WHEN THE REAL COST OF MOVING

THE LABORATORY IS FACTORED IN, IT WILL TAKE OVER 100-YEARS TO RECOUP THE COST IF YOU ASSUME THE OPERATIONS AND MAINTENANCE COST IS EQUAL.

BUT, IN FACT, AFTER THE LABORATORY IS MOVED, THE COST OF OPERATION AND MAINTENANCE WILL BE MUCH HIGHER THAN IT WILL BE IF LEFT IN THE CARE OF THE PERSONNEL WHO DESIGNED AND BUILT IT.

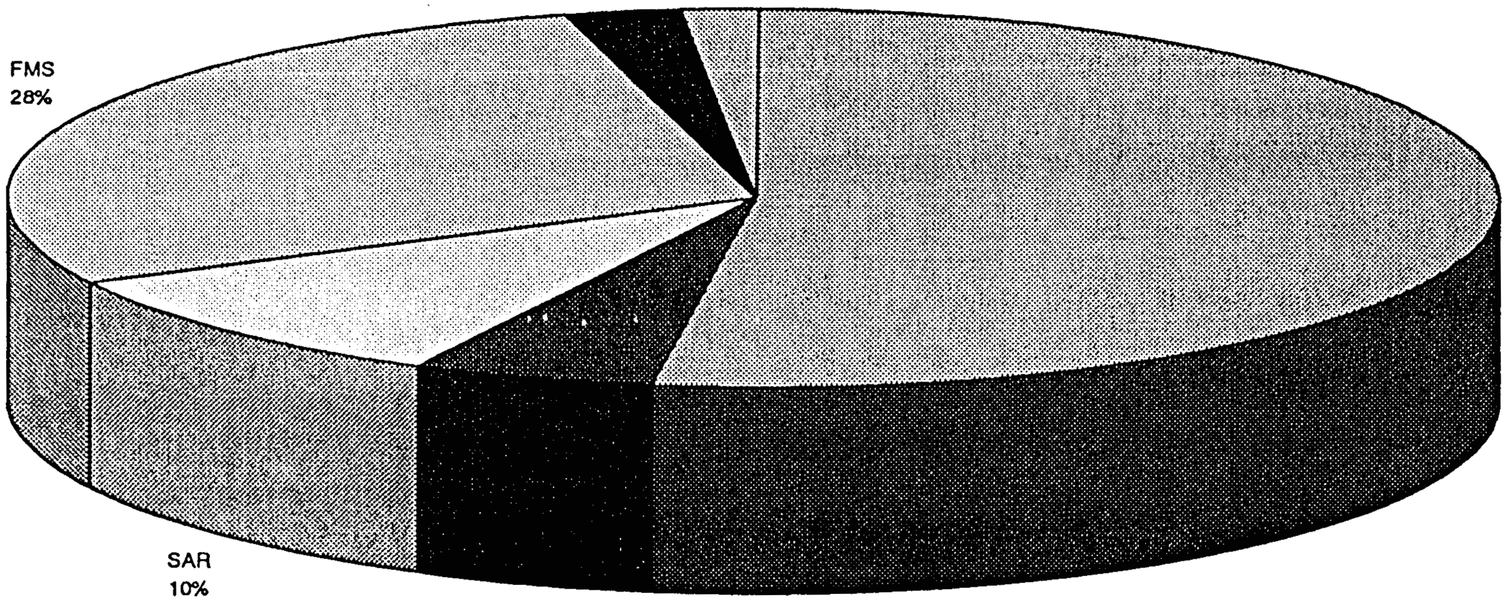
THIS IS TRUE BECAUSE THESE EQUIPMENTS ARE UNIQUE AND THE AIR FORCE HAS NOT HAD TO PROCURE DOCUMENTATION FOR ANOTHER CONTRACTOR TO ASSUME THAT ROLE. THE AFEWES IS LOCATED IN THE LOCKHEED PLANT BECAUSE IT IS THE OUTGROWTH OF

EQUIPMENTS INVENTED BY OUR ENGINEERS. ALL OF TODAY'S 39 SIMULATIONS WERE DEVELOPED BY LOCKHEED ENGINEERS AND HAVE NEVER BEEN OPERATED OR MAINTAINED BY ANYONE ELSE.

MY TIME IS UP. HOWEVER, I SUBMIT TODAY A FULL PACKAGE OF INFORMATION FOR THE COMMISSION, IN SUPPORT OF OUR RECOMMENDATION THAT THE AFEWES REMAIN IN FORT WORTH. ALL THREE CATEGORIES OF DOD REALIGNMENT CRITERIA: MILITARY VALUE, RETURN ON INVESTMENT AND IMPACT, FAVOR KEEPING THE AFEWES AT ITS CURRENT LOCATION WITHIN AIR FORCE PLANT 4.

AFEWES CAPABILITY IS ALREADY A UNIQUE, COST-EFFECTIVE, CROSS-SERVICE ASSET WHICH WILL ONLY BE DEGRADED BY DOD'S RECOMMENDED MOVE. THANK YOU FOR LISTENING. DO YOU HAVE ANY QUESTIONS?

AFEWES CUSTOMER BASE
1990 - 1994



AFEWES SUPPORTS MANY KEY PROGRAMS

USAF	→	B-52, F-4, F-15, F-16, F-111, B-1, C-130, C-141, E-3, EF-111, SPECIAL A/C, ALQ-94, ALQ-99, ALQ-117, ALQ-119, ALQ-131, ALQ-135, ALQ-137, ALQ-161, ALQ-184, ASPJ, HAVE CHARCOAL, INEWS, LINEBACKER, EWJT, ASTE, DIRCM, MIRCM, FIREFLY
ARMY	→	UH-1, UH-60, OV-1, AQUILA, ALQ-80, ALQ-136, ALQ-144, ARJS, ATIRCM, RFED
NAVY	→	A-6, A-7, EA6B, F-4, F-14, F-18, ALQ-99, ALQ-126, ALQ-162, ASPJ, AAED
FOREIGN	→	ISRAEL, BELGIUM, NETHERLANDS, KOREA, SWITZERLAND, FRANCE, SWEDEN, UK, GERMANY, ITALY, TURKEY, CANADA, NORWAY, RAPPORT, ALQ-131, ALQ-162, ALQ-171, BARRACUDA, CEREBUS, SKY SHADOW, ZEUSS,

39 THREAT SIMULATIONS

SA-2B/F	SA-18	PULSE DOPPLER AI
SA-2D	REDEYE	FOX FIRE
SA-3	WILD CARD	JAYBIRD
SA-4	GUN DISH	SVOD/RBSN
SA-6M	FLAP WHEEL	SRO-2/NRZ-2
SA-7 (A AND B)	LONG TRACK	MEG
SA-8	STINGER BASIC	JETS
SA-9	AIM-9L	COMM/DL
SA-10	AIM-9M	IR (THREAT RESONSE LAB)
SA-11M	FLANKER *	IR (THREAT ALERT/RESPONSE LAB)
SA-13	FULCRUM *	IADS (C3, SA-4, SA-8, LONG TRACK)
SA-14	FOXHOUND *	CLUTTER GENERATOR
SA-16	SPIN SCAN	TEST DIRECTOR SYSTEM

* OPERATIONAL IN CY 96

PLUS AFEWES-TACWARS AND AFEWES-FSL LINKS

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SUMMARY

OF

SIGNIFICANT AFEWES T&E ACCOMPLISHMENTS

1985 - 1994

18 April 1995

TOPIC INDEX

SIGNIFICANT AFEWES RF TEST PROGRAMS

TIMEFRAME	REPORT #	PROGRAM	ACCOMPLISHMENTS
1985 - 1986	8505 - 8509	TGU/ALQ-184 Testing	Five tests evaluating the effectiveness of the ALQ-184, and its Technique Generation Unit (TGU) versus SAM, AAA, and AI threats.
1985 - 1989	----	Senior Year/Senior Crown	Multiple classified test programs to optimize situation awareness and defensive countermeasures for strategic reconnaissance platforms.
1985 - 1990	8522 8618 8619 8644 8818 8828/89 9001	ALQ-131 Testing	Recurring DT&E and OT&E test programs (7) to refine ALQ-131 receiver/processor functions and jammer effectiveness versus SAM, AAA, and AI threats in a dense signal environment.
1986	8634	AI Correlation	Multi-site test to ensure correlation, in an ECM environment, of an actual Soviet AI system with the respective HWIL and flight test simulations of the same AI system.
1986	8613	AN/ALQ-99 Test	Development of optimized cooperative ALQ-99 countermeasures to support EA-6B ops in OPERATION EL DORADO CANYON.
1986 - 1989	8632 8803 8910	Towed Decoy Testing	Three tests supporting development and effectiveness evaluation of the Navy's Advanced Airborne Expendable Decoy versus SAM, AAA, and AI Threats. AFEWES testing supported life cycle evolution of the AAED system from initial concept into production.
1986 - 1993	8601 - 8609 8622 8726 8828 9301 9303	ASPJ Testing	Extensive DT&E and OT&E evaluations of the ALQ-165 ASPJ System which resulted in significant enhancements to its receiver/processor capabilities and jammer effectiveness in a complex signal environment.

SIGNIFICANT AFEWES RF TEST PROGRAMS

TIMEFRAME	REPORT #	PROGRAM	ACCOMPLISHMENTS
1988	8801	Tactics Development & Evaluation	TAWC-sponsored exploration of synergistic effects of combined active, expendable, and visually-cued end-game maneuver versus a monopulse SAM system. Accomplished via unique integration of AFEWES and an F-16 cockpit simulator.
1988	N/A	ATA Test	Parametric investigation of detection range as a function of platform signature levels in support of A-12 design and development activities.
1988	N/A	CAS Test	Engineering evaluation of an F-16 derivative configuration being considered for CLOSE AIR SUPPORT (CAS) applications versus an AFEWES monopulse SAM system with optical tracking capability.
1988 - 1989	8802 8912	ALQ-172	Two separate tests to, 1) refine and evaluate receiver/processor functions in a complex signal environment and, 2) optimize and evaluate deceptive ECM techniques versus multiple SAM threats for B-52, MC-130, and AC-130 applications.
1989 - 1990	8913 9008	Seek Spinner/Tacit Rainbow	Evaluation of two different concepts for an UNMANNED, LOITERING, HUNTER-KILLER VEHICLE being considered for production.
1990 - 1991	9014 9109	Integrated Towed Decoy Testing	Two separate tests evaluating the synergistic effectiveness of, 1) ALQ-126B and AAED, and 2) ASPJ and AAED versus multiple SAM threat systems.
1990 - 1992	9011 9203 9204	F-15 TEWS	Two separate DT&E tests of the ALQ-135 system to, 1) refine and evaluate receiver/processor performance in a dense signal environment, and 2) optimize and evaluate JAMMER effectiveness in one-on-one engagements with SAM and AI threat systems.
1991	N/A	Integrated AFEWES/Eglin/REDCAP Demonstration	First-ever real-time integration of digital model, HWIL, and flight test simulation resources to address a larger segment of the EC test and evaluation problem.

SIGNIFICANT AFEWES RF TEST PROGRAMS

TIMEFRAME	REPORT #	PROGRAM	ACCOMPLISHMENTS
1994	9417	F-15 TEWS OT&E	Evaluation of ALQ-135 JAMMER effectiveness versus SAM, AAA, and AI threats in an operationally realistic maximum density environment.
1994	9501	QTP	Multi-nation (US, UK, Canada, Australia) test to evaluate the effectiveness of a variety of towed decoy and dual-source ECM techniques against a surface-to-air missile system.
1994	9418	Raytheon RP	Evaluation of a prototype receiver processor using an approved AFOTEC threat scenario to be marketed by Raytheon for future EW systems.

SIGNIFICANT AFEWES INFRARED TEST PROGRAMS

TIMEFRAME	REPORT #	PROGRAM	ACCOMPLISHMENTS
1984 - 1986	8503 8455 8450 8513 8640	Have Charcoal	Five tests to develop optimized Band I/Band II IRCM techniques later incorporated into AIR FORCE ONE and AWACS.
1986 - 1990	8531 8709 8815 8903 8914 9009	AFEWC IR Tests	Six individual tests which accomplished exploitation and parametric testing for multiple IR threat seekers which supported development of AFEWC's TEAM & IMOM digital models.
1991	9206	Big Safari IRCM	Evaluation and refinement of a directed IRCM device versus Band IV infrared seekers to determine DIRCM ability to protect C-130 aircraft.
1992	9210	DIRCM/MIRCM	Competitive evaluation of 2 alternative IRCM technologies to determine the most effective solution for C-130 applications.
1993	9302	Snowstorm	A quick-reaction test performed for AMC to optimize flare ejection sequences for C-141 transports directly linked to BOSNIAN RELIEF efforts.
1993	9307	ASTE	Initial real-wavelength characterization of 9 advanced IR expendable techniques being developed by ASC for F-16, B-1B, C-130 and next generation DOD aircraft applications.
1993	9313	513 Test Squadron	Optimized flare dispenser settings for the B-1.
1994	9404	AFIWC	Test to provide the Air Force Information Warfare Center (AFIWC) with seeker characterization data on a modern threat shoulder-launched infrared missile.
1994	9407	Firefly	A test to provide Northrop with effectiveness data to support a proposal for a major competitive UK/USSOCOM Directional Infrared CounterMeasures (DIRCM) contract.

SIGNIFICANT AFEWES INFRARED TEST PROGRAMS

TIMEFRAME	REPORT #	PROGRAM	ACCOMPLISHMENTS
1994	9419	Army ALQ-144	Evaluation of multiple ALQ-144 waveforms against a shoulder-launched threat infrared missile.
1994	Classified	Project 7	Major DOD priority 1-1 special access required infrared countermeasures test.
1994	Data Package	Scorpio	A test to provide Lockheed Sanders with effectiveness data to support a proposal for a major competitive UK/USSOCOM Directional InfraRed CounterMeasures (DIRCM) contract.

SIGNIFICANT AFEWES FOREIGN TEST PROGRAMS			
TIMEFRAME	REPORT #	PROGRAM	ACCOMPLISHMENTS
1986	8654	Israeli/ALQ-178 Test	Evaluation of candidate active techniques prior to specification of ALQ-178 design requirements.
1987	8718	OTP (Multi-National)	Evaluation of 4 diverse jamming concepts to determine effectiveness versus an advanced SAM for TORONADO, P-3C, and OV-1 applications.
1988	8810	Israeli ALQ-178 (Lisa)	Dense environment effectiveness test of prototype hardware versus SAM and AAA threat systems for F-16 applications.
1988	8816	British ALQ-101	Evaluation and refinement of ALQ-101 technique settings versus multiple SAM and AAA threats for JAGUAR applications.
1989	8916	German Cerebus III	Optimization and dense environment effectiveness test of the CIII system versus multiple SAM and AAA threats for TORONADO IDS fighter/bomber applications.
1990	9016	German ALQ-GY	Optimization and evaluation of an advanced prototype-system versus SAM and AI threats to support a future production decision.
1991	9103	Trial Quincywort	Effectiveness evaluation for the UK of the Integrated Zeus System versus SAM and AAA threats for HARRIER GR5/GR7 applications.
1993	9401	Turkish Rapport	Extensive evaluation of the ALQ-178 receiver processor, Jammer effectiveness evaluation versus multiple SAM, AAA, and AI threat systems, plus IR countermeasures evaluation versus hostile IR threat seekers.
1994	9410	TIINA 3	Swedish Air Force test to develop, optimize, and evaluate ECM techniques against two surface-to-air missiles (SAM) and one Anti-Aircraft Artillery (AAA) system.

* OTHER FOREIGN CUSTOMERS: CANADA, FRANCE, ITALY, NATO, SWITZERLAND

AFEWES WORKLOAD

AF COMMENT

- PROJECTED WORKLOAD WAS ONLY 28 PERCENT OF ITS AVAILABLE CAPACITY.

FACTS

- AVERAGE WORKLOAD FOR CY 93 AND CY 94 WAS 90% (BASED ON A 16-HOUR DAY). WORKLOAD HAS ACTUALLY BEEN INCREASING BECAUSE NEW CAPABILITIES HAVE BEEN COMING ON-LINE.
- WORKLOAD IS PROJECTED TO CONTINUE AT ABOUT THE SAME LEVEL BASED ON CUSTOMER CONTACTS. CURRENTLY PLANNED TESTS INCLUDE:

1995	1996 AND BEYOND
C-17 B-2 BAND IV INFRARED COUNTERMEASURES (IRCM) ADVANCED TACTICAL IRCM - ARMY DIRECTIONAL IRCM - UK/USSOCOM SWEDEN GERMANY DOD SPECIAL ACCESS	B-1 B-2 F-22 ALQ-135 ADVANCED TACTICAL RADAR JAMMER - ARMY ADVANCED MISSILE WARNING RECEIVER - ARMY INTEGRATED DEFENSIVE ELECTRONIC COUNTERMEASURES SYSTEM - NAVY SWEDEN UNITED KINGDOM ITALY

- THE DELIVERY OF THE MULTIPLE EMITTER GENERATOR EXPANSION (1995) AND RECONFIGURABLE AIRBORNE INTERCEPTOR (1996) WILL ALSO SPUR INCREASES IN WORKLOAD.

AFEWES DUPLICATION

AF COMMENT

- AFEWES BASIC HARDWARE-IN-THE-LOOP INFRASTRUCTURE IS DUPLICATED AT OTHER AIR FORCE TEST AND EVALUATION FACILITIES.

FACTS

- AFEWES HAS 39 SIMULATIONS. TWO BUILT BY LFWC ARE DUPLICATED AT OTHER AIR FORCE AND ARMY LOCATIONS. FOUR OTHER SIMULATIONS SIMILAR (BUT OLDER AND UNVALIDATED) EXIST AT OTHER AIR FORCE AND NAVY LOCATIONS.
- AFEWES IS USED BY AIR FORCE, NAVY, ARMY, NATO AND FOREIGN GOVERNMENTS BECAUSE IT IS UNIQUE IN THE WORLD.

* AUSTRALIA	* ITALY	* SWITZERLAND
* CANADA	* KOREA	* TURKEY
* FRANCE	* NETHERLANDS	* UK
* GERMANY	* NORWAY	* BELGIUM
* ISRAEL	* SWEDEN	

- IT IS SELF CONTRADICTORY TO CLAIM DUPLICATION AND THEN MAKE PLANS TO MOVE THE CAPABILITY.

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ATTACH (A)

AFEWES CLOSURE WOULD HAVE SIGNIFICANT IMPACTS ON DOD / ALLIED T&E

DIGITAL MODELS → MEASUREMENT FACILITIES → INTEGRATION LABS → ? → INSTALLED SYSTEM TEST FACILITY → FLIGHT TEST

- *INABILITY TO PERFORM DENSE ENVIRONMENT EFFECTIVENESS TESTING*
- *INABILITY TO PERFORM STATISTICALLY RELEVANT IR ALERT / RESPONSE TESTING*
- *INABILITY TO PERFORM OPERATIONALLY REALISTIC SEMI-ACTIVE MISSILE T&E*
- *INABILITY TO PERFORM FULLY-DYNAMIC, MULTI-SPECTRAL (IR / RF) T&E*
- *INABILITY TO PERFORM END-GAME MANEUVER T&E*

WITHOUT AFEWES, DOD AND ALLIED AIRCRAFT WOULD ENTER COMBAT WITHOUT FULLY PROVEN / REFINED EC SYSTEMS

HITL CONSOLIDATION ISSUES

AFEWES Move to BAF or ACETEF

EDWARDS AFB

Advantages

- o Reduces risk of performance in installed configuration
- o Reduces testing logistics to one location
- o Provide common stimulation source and expertise of system under test from breadboard through installed configuration
- o Requires HITL/ISTF chamber interface waveguides and IR signal executive
- o ECSEL capability integrated at ISTF
- o Closed loop effort at Point Mugu is terminated
- o Supports growth of ACETEF to a category I facility

Disadvantages

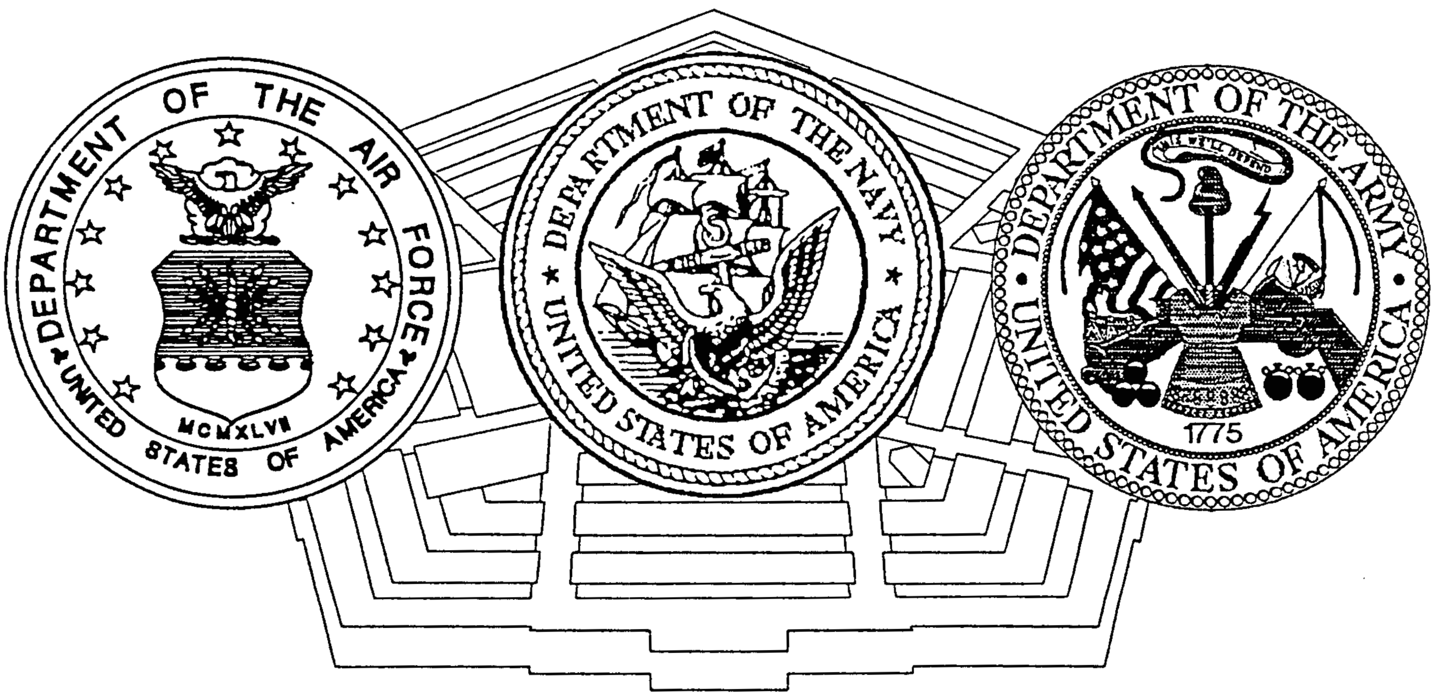
- o Costs $50 - $60 Million to move selected systems
- o Loss of capability and expertise of personnel who don't move
- o Requires 12 -18 months of down time to move facility starting in FY98
- o Move completion FY99 at the earliest (MILCON 2 YRS + 1 YR AFEWES MOVE)
- o Move will effect T&E programs starting in FY96 with any AFEWES move
- o Cost to move ECSEL capability to BAF or ACETEF

Issues

- o Loss of availability for F-22 and F-18E/F in Fy97/98
- o Recompetition of AFEWES contract in FY96
- o Peak testing of F-22 avionics in FY98/99would cause slippage in other programs
- o Cost of MILCON for new building to house AFEWES costs $8 million

T&E INFRASTRUCTURE EXECUTIVE AGENT

BOARD OF DIRECTORS



BoOD STUDY

ELECTRONIC COMBAT

EC HITL / ISTF CONSOLIDATION STUDY

HARRY BANKS
HITL/ISTF SUB-GROUP LEAD

4 February 1994

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The Integration of Modeling and Simulation

Into An Operational Flight Test

513 Engineering And Test Squadron

June 1994

In 1992 the 513 Engineering and Test Squadron (513 ETS) joined several other DOD organizations in planning for a comprehensive test of US infrared countermeasure (IRCM) capabilities when employed against any of several missile systems. These systems all have a designed capability to discriminate flares from the aircraft dispensing them. The first phase of the test program, known as the Infrared Band IV Countermeasures Joint Test and Evaluation, began in June 1993 at the Naval Air Warfare Center Weapons Division at China Lake, California, and concluded in December 1993 at the McGregor Test Range at Orogrande, New Mexico. ("Band IV" refers to a specific portion of the infrared spectrum in which much of the radiation emitted by aircraft occurs.)

Aircraft supplied by 513 ETS included the B-1B and the B-52H strategic bombers. The B-1B flew two, two-hour missions in December 1993, and the B-52H flew one, two-hour mission in June 1993 and two, two-hour missions in December 1993. The June test was a quick look effort designed to give all participating organizations preliminary data that would assist them in setting up the subsequent tests at McGregor.

Each missile system in this test has some degree of infrared counter-countermeasure (IRCCM) processing, and a single flare very likely cannot overcome the IRCCM logic. Because of this, the test organizations examined IRCM techniques consisting of combinations of multiple flare drops and maneuvering tactics. With only two missions per aircraft allotted for the December test, we decided to conduct a hardware-in-the-loop simulation prior to that test in an attempt to identify promising IRCM techniques. Given a high level of confidence in the simulation and a sufficient amount of data gathered during the simulation, we could make valid decisions to focus the December flight test.

We chose the Air Force Electronic Warfare Evaluation Simulator (AFEWES) at Fort Worth as the facility in which to conduct the simulation. The enhanced infrared laboratory at AFEWES has the capability to reproduce realistic infrared signatures of aircraft and flares and can also simulate the dynamics of an aircraft dispensing flares while in flight. The hardware portion of the simulation is completed by placing the infrared missile seeker on a motion table that is gimbaled to allow the seeker to experience the lateral forces of flight while tracking the simulated aircraft or flares. To simulate missile closure during flight in a closed loop evaluation, the intensity of the simulated aircraft and flares increases, and the separation of the components of the aircraft signature (such as multiple engines) as well as the flare distance from the aircraft increases.

Although we conducted simulations for both aircraft, the following discussion covers only the B-1B since it had the higher priority.

The simulation of the aircraft consisted of two parts, the infrared signature and the flight dynamics. To develop an infrared signature, we used a validated digital model with inputs based on the actual test conditions we expected at the McGregor Test Range. Inputs to the model included the operating parameters of the aircraft as well as factors from the test environment that could affect the infrared signature, such as test site location, date, and time of day. The AFEWES engineers then used the output of the model to drive the intensity levels of the infrared lamps that simulated the aircraft in the laboratory. The aircraft flight simulation consisted of movement of the infrared lamps to mimic the flight profiles planned for the field test at McGregor.

The AFEWES simulator also uses movable lamps to simulate flares. To model the flare intensities and burn times as closely as possible to reality, we used actual data gathered from a previous test. Those data were then used to drive the lamp intensities and to force the movement of the lamps to simulate the flare trajectories.

The AFEWES engineers also accounted for atmospheric attenuation of the infrared radiation emitted by both the aircraft and the flares by using the industry standard atmospheric transmission model, LOWTRAN7. The lamp intensities for both the aircraft and the flares were then modified by applying attenuation factors based on the distance of the aircraft and flares from the missile test site.

The final part of the simulation consisted of actual missile hardware mounted on the motion table. We selected our highest priority missile from the flight test as the one on which to concentrate in the laboratory simulation. Although the motion table has the capability of simulating missile flight, we decided to hold the missile fixed in the gimbal system and to allow it only to track either the aircraft or the flares without simulating flyout. We did this in order to approximate as closely as possible the setup at the test range in which the missile seekers are fixed to a tracking mount, and the tracking mount is forced by a human operator to follow the aircraft. The seeker, which is gimbaled within the missile body, is then free to lock onto and track any infrared sources in its field of regard.

The test process consisted of spinning up the missile seeker, allowing the seeker to lock onto the simulated aircraft signature, and deploying a specific pattern of flares. The test analyst then recorded whether or not the flare deployment decoyed the seeker. We conducted enough of these individual deployments to draw conclusions regarding decoy effectiveness and to determine statistical differences in the performance of different flare patterns.

Our purpose in conducting this simulation was to evaluate several candidate countermeasure techniques in an attempt to identify only a few for follow-on evaluation during the December flight test. The variables with which we were concerned in the laboratory were the number of flares within a technique, the timing of the release of the flares, and the seeker-to-aircraft aspect. We needed to gather a large amount of data because of the number of combinations of variables and the need to draw statistically significant conclusions. The laboratory environment at AFEWES gave us the capability to collect the data in an efficient manner. We also found that we had the time within the laboratory setup to evaluate the data and make significant changes to subsequent countermeasure techniques. This is something that would have been difficult to do during the flight test.

At the conclusion of the AFEWES simulation we were able to identify a single technique that performed much better than all the other techniques we simulated in the lab. We decided to concentrate on that technique for the subsequent flight test. In conducting the flight test, which included the real aircraft dispensing real flares against real missile systems, we found that the countermeasure technique identified during the hardware-in-the-loop simulation had a significant degree of success against our top priority missile.

Had we attempted to conduct this entire process by means of a field test, which for all practical purposes, would have been impossible, we would have used over 200 flying hours, 100 test range hours, and 4000 MJU-23/B flares at a cost of five million dollars above the cost to accomplish the process at AFEWES. Our high degree of confidence in the simulation coupled with the ability to collect a large amount of relatively inexpensive data in a short amount of time allowed us to focus our efforts in the field test. Through a combination of using digital modeling, hardware-in-the-loop simulation, and flight testing, we found a way to increase the odds that the B-1B can perform its mission and get its crew home safely.

IR ELECTRO-OPTICS

1995 Meeting of the IRIS Specialty Group on Infrared Countermeasures

3-6 April 1995

Applied Physics Laboratory/JHU

Laurel, MD

Sponsored by

Night Vision & Electronic Sensors Directorate
Defense Technical Information Center
Advanced Research Projects Agency
AF Wright Laboratory Avionics and Materials Directorates
Ballistic Missile Defense Organization
Office of Naval Research
U.S. Defense Industry
Department of the Army, Office of the Assistant Secretary, RD&A

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The Infrared Information Analysis Center

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EO / IR TEST PROCESS
R.O.M. FACILITY COSTS

	GTSIMS DIGITAL SIMULATION (Full Plume)	AFEWES IR LAB HITL SIMULATION	GWEF / PRIMES IR TWSTE*	OPEN AIR RANGE TESTING**
DATA PASSES PER MONTH	4000	3200	900	100
MONTHLY O & M COST	$ 15K	$ 335K	$ 200K	$ 400K
COST PER DATA PASS	$ 4	$ 105	$ 225	$ 4,000

**10 MISSIONS

* TOTAL WEAPON SYSTEM TEST ENVIRONMENT (PROJECTED)

IR ELECTRO-OPTICS

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Administered by

The Infrared Information Analysis Center

7 April 1995

Subject: BRAC 95 Decision to Disestablish/Relocate AFEWES and REDCAP

To Whom It May Concern:

My perspective on this subject is from the viewpoint of a long time user of Electronic Warfare (EW) simulation and range test facilities to develop and optimize EW systems and processes when faced with an ever increasing array of complex threats and a most dynamic world environment. Operational EW systems are only as effective as the latest information and analysis/evaluation allows them to be.

The integration of AFEWES and REDCAP with AFFTC is a fundamentally sound approach for Air Force EW. Management and utilization planning of EW test facilities, from a central point, is quite desirable. However, perhaps this integration could be accomplished with electronic linkage of facilities rather than physical movement. Electronic integration should be reviewed/analyzed before mandating physical facility moves. Additionally, we should determine if and how our EW simulation facility resources can be shared with our international allies/friends if the suggested physical move takes place.

If facility movement really is the best answer to this integration issue, it must be done slowly and carefully. Why? For many reasons, but the most important ones are:

(1) The AF EW community, and our overall defense posture, cannot afford a lengthy time gap during which these EW simulation facilities are not available for testing/analysis. The only prudent plan would be to move a facility, one threat system at a time, to minimize such a gap.

(2) Appropriate data and documentation must be generated on the bits and pieces of these facilities and operator/maintenance training for new personnel must be provided. These activities take time.

A carefully planned phase down of simulator systems at the existing facilities must be laid out and followed in coordination with a corresponding planned ramp up of these systems at a new facility location. This is likely to be a 2 - 5 year process.

In summary, I would like to recommend that the decision makers appropriately consider:

(1) The determination of whether or not physical movement of AFEWES and REDCAP is necessary and desirable.

(2) If physical movement is decreed, then develop a plan to spend this over a multi-year time period to avoid dangerous gaps in test simulator availability and potential EW simulation chaos.

Sincerely,

CGBrown

Charles G. Brown, PhD

CGB:dj

Document Separator

1100 Troon Dr. West
Niceville, FL. 32578
Tel. (904)-897-1365

1 April, 1995

Mr. Alan J. Dixon, Chairman
Defense Base Closure and Realignment Commission
1700 North Moore Street, Suite 1425
Arlington, Virginia 22209

Dear Mr. Dixon:

My purpose in this writing is to bring to your attention some opposing views on the DOD recommendation to "Disestablish" the **Air Force Electronic Warfare Evaluation Simulator (AFEWES)**. In my view we are dangerously near some decisions that will adversely impact the survivability of our combat forces of the future.

In my experience, during the Vietnam conflict we flew many combat missions into the Hanoi area where the primary threat was radar controlled guns and surface-to-air missiles. The radar systems we faced then, by today's standards, were antiquated and obsolete. Although during the latter stages of that conflict we did have some rudimentary radar warning and electronic counter measures available to the aircrews, our primary means of survival was speed and maneuver. Speed and maneuver were not always effective (our losses to hostile radar controlled systems approximates the total active inventory of fighter aircraft in the Air Force today) and it is clear that they are totally ineffective against current Infrared and Radar controlled threats.

My point is, in today's world of shrinking Force Structure, we are not serious enough about the survivability of the forces that we have. One has little difficulty in postulating a significant radar controlled Surface-to-Air threat capability in any potential enemy of the United States. This is not the case for the Air-to-Air threat.

AFEWES has recently completed, at great expense to the Air Force, modernization upgrades to the Radio-Frequency (RF) and Infrared (IR) measurement capabilities of the system. It is a one-of-a-kind system that is not duplicated anywhere in the world and it's disestablishment is a mistake with potentially disastrous ramifications. As you know, Electronic Combat is a highly dynamic warfighting imperative which requires constant assessment of the threat, research for the counter, and counter to the counter etc.etc.. AFEWES provides that capability.

In addition to the unacceptable loss of capability, the cost and "workload impacts" justification used in the DOD recommendation to disestablish AFEWES is flawed. For example, the estimated one-time cost to implement is $5.8 million. A closer look will reveal the cost to be near $60 million, and the projected workload of 28% of available capacity is more accurately near 90%.

Mr. Dixon, you face a very difficult task and I don't envy you the position. Let me assure you that I understand and support the need to consolidate and reduce cost wherever possible. My only request is that you take another serious look at the requirement for AFEWES and the justification used in recommending it's disestablishment.

Thank you for allowing me to comment.

Very Respectfully

William L. Kirk

William L. Kirk
General USAF (RET)

Document Separator

PLEASE PASS
TO DAVE
JAGGERS
THANX

April 4, 1995

Mr. Allen J. Dixon, Chairman
Defense Base Closure and Realignment Commission
1700 N. Moore Street
Suite 1425
Arlington, VA 22209

Dear Mr. Dixon,

I am writing this letter as a private citizen who is concerned at some of the planned actions of the Base Closure and Realignment Commission. I am a retired Air Force civilian who for forty years was involved with intelligence and Electronic Warfare activities of all services. For the last ten years of my career I served as the Technical Director of the Air Force Electronic Warfare Center in San Antonio. Since retirement I have worked as a volunteer (all unpaid) in several areas related to Electronic Warfare to include a term a president of the Association of Old Crows, the Electronic Defense Association.

My specific areas of concern pertain to the Air Force Electronic Warfare Evaluation Simulator (AFEWES) in Ft. Worth Texas and the Realtime Electromagnetic Digitally Controlled Analyzer and Processor (REDCAP) in Buffalo New York. I worked with both of these facilities from the late 1960's until my retirement in 1991. During the Viet Nam conflict we learned that past neglect of Electronic Warfare was costing many lives as we had to develop techniques and equipment to counter a relatively old and unsophisticated Surface-to-Air Missile (SAM), the SA-2. Both AFEWES and REDCAP were critical assets as we successfully developed Electronic Warfare systems that saved many lives over the course of that conflict. More importantly, however, we learned that it was imperative that we retain these facilities as we developed capabilities to counter the new and more sophisticated threats to our aircraft. Never again should we have to develop defenses <u>after</u> a war has started.

REDCAP and AFEWES have worked cooperatively since Viet Nam. My first major work with these organizations was during a study that used REDCAP for analysis of aircraft penetrating Air Defenses up to the point of engagement by a missile, and then the data was transferred by computer tape to AFEWES where the terminal engagement analysis was performed. (As it turned out, this was essentially a computer analysis of what became known as LINEBACKER II) At the time we all thought this was an excellent procedure even though it was a bit laborious due to the physical transfer of computer tapes. We could only dream of the day when new technologies would permit electronic linking of these and other facilities to permit even faster, more efficient, cheaper and more sophisticated analysis of increasingly complex Electronic Warfare systems that must counter the increasingly complex weapons.

Now that such electronic linking is feasible and proven, there is a recommendation to ignore that capability and consolidate facilities physically. This seems totally counter-productive and the physical move creates an expense that far exceeds the minimal savings that might accrue. I have no expertise in the cost of moves of this nature, but to suggest that the AFEWES facility can be moved for a cost of $5.8 million seems optimistic at best and out of touch with reality at worst. I have not seen the figures for REDCAP, but I presume they are similar.

My reason for writing this letter is simply that I fear that we are rapidly dismantling a capability to develop and test Electronic Warfare equipment that will be sorely needed where ever the next hostilities occur. I would also suggest a careful review of the cost figures which seem far out of line.

I sincerely trust that any decisions made to close facilities will always be made with the needs of our military in mind. We cannot afford to buy time to develop defenses with the lives of our service personnel.

Thank you for your consideration in this matter.

Craig L. Johnson

Craig L. Johnson
2907 Gainesborough
San Antonio, TX 78230

RETURN ON INVESTMENT (ROI)

AF COMMENT

- THE TOTAL ESTIMATED ONE-TIME COST TO IMPLEMENT THIS RECOMMENDATION IS $5.8M ... ANNUAL RECURRING SAVINGS AFTER IMPLEMENTATION ARE $0.8M WITH A RETURN ON INVESTMENT EXPECTED IN SEVEN YEARS. THE NET PRESENT VALUE OF THE COST AND SAVINGS OVER 20 YEARS IS A SAVINGS OF $5.8 MILLION.

FACTS

- THE AIR FORCE ASSESSMENT SIGNIFICANTLY UNDERESTIMATES THE COST OF IMPLEMENTATION AND THE DISCOUNT RATE RESULTING IN AN INACCURATE ROI AND BREAK-EVEN ESTIMATE. THE MORE LIKELY OUTCOME COMPARED TO THE AIR FORCE DATA IS:

	FACT	AIR FORCE
COST	$ 43.9M	$ 5.8M
NPV (OVER 20 YEARS)	$ (27.7)M	$ 5.8M
BREAK-EVEN	53 YEARS	7 [illegible]ARS

COST TO IMPLEMENT

AF COMMENT

- THE TOTAL ESTIMATED ONE-TIME COST TO IMPLEMENT THIS RECOMMENDATION IS $5.8M.

FACTS

- THE FOLLOWING SIMULATIONS/SUPPORT SYSTEMS ARE ESSENTIAL:

SA-4
SA-6M
SA-8
SA-10
SA-11
FLAP WHEEL
FLANKER
GUN DISH
FULCRUM
FOXHOUND
CLUTTER GENERATOR
BASIC INFRARED LAB
ENHANCED INFRARED LAB
MULTIPLE EMITTER GENERATOR BASIC
MULTIPLE EMITTER GENERATOR ADVANCED
DATA PROCESSING FACILITY
RESIDUAL INVENTORY/SPARE PARTS
JAMMER TECHNIQUE SIMULATOR
BUS SNAPSHOT ANALYZER
TEST EQUIPMENT
SOFTWARE DEVELOPMENT FACILITY
TEST DIRECTOR SYSTEM

- THE RESULTING ONE-TIME COST TO IMPLEMENT (USING CY98 RATES):

– DRAWINGS FOR 186 RACKS	$ 8,949,360
– SOFTWARE AND HARDWARE O&M MANUALS (17 SIMULATIONS/SUPPORT SYSTEM)	8,428,539
– PHASE IN/PHASE OUT/TRAINING/OVERLAP	12,924,117
– DISASSEMBLY/MOVE/REASSEMBLY INTEGRATION	6,495,263
– FACILITY PREPARATION (36,000 SQ FT @ $140/SQ FT)	5,040,000
– REPLACEMENT OF LFWC ASSETS USED TO SUPPORT AFEWES	2,100,000
TOTAL COST FOR MINIMUM MOVE	$43,937,279

THE TOTAL COST TO MOVE ALL AFEWES SIMULATIONS IS $66.7M

AFEWES RELOCATION COST

	TIME	DOLLARS	MANHOURS
● COST TO TAKE APART	1 YR	1,300,028.80	13,265.6
● COST TO TRANSPORT	1 MO	1,167,124.00	N/A
● COST TO PUT BACK TOGETHER		4,696,120.80	47,919.6
● INTEGRATION COSTS	2YRS	1,646,909.80	16,800.1
● COSTS TO HOST (INDLUDES MODIFICATION OF 39,000 SQ. FT. BLDG)		7,451,528.00	20,196.0
● DRAWING UPDATES	3 YRS	18,008,676.00	183,762.0
● OPERATION AND MAINTENANCE MANUALS			
– HARDWARE	2 YRS	5,497,408.00	56,096.0
– SOFTWARE	2 YRS	5,454,729.00	55,660.5

AFEWES RELOCATION COST

	TIME	DOLLARS	MANHOURS
● TRAINING FOR EDWARDS AFB PERSONNEL			
– SOFTWARE	1 YR	2,277,520.00	23,240.0
– HARDWARE	1 YR	1,869,840.00	19,080.0
– SIMULATOR OPERATOR	1 YR	638,960.00	6,520.0
– SUPPORT EQUIPMENT	1 YR	2,530,360.00	25,820.0
– SIMULATOR SUPPORT FOR TRAINING	1 YR	866,320.00	8,840.0
● ONE YER MAINTENANCE SUPPORT (20 MEN)	1 YR	4,076,800.00	41,600.0
● REPLACEMENT OF LFWC ASSETS USED TO SUPPORT AFEWES	N/A	2,100,000.00	
● CHIEF ENGINEER/PROGRAM MANAGEMENT SUPPORT		5,086,200.00	51,900.0
● AIR FARE/PER DIEM FOR 22 MEN IN 1998 AND 20 MEN IN 1999	N/A	2,033,057.00	N/A
TOTAL		66,763,801.40	571,547.8

LINE #	SIMULATION	DRAWINGS (MANHOURS)	O&M HARDWARE MANUALS (MANHOURS)	SOFTWARE MANUALS (MANHOURS)	SOFTWARE TRAINING (MANHOURS)	HARDWARE TRAINING (MANHOURS)	OPERATOR TRAINING (MANHOURS)	SUPPORT EQUIPMENT TRAINING (MANHOURS)	SUPPORT PERSONNEL DURING TRAINING (MANHOURS)
1	SA-2	16368.0	708.0	1995.0	640.0	400.0	240.0	420.0	320.0
2	SA-3	8184.0	1800.0	1995.0	640.0	400.0	360.0	420.0	320.0
3	SA-4	310.0	762.0	1995.0	1440.0	1120.0	240.0	2240.0	320.0
4	SA-6M	9672.0	522.0	1995.0	960.0	760.0	40.0	1680.0	230.0
5	SA-8	310.0	780.0	1995.0	1440.0	1120.0	360.0	2240.0	320.0
6	SA-10	310.0	4500.0	1995.0	1600.0	1440.0	360.0	2240.0	340.0
7	SA-11M	310.0	0.0	1995.0	960.0	760.0	40.0	1680.0	230.0
8	FLAPWHEEL	11160.0	150.0	1995.0	640.0	400.0	360.0	400.0	420.0
9	GUNDISH	5580.0	240.0	997.5	640.0	400.0	360.0	420.0	320.0
10	LONG TRACK	11160.0	750.0	1995.0	640.0	400.0	360.0	420.0	320.0
11	FLANKER	0.0	4200.0	1995.0	960.0	720.0	360.0	2000.0	400.0
12	FULCRUM	0.0	4200.0	1995.0	960.0	720.0	360.0	2000.0	400.0
13	FOXHOUND	0.0	4200.0	1995.0	1280.0	1120.0	360.0	2000.0	400.0
14	JB/FF/PDAI/SPIN SCAN	21576.0	2628.0	1995.0	960.0	720.0	360.0	2000.0	400.0
15	MEG BASIC	14136.0	1422.0	1995.0	1600.0	1760.0	360.0	840.0	500.0
16	MEG ADVANCE	0.0	1422.0	1995.0	1600.0	1760.0	360.0	840.0	500.0
17	BSA	0.0	600.0	798.0	80.0	160.0	40.0	80.0	40.0
18	JETS	17856.0	960.0	1995.0	160.0	320.0	160.0	0.0	160.0
19	JEDI	1488.0	680.0	399.0	160.0	40.0	40.0	0.0	40.0
20	COMM/DL	9672.0	1920.0	1995.0	640.0	400.0	240.0	420.0	320.0
21	IR - CARCO	310.0	4200.0	1995.0	1600.0	1920.0	360.0	2480.0	1250.0
22	IR - BENDIX	16368.0	4200.0	1995.0	800.0	960.0	360.0	840.0	850.0
23	CLUTTER GENERATOR	4464.0	720.0	1995.0	320.0	160.0	40.0	40.0	40.0
24	TEST DIRECTORS SYSTEM	0.0	6000.0	1995.0	1600.0	480.0	160.0	40.0	160.0
25	DATA PROCESSING FACILITY	0.0	720.0	399.0	80.0	80.0	40.0	0.0	40.0
26	SOFTWARE DEVELOPMENT FACILITY	3720.0	720.0	399.0	80.0	80.0	40.0	0.0	40.0
27	MISSILE DEVELOPMENT FACILITY	3720.0	720.0	399.0	120.0	80.0	40.0	0.0	40.0
28	RAI DEVELOPMENT FACILITY	4464.0	720.0	399.0	160.0	160.0	40.0	0.0	40.0
29	TACAN	1488.0	750.0	1995.0	320.0	160.0	40.0	40.0	40.0
30	C3	9672.0	1302.0	1995.0	160.0	80.0	40.0	40.0	40.0
31	SA-4 WITH C3	1488.0	1200.0	1995.0	P/O #3 & #30	P/O #3 & #30	P/O #3 & #30	P/O #3 & #30	P/O #3 & #30
32	SA-8 WITH C3	1488.0	1200.0	1995.0	P/O #5 & #30	P/O #5 & #30	P/O #5 & #30	P/O #5 & #30	P/O #5 & #30
33	TEST MANAGEMENT CENTER #1	0.0	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24
34	TEST MANAGEMENT CENTER #2	0.0	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24
35	TEST MANAGEMENT CENTER #3	0.0	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24
36	TEST MANAGEMENT CENTER #4	0.0	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24
37	TEST MANAGEMENT CENTER #5	0.0	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24
38	TEST OBSERVATION CENTER	0.0	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24	P/O #24
39	SHIELD ROOM #1	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
40	SHIELD ROOM #2	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A

41	SHIELD ROOM #3	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
42	SHIELD ROOM #4	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
43	SHIELD ROOM #5	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
44	SHIELD ROOM #6	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
45	SHIELD ROOM #7	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
46	SHIELD ROOM #8	704.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
47	SHIELD ROOM #11 (IR)	352.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48	SHIELD ROOM #12 (RAI)	352.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
49	SECURED STORAGE (PARTS/EQUIPM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	TEST EQUIPMENT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
51	VENDOR DOCUMENTATION	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
52	TRANSFER OF CLASSIFIED DOCUME	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
53	REMOVAL COSTS FROM LFWC PM RE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
54	SHIPPING DOCUMENT PREP/COORD.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
55	TEST CARTS/WORK STATIONS	744.0	1200.0	1995.0	N/A	N/A	N/A	N/A	N/A
56	POWER DISTRIBUTION UNITS	1056.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
57	AIR HANDLERS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
58	400 HZ POWER CONVERTORS	P/O #45 - #54	N/A	N/A	N/A	N/A	N/A	N/A	N/A
59	WAVEGUIDE NETWORKS	352.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
60	CM. DOC./REC./SW TRANSFER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
61	DE-ACTIVATE/CLEAN-UP AFEWES	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	SUB-TOTALS MANHOURS =	183762.0	56096.0	55660.5	23240.0	19080.0	6520.0	25820.0	8840.0
	TOTALS * 1998 LABOR RATE ($98) PER TASK =	$ 18,008,676.00	$ 5,497,408.00	$ 5,454,729.00	$ 2,277,520.00	$ 1,869,840.00	$ 638,960.00	$ 2,530,360.00	$ 866,320.00
	FACILITY REWORK @ $140/SQ. FT (ASSUMES 39,088 SQ.FT). =			$ 5,472,320.00					
		TOTAL MANHOUR COST =		$ 50,905,100.40					
		TOTAL SHIPPING COST =		$ 1,167,124.00					
	REPLACEMENT OF LFWC ASSETS USED TO SUPPORT AFEWES =			$ 2,100,000.00					
	CHIEF ENGINEER/PROGRAM MANAGEMENT SUPPORT =			$ 5,086,200.00					
	AIR FARE/PER DIEM FOR 22 MEN IN 1998 AND 20 MEN IN 1999 =			$ 2,033,057.00					
	TOTAL (MANHOURS & ALL COSTS FOR MOVING ALL SIMULATIONS) =			**$ 66,763,801.40**					
	TOTAL SQ. FT. REQUIRED (ALL SIMULATIONS) =			31,458	SQUARE FEET + NEEDED OFFICE AREA + NEEDED AIR HANDLER UNITS FLOOR SPACE				
		TOTAL MANHOURS (ALL TASKS) =		571547.8					

DISASSEMBLY TASK (MANHOURS)	FACILITY PREP SUPPORT (EDWARDS) (MANHOURS)	RE-ASSEMBLY TASK (MANHOURS)	DEMONSTRATION INTEGRATION TASK (MANHOURS)	20 MAN LEVEL MAINTENANCE SUPPORT (1 YEAR) (MANHOURS)	TOTAL MANHOURS	SQ. FT REQUIRED [redacted]	SHIPPING COSTS SIMULATOR BASED ON RACK COUNT (DOLLARS)	SUPPORT CABINETS & OTHER HW (DOLLARS)	SHIPPING SPECIAL REQUIREMENTS CABLING & ETC (DOLLARS)	TOTAL SHIPPING $ COST	LINE #
261.0	748.0	1479.0	599.0	[illegible]	24178.0	625	$ 9,768.00	$ 7,212.00	$ 112.00	$ 17,092.00	1
130.5	374.0	739.5	299.5	[illegible]	15662.5	600	$ 3,108.00	$ 7,212.00	$ 112.00	$ 10,432.00	2
261.0	748.0	1479.0	599.0	[illegible]	11514.0	900	$ 8,436.00	$ 7,212.00	$ 112.00	$ 15,760.00	3
130.5	374.0	739.5	299.5	[illegible]	17402.5	500	$ 2,220.00	$ 2,404.00	$ 112.00	$ 4,736.00	4
261.0	748.0	1479.0	599.0	[illegible]	11652.0	1052	$ 7,992.00	$ 24,040.00	$ 112.00	$ 32,144.00	5
261.0	748.0	1479.0	599.0	[illegible]	15872.0	1470	$ 13,320.00	$ 28,848.00	$ 112.00	$ 42,280.00	6
130.5	748.0	739.5	599.0	[illegible]	8192.0	625	$ 4,884.00	$ 4,808.00	$ 112.00	$ 9,804.00	7
261.0	748.0	1479.0	599.0	[illegible]	18612.0	500	$ 6,660.00	$ 2,404.00	$ 112.00	$ 9,176.00	8
130.5	374.0	739.5	299.5	[illegible]	10501.0	P/O #8	P/O #8	$ 7,212.00	$ 112.00	$ 7,324.00	9
261.0	748.0	1479.0	599.0	[illegible]	19132.0	600	$ 6,660.00	$ 2,404.00	$ 112.00	$ 9,176.00	10
261.0	748.0	1479.0	599.0	[illegible]	13722.0	2400	$ 9,768.00	$ 38,464.00	$ 1,712.00	$ 49,944.00	11
65.3	187.0	369.8	149.8	[illegible]	11406.8	P/O #11	P/O #11	P/O #11	$ 112.00	$ 112.00	12
65.3	187.0	369.8	149.8	[illegible]	12126.8	P/O #11	P/O #11	P/O #11	$ 112.00	$ 112.00	13
261.0	748.0	1479.0	599.0	[illegible]	33726.0	800	$ 12,876.00	$ 28,848.00	$ 112.00	$ 41,836.00	14
261.0	748.0	1479.0	599.0	[illegible]	25700.0	1000	$ 8,436.00	$ 60,100.00	$ 112.00	$ 68,648.00	15
261.0	748.0	1479.0	599.0	[illegible]	11564.0	250	$ 1,332.00	$ 7,212.00	$ 112.00	$ 8,656.00	16
65.3	187.0	369.8	149.8	[illegible]	2569.8	P/O #5	$ 2,664.00	$ 9,616.00	$ 112.00	$ 12,392.00	17
261.0	748.0	1479.0	599.0	[illegible]	24698.0	1000	$ 10,656.00	$ 9,616.00	$ 112.00	$ 20,384.00	18
65.3	187.0	369.8	149.8	[illegible]	3618.8	100	$ 888.00	$ 2,404.00	$ 112.00	$ 3,404.00	19
261.0	748.0	1479.0	599.0	[illegible]	18694.0	500	$ 7,104.00	$ 28,848.00	$ 112.00	$ 36,064.00	20
261.0	748.0	1479.0	599.0	[illegible]	17202.0	1500	$ 7,992.00	P/O #22	$ 3,632.00	$ 11,624.00	21
261.0	748.0	1479.0	599.0	[illegible]	29460.0	2140	$ 2,664.00	$ 120,200.00	$ 2,832.00	$ 125,696.00	22
65.3	187.0	369.8	149.8	[illegible]	8550.8	200	$ 2,664.00	$ 7,212.00	$ 112.00	$ 9,988.00	23
261.0	748.0	1479.0	599.0	[illegible]	13522.0	200	$ 1,332.00	$ 26,444.00	$ 112.00	$ 27,888.00	24
130.5	374.0	739.5	299.5	[illegible]	2902.5	308	$ 3,552.00	$ 4,808.00	$ 112.00	$ 8,472.00	25
130.5	374.0	739.5	299.5	[illegible]	6622.5	1104	$ 5,328.00	$ 4,808.00	$ 112.00	$ 10,248.00	26
130.5	374.0	739.5	299.5	[illegible]	6662.5	504	$ 2,664.00	$ 4,808.00	$ 112.00	$ 7,584.00	27
130.5	374.0	739.5	299.5	[illegible]	7526.5	1650	$ 3,552.00	$ 4,808.00	$ 112.00	$ 8,472.00	28
65.3	187.0	369.8	149.8	[illegible]	5604.8	125	$ 1,332.00	$ 4,808.00	$ 112.00	$ 6,252.00	29
261.0	748.0	1479.0	599.0	[illegible]	16416.0	500	$ 888.00	$ 4,808.00	$ 112.00	$ 5,808.00	30
65.3	187.0	369.8	149.8	[illegible]	5454.8	1329	P/O #3	P/O #3	$ 112.00	$ 112.00	31
65.3	187.0	369.8	149.8	[illegible]	5454.8	1491	P/O #5	P/O #5	$ 112.00	$ 112.00	32
65.3	187.0	369.8	149.8	[illegible]	771.8	225	$ 1,776.00	$ 4,808.00	$ 112.00	$ 6,696.00	33
65.3	187.0	369.8	149.8	[illegible]	771.8	250	$ 1,776.00	$ 4,808.00	$ 112.00	$ 6,696.00	34
65.3	187.0	369.8	149.8	[illegible]	771.8	200	$ 1,776.00	$ 4,808.00	$ 112.00	$ 6,696.00	35
65.3	187.0	369.8	149.8	[illegible]	771.8	275	$ 1,776.00	$ 4,808.00	$ 112.00	$ 6,696.00	36
65.3	187.0	369.8	149.8	[illegible]	771.8	325	$ 1,776.00	$ 4,808.00	$ 112.00	$ 6,696.00	37
65.3	187.0	369.8	149.8	[illegible]	771.8	750	$ 888.00	$ 2,404.00	$ 112.00	$ 3,404.00	38
522.0	187.0	739.5	149.8	[illegible]	2302.3	110	0	$ 2,404.00	$ 112.00	$ 2,516.00	39
522.0	187.0	739.5	149.8	[illegible]	2302.3	395	0	$ 2,404.00	$ 112.00	$ 2,516.00	40

522.0	187.0	739.5	149.8		2302.3	530	0	$ 2,404.00	$ 112.00	$ 2,516.00	41
522.0	187.0	739.5	149.8		2302.3	325	0	$ 2,404.00	$ 112.00	$ 2,516.00	42
522.0	187.0	739.5	149.8		2302.3	460	0	$ 2,404.00	$ 112.00	$ 2,516.00	43
522.0	187.0	739.5	149.8		2302.3	460	0	$ 2,404.00	$ 112.00	$ 2,516.00	44
522.0	187.0	739.5	149.8		2302.3	460	0	$ 2,404.00	$ 112.00	$ 2,516.00	45
522.0	187.0	739.5	149.8		2302.3	220	0	$ 2,404.00	$ 112.00	$ 2,516.00	46
261.0	187.0	369.8	149.8		1319.5	P/O # 21 & #22	0	P/O #21	$ 112.00	$ 112.00	47
261.0	187.0	369.8	149.8		1319.5	0	0	P/O #22	$ 112.00	$ 112.00	48
26	74.8	147.9	59.9		308.7	1500	$ 11,988.00	$ 298,096.00	$ 112.00	$ 310,196.00	49
261.0	0.0	0.0	0.0		261.0	1000	$ 13,320.00	0	$ 640.00	$ 13,960.00	50
N/A	N/A	N/A	N/A		0.0	N/A	N/A	N/A	$ 37,120.00	$ 37,120.00	51
N/A	N/A	N/A	N/A		0.0	N/A	N/A	N/A	N/A	$ -	52
N/A	N/A	N/A	N/A		0.0	N/A	N/A	N/A	N/A	$ -	53
N/A	N/A	N/A	N/A		0.0	N/A	N/A	N/A	N/A	$ -	54
N/A	N/A	N/A	N/A		3939.0	N/A	N/A	N/A	N/A	$ -	55
261.0	74.8	147.9	59.9		1599.6	200	$ 2,304.00	N/A	$ 1,792.00	$ 4,096.00	56
261.0	74.8	147.9	59.9		543.6	200	$ 2,220.00	N/A	N/A	$ 2,220.00	57
261.0	74.8	147.9	147.9		631.6	N/A	N/A	N/A	$ 864.00	$ 864.00	58
1044.0	74.8	5916.0	599.0		7985.8	N/A	N/A	$ 60,100.00	N/A	$ 60,100.00	59
320.0	0.0	0.0	0.0		320.0	600	N/A	$ 59,600.00	N/A	$ 59,600.00	60
640.0	N/A	N/A	N/A		640.0	N/A	N/A	N/A	N/A	$ -	61
13905.6	20196.0	47919.6	16800.1	41600.0	41600.0	[redacted]					
			TOTAL MANHOURS =		519439.8						
$ 1,362,748.80	$ 1,979,208.00	$ 4,696,120.80	$ 1,646,409.80	$ 4,076,800.00	$ 50,905,100.40						
					TOTALS PER TASK =	[redacted]	$ 188,340.00	$ 925,040.00	$ 53,744.00		
									TOTAL SHIPPING COSTS =	$ 1,167,124.00	

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GROUNDRULES & ASSUMPTION
USED IN PREPARATION OF AFEWES RELOCATION COST SPREAD SHEET.

1. This estimate does not include any Insurance costs on shipping of the hardware.

2. This relocation cost estimate does not include any cost for shipping of furniture (i.e., desks, file cabinets, tables, classified storage containers, work benches, book cases and etc.)

3. This estimate assumes that layout at new location is identical to existing AFEWES layout. Cable length and waveguide lengths are critical. The layout must be very similar to use existing cabling and network interfacing to prevent the re-manufacture of cables and waveguide runs. This estimate does not include any cable re-manufacturing costs.

4. All simulation modifications will remain in place. Both hardware and software changes are documented in RFCC's and TVA's.

5. Training costs are based on providing a similar type of training provided to the government on the Have Copper System delivered to Eglin. This training consisted of an Engineering Overview, an Operation & and Maintenance Course and a Software course taught to Engineering level students. These students need to be familiar with typical Radar and Infra-red Operations & Maintenance activities.

6. AFEWES de-activation costs are included in this estimate. It is estimated that a 4 man-level of effort is required for one month to resolve and clear/clean up all remaining items after the simulations are shipped.

7. Man-hour estimates for drawings are based on changes to existing documentation for simulation/hardware at a 31 man-hour/drawing rate. Generations of new drawings for simulation/hardware is at an 88 man-hour/drawing rate. Drawing estimates are based on a review of the existing documentation and an engineering estimate of what would be required to support the simulation/hardware.

8. Man-hours estimates for O&M Hardware manuals are based on a 6 man-hours per page estimate. Documentation content is similar to the documentation generated for the RSAMB Operator/Maintenance Procedures manual. Page count estimates are based on engineering judgment for what would be required to support the simulation/hardware. Manuals are not Technical Order's, but documentation that Engineering level personnel could use to maintain and operate the simulations.

9. Man-hours estimates for Software manual are based on 1995 man-hours per unique simulation. A Percentage factor is applied to those simulations and support hardware that are common or their complexity is simple.

10. Training hours for Software, Hardware, Operator are based on engineering judgment to provide a like HAVE COPPER course to engineering level personnel to become proficient in the maintenance and operations of the simulation/hardware system. Man-hours are also include to ensure that maintenance activities still occur while training is being conducted. Training is assumed to occur at LFWC, as no off-site training costs are included in this estimate.

11. Disassembly, Re-assembly, Demonstration/Integration tasks and Facility Preparation support are based on HAVE COPPER System actuals. Factors have been applied to simulations/hardware based on the amount and complexity of the hardware.

12. Square footage is based on current layout in AFEWES for the simulation/hardware. AFEWES has 39,088 square feet. The cost of building a facility is not included in this estimate. This estimate assumes that a 39,000 square foot shell is available. Facility renovation costs are based on actuals that occurred during AFEWES Integrated Upgrades, in which $140/sq. ft. was expended.

13. Shipping costs are based on weight and reflect the shipping rate for shipment from Fort Worth to Edward's. Cost is $0.16/pound. Weight estimates are based on engineering judgment using the number of racks, test carts, cables, documentation cabinets, parts cabinets, test equipment and etc., that are required to support each simulation.

14. This estimate includes the cost of Lockheed Fort Worth Company assets used to support AFEWES; test equipment, perishable tools, desks, file cabinets, classified storage containers, shop for minor fabrication/repair tasks, Test Directors System Large Screen Display and SA-10 spares.

15. This estimate does not include the costs of seventy-eight (78) Computer Science Corporations assets used to support AFEWES Automatic Data Processing capability.

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FACILITY REQUIREMENTS FOR AFEWES SIMULATIONS

1. Floor space required for all simulations and support hardware is 39,088 square feet.
2. Perimeter walls of the facility will need to meet DIAM 50-3 requirements.
3. Facility must be capability of Open Classified storage.
4. Cypher locks on all entrance/exit doors.
5. Raised computer floor is required. Requirement is a 1200 lb./sq. ft. raised floor system, floor tiles to be white and include some perforated tiles. Floor height to be 18".
6. Security alarm system, sprinkler piping and fire alarm system required.
7. Provide for a low resistance earth ground 7-10 ft. ground rods typical resistance less than OHM to ground, tie raised floor to ground loop.
8. Install suspended ceiling.
9. Install RF filter fluorescent lighting (with DC dimmers) on ceiling grid. Dimmer should be RFI type. Fixtures as required in each room shall be wired to emergency power. Install red lights (with dimmers) for operation lighting.
10. Cable trough (4" x 4") for cable routing.
11. Install necessary exist signs.
12. Telephone lines and sets in all area.
13. Install Power Distribution Units (nine required) in various area to provide filtered power to simulations.
14. Install and provide for chilled water air conditioning and electrical power for air. Install 30 ton Liebert Air Handler .
15. PA system is required.
16. Install automatic door closure unit and door sweeps on all doors.

17. General power requirements for Normal Operations must consist of :

a) Three phase, 120 VAC, 60 Hz
b) Three Phase, 208 VAC, 60 Hz
c) Three Phase, 480 VAC, 60 Hz
d) Three Phase, 120 VAC, 400Hz
e) +28VDC
f) Three phase, 120 VAC, 50 Hz
g) Three Phase, 208 VAC, 50 Hz

to support all simulations. Current requirements currently unknown.

Document Separator

HITL CONSOLIDATION ISSUES

AFEWES Move to BAF or ACETEF

EDWARDS AFB

Advantages

- o Reduces risk of performance in installed configuration
- o Reduces testing logistics to one location
- o Provide common stimulation source and expertise of system under test from breadboard through installed configuration
- o Requires HITL/ISTF chamber interface waveguides and IR signal executive
- o ECSEL capability integrated at ISTF
- o Closed loop effort at Point Mugu is terminated
- o Supports growth of ACETEF to a category I facility

Disadvantages

- o Costs $50 - $60 Million to move selected systems
- o Loss of capability and expertise of personnel who don't move
- o Requires 12 -18 months of down time to move facility starting in FY98
- o Move completion FY99 at the earliest (MILCON 2 YRS + 1 YR AFEWES MOVE)
- o Move will effect T&E programs starting in FY96 with any AFEWES move
- o Cost to move ECSEL capability to BAF or ACETEF

Issues

- o Loss of availability for F-22 and F-18E/F in Fy97/98
- o Recompetition of AFEWES contract in FY96
- o Peak testing of F-22 avionics in FY98/99would cause slippage in other programs
- o Cost of MILCON for new building to house AFEWES costs $8 million

T&E INFRASTRUCTURE EXECUTIVE AGENT

BOARD OF DIRECTORS

BoOD STUDY

ELECTRONIC COMBAT

EC HITL / ISTF CONSOLIDATION STUDY

HARRY BANKS
HITL/ISTF SUB-GROUP LEAD
4 February 1994

THE AFEWES CAN BE OPERATED AND MAINTAINED FOR LESS EXPENSE IF LEFT IN FORT WORTH

BECAUSE OF THE CONTRACTOR'S EXPERIENCE

- CURRENT CONTRACTOR CONCEIVED AND DEVELOPED THE AFEWES CLOSED-LOOP, REAL-TIME, ACTUAL RF THREAT SIMULATION IN 1958
- DEVELOPED OVER 90% OF AFEWES SIMULATIONS NOW OPERATIONAL
- HAS THE ONLY EXPERIENCE AVAILABLE IN AFEWES OPERATION (37 YEARS) - CONDUCTED AN AVERAGE OF 110 TEST WEEKS PER YEAR DURING THE LAST 10 YEARS ALONE
- CORPORATE MEMORY AND EASY ACCESS TO SIMULATION DESIGNERS ENHANCES MAINTENANCE AND MINIMIZED DOWN TIME
- MAINTAINS UNIQUE RESOURCES (TACWARS) NECESSARY TO LINK AFEWES WITH LFWC TEST ASSETS (FLIGHT SIMULATOR) AND OTHER DOD TEST ASSETS (OPEN AIR RANGES, REDCAP)

THE AFEWES CAN BE OPERATED AND MAINTAINED FOR LESS EXPENSE IF LEFT IN FORT WORTH (CONT'D)

BECAUSE THE CONTRACTOR IS ORGANIZED TO ACCOMODATE A VARIABLE WORKLOAD

- GOVERNMENT REQUIRED SIMULATOR WORKLOAD IS HIGHLY VARIABLE
- AN EASILY VARIED CADRE OF SKILLED MANPOWER MEANS THE CUSTOMER ONLY PAYS FOR SUPPORT AS NEEDED
  - THE USAF BENEFITS BY NOT HAVING TO PAY FOR FULL-TIME SUPPORT OF <u>AFEWES-EXPERIENCED</u> TEST DIRECTORS, OPERATIONS ENGINEERS AND DESIGNERS NECESSARY TO SUPPORT CUSTOMER TEST REQUIREMENTS AND OPERATE/MAINTAIN THE SIMULATORS

IF AFEWES WERE MOVED, HOW WOULD USAF GET "ON-CALL" SUPPORT?

AFFTC BUILDING REQUIREMENTS

- THE AFEWES MUST BE IN A SHIELDED BUILDING WITH RAISED FLOORS (TO ALLOW ELECTRICAL INTERCONNECTIONS), LOWERED ROOF (TO ALLOW FOR RF INTERCONNECTIONS), SPECIAL POWER AND SPECIAL AIR CONDITIONING. THE IR PORTION REQUIRES SEISMIC STABILITY.
- AFFTC HAS TWO OPTIONS
  - BUILD A NEW FACILITY
    - ✔ 100% REPLACEMENT WOULD REQUIRE AT LEAST 40,000 SQ FT.
    - ✔ MOVING ONLY THE NEWEST, HIGHEST UTILIZED SIMULATIONS WILL REQUIRE A 36,000 SQ FT FACILITY.
    - ✔ AT $140 PER SQ FT, COST WILL EXCEED $5.0M.
  - REMODEL THE EXISTING BUILDING SURROUNDING THE BENEFIELD ANECHOIC CHAMBER
    - ✔ REMODELING THE WEST AREA (NOW ESSENTIALLY VACANT) OF THE BUILDING TO HAVE A SEISMIC FIRST FLOOR SECTION (900 SQ FT) AND ADDING A SECOND AND THIRD FLOOR WITHIN THE SHELL COULD MAKE ABOUT 36,000 SQ FT AVAILABLE.
    - ✔ BASED ON AFEWES REARRANGEMENT COSTS, THIS REMODELING WOULD COST OVER $5M (IF DONE IN TEXAS).

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS DIVISION (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6503

15 JUL 1985

REPLY TO ATTN OF: RWP

SUBJECT: Cost Benefit Analysis, Air Force Electronic Warfare Evaluation Simulator (AFEWES)

TO: ASD/OL-BA RWK

1. Reference OL-BA letter 13 June 85 and our response dated 20 Jun 85.

2. As requested, we have performed a comparison of the costs to the government if the forthcoming AFEWES test contract is competed versus if it is awarded sole source to General Dynamics. As indicated in our response of 20 Jun 85, the extreme time constraint only permitted a top level comparison.

3. The conclusion of the enclosed analysis is that:

a. The immediate contract cannot be competed since sufficient documentation is not available, and

b. The only long range alternative to a continued sole source General Dynamics' contract is to obtain the required documentation, move the equipment to an AF base, and compete the Operation and Maintenance tasks.

4. A major portion of the economic commitment required to permit competition or establishing an organic capability comes from the acquisition of drawings. The assumption made in the inclosed analysis is that level one drawings are sufficient. This assumption is based on information received from the AFEWES program office and from GD personnel. ASD/RWWE, Mr. Pat Grebinski, has indicated that level II drawings might be required. Should a determination be made to this effect, the analysis would need to be adjusted accordingly.

5. Please address any questions or comments to ASD/RWPE, Ms R. Behringer, ext 52651.

Guy E. Jette

GUY E. JETTE
Actg Director of Program Control
Deputy for Reconnaissance/Strike
and Electronic Warfare Systems

1 Atch
Cost Benefit Analysis

cc: ASD/RWW
RWX
RWKE

COST BENEFIT ANALYSIS

AIR FORCE ELECTRONIC WARFARE EVALUATION SIMULATOR (AFEWES)

OPERATIONS AND MAINTENANCE (O + M) CONTRACT

Prepared: July 1985, ASD/RWPE, R.E.Behringer

COST BENEFIT ANALYSIS

AIR FORCE ELECTRONIC WARFARE EVALUATION SIMULATOR (AFEWES)

1. Objective

The Objective of this Cost Benefit Analysis is to determine the costs and benefits associated with competing the AFEWES contract versus awarding it sole source to General Dynamics (GD). This will be accomplished by:
a) establishing the costs and benefits associated with either contracting method and
b) analyzing the data and presenting the costs and the benefits expected to be realized.

2. Alternatives

2.1 The following alternatives were identified:

A) award the next contract(May 1986 through May 1989) to operate AFEWES at AF Plant 4 to GD on a sole source basis

B) compete the upcoming contract (May 86 - May 89) for operating AFEWES at its present location

C) compete the upcoming contract (May 86 - May 89) for operating AFEWES at another location in CONUS

D) award the next contract sole source but compete the follow-on contract (May 89 through May 92) for operating AFEWES at its current location

E) award the next contract (May 86 - May 89) sole source but compete the follow-on contract (May 89 through May 92) for operating AFEWES at another contractor's facility in CONUS

F) award the next contract (May 1986 - May 1989) sole source to GD but compete the follow-on contract (May 1989 through May 1992) for operating AFEWES at AFB-X (for example at WPAFB or at Eglin AFB)

G) establish an AF organic capability at an AF test facility (for example WPAFB or Eglin AFB), eliminating either sole source or competitive decision

2.2 Alternatives "B" and "C" were rejected since currently no data exists that would permit anyone other than experienced, trained AFEWES technicians to expediently operate and maintain the simulators. The minimum data required, as determined by AFEWES System Program Office (SPO) personnel, is level I drawings together with operating and maintenance manuals. This data would have to be generated by General Dynamics (GD) and procured from them. This requirement could be included in the next contract with GD (May 86).

3. Assumptions

The following assumptions were made in developing the estimate:

a) The upcoming contract is for 3 Years, May 1986 through May 1989.

b) 90% of the existing simulators will still be used in 1989; 10% of the existing simulations will be outdated, representing threats that have been deleted from enemy inventory. The SPO felt the percentage could be as high as 25%. 10% was used as "the worst case"

c) Competitive procurement yields a 10% cost reduction. This 10% reduction is arrived by combining ASD's evaluations for the AMRAAM Economic Analysis which indicated 8% - 9% savings, and Eglin's extensive experiences on their Competitive Model which indicates an 11% savings.

d) 10% of the Operations and Maintenance (O + M) manuals are already generated for in-house training (see trip report, ATCH 1, Para 4).

e) GD would train new personnel (contractor's and/or AF) approximately 6 months prior to turnover, using O+M manuals and drawings. The place of training would be either Plant 4 and/or another facility. If training is accomplished at another facility, travel costs are included with the costs to transport the AFEWES equipment.

f) Level 1 drawings are adequate for the winning contractor or the AF to operate and maintain the simulators and perform minor modifications and simulation/validations.

g) GDs cost estimates for data, facility-modifications, etc are based on inclusion in the May 86 operations and maintenance contract.

h) AF level -7 technicians (Technical Sgts, E-7) will operate and maintain AFEWES at Eglin and/or AFB-X. AF Captains (O-3) will perform simulation-validations and perform and/or supervise minor modifications.

i) For alternative F, all tasks will be performed by contractor personnel, supplemented and supervised by blue-suiters (level -7 technicians and Cpts)

j) Provisioning data will not be required by either AF or contractor-X to maintain the AFEWES facility (based on discussions with LTC Repasy, see ATCH 1, Para 6-2).

k) The manloading profiles(approx. 70 people) will be the same for GD, contractor X, or AF. A ratio of 6:1 of AF level -7 technicians to Capts is approximately representative of the contractor's manload experience profile (Atch 8)

4. Costs of each Alternative

4.1 Alternative A: Award Upcoming (1986-1989) Contract Sole Source to GD.

The tasks of the upcoming (1986-1989) O+M contract are projected (see draft RFP) to remain essentially unchanged from the tasks of the 1982-1985 contract ----0079. The actuals of contract 0079 were therefore used as the basis for this analysis. The Present Value (PV) of the existing (1982-1985) contract was determined using table A-1 of AFP 178-8(Atch 6), to establish the basic yearly average operating costs. The total O+M sum was derived by using the amount obligated to date, adding projected obligations through the end of FY85, and deducting costs for tasks other than O+M (i.e. minor modifications and simulation-validations).

4.1.1 As per GD (Atch 5, Para 9), 40% of the actual costs of the current contract were for O+M specific tasks; 60% were for "other" tasks (simulation validation and/or minor modifications). The total cost of contract ---0079 therefore was split into 2 parts: 40% O+M and 60% Other.

4.1.2 Totals, Alternative A:

		Yearly Costs	One-Time
Amount obligated as of 1 July 85	$19M		
Plus: Projected obligations through end of FY85	$ 5M		
Total Costs, contract -0079, TY $s	$24M		
PV, base year 1982 (10%,3Yrs) ($24.M X .751= $18.024M			
total O+M Costs =$18.02x.40=7.21M			
total "other" costs(minor mods + sim/vals = $18.02x.6=10.81M			
yearly O+M costs = 7.21/3= $2.4M		2.4	0
yearly "other"" =10.81/3= $3.6M		3.6	0
Total Cost, PV, BY82, ALTERNTIVE A:		6.0	0

4.2 Alternative B: rejected

4.3 Alternative C: rejected

4.4 Alternative D: Compete 1989-1992 contract (O+M at AF Plant 4). All of the costs for tasks required to establish a competitive basis (i.e. drawings, phase-in/phase-out plan, manuals) are based on the assumption that theses tasks are included in the 1986-89 contract. To present comparable values, they must be changed to reflect the cost of the FY82 base year used in summary 4.1.2 above.

The currrent AFEWES equipment consists of 454 racks for 34 simulations. Simulations SA-4,6,8,10 are being modified. They directly replace 56 existing racks of equipment (per telcon with Mr. D. Tipton, GD, on 9 Jul 85). All data is being procured for these modifications. Therefore data need only be procured for the remaining 398 racks of equipment (454 less 56) for 30 simulations.

4.4.1 An average of 10% savings due to competition was assumed (see assumption C).

4.4.2 Drawings
The winning contractor will require the following level 1 drawings of all equipment to permit trouble shooting, fault isolation, identification, and correction as well as minor modifictions to the equipment.

4.4.3 Manuals
The winning contractor will require the following Operations and Maintenance Manuals written to the level of a qualified technician, same as employed by GD today. The manhours associated with each drawing and manual were generated by GD and accepted by AFEWES SPO personnel (Atch 3 and 4).

4.4.4 Sub-Lease Costs
AF Plant 4 is wholly owned by the AF and provided to GD to perform government-contracted tasks (i.e. F-16, F-111, AFEWES, etc.) GD is responsible to provide/contract for all overhead services such electricity, water, etc.
A second contractor operating at AF Plant 4 would need to have access to these overhead services. The government would have to:
a) either work out an equitable reimbursement with GD for the added administrative tasks (approx. .5 man continuously or $50K/year in FY86 dollars) or
b) contract for these services directly, allocating the expenses to the various contracts and contractors.
Assuming the worst case, $50K(FY86 dollars) overhead administrative cost is added to the yearly costs of alternative D.
The floor space requirements for the actual simulator equipment were considered a wash for either GD or contractor X.

4.4.5 Phase-In/Phase-Out Plan
GD estimated the cost of a phase-in/phase-out plan would be approximately $75K (see Atch 3) if included in the 1986-1989 contract.

4.4.6 Phase-In/Phase-Out Overlap
GD would be required to train the new contractor's personnel as part of the phase-in period using the data developed. The cost for the overlap is estimated by GD and SPO (ATCH 3 and 4) to be approximately $1M if included in the 1986 contract.

4.4.7 Facility Modifications
Requiring/allowing a second contractor to operate side-by-side with GD at AF Plant 4 would require that the plant is modified to assure either contractor's industrial security. The cost of this modification was not estimated since a facility survey would need to be conducted by facility engineers and a separate facilities modification cost analysis would have to be performed.

4.4.8 Totals: Alternative D

		Yearly Costs	one-time
4.4.1. GD's Yearly O+M Costs:			
PV, BY82 (see 4.1.2. above)	$ 2.4 M		
less 10% competition benefit	.24M		
= Competitive Yearly O+M Costs		$2.16M	
GD's Yearly Other Costs:			
PV, BY82 (see 4.1.2. above)	$ 3.6 M		
less 10% competition benefit	.36M		
= Competitive Yearly "Other" Costs		$3.24M	
4.4.2. Drawings:			
398 Eqmt Racks x24 drwg/rack =9552			
9552 dwgsx31mhr/dwgx$36/dwg=$10.7M			
= PV(10%,4Yrs)=$10.7x.683=$7.31	$30 MH		$7.31M
4.4.3 Manuals:			
30 Simulations x 2,900 mhrs/SW maint.+ ops manuals = 87,000 Mhrs			
Plus: 30 Sims x 5,900 Mhrs/HW maint. and ops manuals =177,000 Mhrs			
87,000+177,000=264,000x$36.-/Mhr=9.5M,Less 10% for existing info,.95M= $8.55M			
= PV(10%,4Yrs)=$8.55x.683= $5.84M			$5.84M
4.4.4. Addit.Sub-Leasing Costs:			
.5 manyears = FY86 $50K			
= PV(10%,4Yrs)=$50Kx.683= $34K		$ .034M	
4.4.5. Phase-In/Phase-Out Plan (Atch.3):			
= PV(10%,4Yrs)=$.075x.683=$.051M			$ .051
4.4.6. Phase-In/Phase-Out Overlap (Atch 5):			
= PV(10%,4Yrs)=$1.0x.683=$.683M			$ .683M
TOTAL COSTS, ALTERNATIVE D:		$ 5.434M	$13.883M

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4.5 ALTERNATIVE E: Compete 1989-1992 AFEWES O+M Contract (O+M performed at Contractor-X's facility, CONUS)

4.5.1 Paragraphs 4.4.1, 4.4.2, 4.4.3, 4.4.5, and 4.4.6 apply.

4.5.2 Transportation
Estimated costs to relocate the AFEWES equipment, including packing, transporting, reassembling, calibrating (i.e. a turn-key operation) were provided by GD (ATCH 5). Assuming that GD estimated their "worst case" costs, a 5% negotiation-reduction was estimated. This however is offset by the consideration that GD provided only a Rough Order of Magnitude (ROM) with a potential negative inaccuracy factor.

4.5.3 Facility
Costs to prepare the facility for AFEWES operations are based on the projected costs to modify AF Plant 4 for the new simulators which will be installed later on this year.

4.5.4 Training
Since the equipment would be located at a new facility, it is recognized that GD would have to perform some additional training at this new facility. No additional costs were estimated since it is assumed that the Phase-in/Phase-out overlap of para 4.4.6 above will be split between the 2 training facilities. The costs for GD travel are included in para 4.5.2 above.

4.5.5 Totals, Alternative E:

4.5.1 Costs as summarized in para 4.4. above:

	Yearly	One-Time
4.4.1	2.16 + 3.24	
4.4.2		7.31
4.4.3		5.84
4.4.5		.05
4.4.6		.68
4.5.2 Costs to moving facility (given, see ATCH 5). PV=$6.725x.683=$4.593		4.59
4.5.3 Facility Preparation (given, see ATCH 5) PV=$7.5x.683=$5.122		5.12
TOTAL COSTS, ALTERNATIVE E:	$5.4M	$23.59M

4.6 ALTERNATIVE F: Costs to move AFEWES to AFB-X and compete its O+M

The general consensus of the AFEWES SPO was that the best suited AF Facility would be Eglin AFB since it is uniquely qualified to perform DTE and IOTE type tests and simulations. The following verbage therefore refers to Eglin AFB instead of AFB-X. However, the costs involved are representative of moving the facility to any central CONUS location.

4.6.1 Costs as summarized in paragraphs 4.4.2, 4.4.3, 4.4.5, 4.4.6, 4.5.2, and 4.5.3 apply.

4.6.2 It is Eglin's policy to stay involved in all simulations. AF personnel takes on some of the management and technical jobs in lieu of contractor personnel. This estimate assumes an 80/20 mix which is representative of similar type contracting actions: the AF provides 20% of the required personnel, the Contractor 80%. The 20% AF personnel is assumed to average 3 Cpt (O-3) management personnel and 9 E-7s Technical Sgts. (See discussions with LTC Repasy, Atch 1, Paragraph 6, last sub-paragraph).

4.6.3 Yearly costs for 3 Cpts and 9 level -7 technicians (E-7's) were derived from AFR 173-13, table 3-3, Total Annual Composite Rate (with PCS), reflecting composite AF costs including facility overhead expenses, training costs, etc. (ATCH 7).

4.6.4 <u>TOTALS</u>: Alternative F:

4.6.1 Costs as summarized in Paragraph 4.5 above:

	yearly	one-time
4.4.2		7.31
4.4.3		5.84
4.4.5		.05
4.4.6		.68
4.5.2		4.59
4.5.3		5.12

Costs peculiar to contractor-operated, AF-supported operations:

4.6.2 Contracted costs: 80% of yearly competitively-procured contract tasks (see Alt D, Para 4.4.1)
.80($2.16M+$3.24M)=$4.32 PV,BY82= $4.32

4.6.3 AF Costs: 20% of yearly competitively-procured contract tasks:
3 full-time AF Cpt (O-3) and
11 full-time level-7 technicians=
3($53,423)+11($37,159)=$160,269+
$408,749=$569,018 FY85 rates
= PV(10%,3Yrs),BY82=$569,018x.751=$427,333= $ .427

TOTAL COSTS, ALTERNATIVE F, PV, BY82: $4.747M $23.59M

— 1985 Dollars
— 1985 situation

4.7 ALTERNATIVE G: Costs to provide AF-organic AFEWES capability:

4.7.1 Costs as summarized in paragraphs 4.4.2, 4.4.3, 4.4.5, and 4.4.6 as well as costs summarized in paragraphs 4.5.2 and 4.5.3 apply.

4.7.2 Yearly O+M costs for an AF owned and operated facility such as Eglin AFB were derived by using AFR 173-13, tables 3-3, Total Annual Composite Rates (ATCH 7).

4.7.3 Total, Alternative G:

4.7.1 Costs as summarized in Paragraph 4.5 above:

	yearly	One-Time
4.4.2		7.31
4.4.3		5.84
4.4.5		.05
4.4.6		.68
4.5.2		4.59
4.5.3		5.12

4.7.2 Costs peculiar to AF operated facility:

	yearly	One-Time
60 full time E-7 x 1 year = 60x$37,159 = $2,229,540, FY85 rates PV (10%,3Yrs), BY82= $2,229,540 x .751=	$ 1.674M	
10 full time AF Cpts (O-3)= 10x$53,423 = $ 534,230, FY85 rates PV= 534,230 x .751=$401,207, BY 82	.401M	
TOTAL COSTS, ALTERNATIVE G:	$ 2.075M	$23.59M

4.1 SUMMARY, ALTERNATIVES A through G

PV, BY 1982 DOLLARS

Alt	Yearly Costs	One-Time Costs
A	$ 6.0 M	0
B	rejected	
C	rejected	
* D	$ 5.4M	$13.9M
E	$ 5.4M	$23.6M
* F	$ 4.7M	$23.6M
G	$ 2.1M	$23.6M

* see para 5.2.1, note b (below)

5. Benefits of each Alternative

5.1 Alternative A: Sole Source GD

5.1.1 The AFEWES facility was developed by GD in 1958. Since then they have had sole responsibility to develop, operate, maintain, and modify the equipment. Throughout this time GD has proven to be reasonably reliable, responsible, and responsive. GD's extensive and unique experience has resulted in the following additional benefits:
a) in addition to the (approx. 70) full time, trained GD technical personnel running AFEWES, GD has a cadre of over 120 trained and fully qualified technicians that can be (and have been) used to meet short schedules. Another 200 AFEWES-trained people are available to help out in an emergency. GD's AFEWES personnel have an average of 14 years experience; their maintenance personnel average 8.6 years (see ATCH 8)!

5.1.2 The AF is obtaining data for all major modifications and new simulations which could ultimately be used to compete their Operations, Maintenance, and Modification. By continuing this course, older simulations will ultimately be phased out and a competitive base will be established. No investment to generate data for "outdated" threats will be made. ASD/RWY threat specialist (LTC Harris) estimated that todays simulations will be phased out within the next 25 years.

5.1.3 Equipment would not need to be moved, eliminating the possibility of damage in transport (i.e. repair/replacement costs).

5.1.4 No disruption in simulation would occur since learning curve is optimized.

5.2. Alternative D: Compete 89-92 AFEWES O+M contract (O+M at AF Plant 4)

5.2.1 Obtaining drawings and O+M manuals for all AFEWES equipment would assure DOD flexibility. Thereafter, Operations, Maintenance, Modification, and Simulation Validation could be competed for the life of the equipment.

Note:
a) GD has gone on record (1980, see Atch 9) that it would be impossible for another contractor to operate out of Plant 4. Before any economic commitment (to obtain data, drawings, etc) is made, this deadlock must be resolved. AFPRO and AFEWES SPO personnel concur that a second contractor could not be successfully integrated into AF Plant 4.
b) Allowing/requiring a second contractor to operate side-by-side with GD at AF plant 4 would, as a minimum require that the plant is modified to assure GD's industrial security. The cost of this modification was not estimated since a separate facility analysis would be required.

5.3 Alternative E: Compete 89-92 AFEWES O+M contract (O+M at Contractor X's facility)

i As with alternative D, obtaining drawings and O+M manuals would assure flexibility. Follow-on contracts could be competed if desired, or AF personnel could be trained to run the equipment.

5.4 Alternative F: Contractor/AF O+M at AFEWES

5.4.1 Moving the AFEWES equipment to an AF base would establish the optimum competitive basis since it would permit repeated competitive awards without again relocating the AFEWES equipment.

5.4.2 By working side-by-side with the winning contractor(s), AF personnel would receive hands-on training, eventually establishing an "organic" AFEWES-trained pool of knowledge/resources.

5.4.3 Highest classification of intelligence, including "no-contractor" data could be utilized in establishing simulator test parameters since an AF organic, trained capability would exist.

5.5 Alternative G: AF Organic O+M of AFEWES

5.5.1 Establishing an AF organic testing capability would provide DOD with maximum flexibility.

5.2 Highest classification of intelligence (including "no contractor") data could be utilized in establishing simulator test parameters.

5.5.3 Test schedules and sequences could be adjusted easily in response to threat / priority changes.

5.5.4 Administrative contracting times would be eliminated.

6. Comparing Costs and Benefits and Ranking Alternatives
All alternatives other than Alternative A involve a substantial one-time investment. One of the major benefits resulting from such a one-time investment is "independence" from a single contracting source (GD). The second major benefit would be attained if the simulation capability were incorporated into an existing AF test facility, divorcing testing and test-evaluations from all industrial influences.

6.1. Costs/Benefits
6.1.1 Alternative A:
The most obvious advantages of this alternative are that it has the lowest cost and has proven itself to be effective consistently throughout the last 25 years.

6.1.2 Alternative D:
Investing (PV, BY82) $13.9M with an annual savings (PV, BY82) of $600K will take 23 years to recoup. Additional costs to modify AF Plant 4 (see para 5.2.1 above) would be required. This alternative would need extensive additional research as well as a potential POM input to obtain "Facility Mod

Funds". The expected remain[illegible]e of the equipment is 25 years. There are no indications that GD has abused their sole source position or that a new contractor could exceed or even meet GD's performance. For all the afore mentioned reasons, this alternative does not seem to be viable.

6.1.3 Alternative E:
$23.6M investment with an annual savings of $600K will take 39 years to recoup (all values in PV, BY 82). The expected remaining life of the equipment is 25 years! Again, since there are no indications that GD has abused their "sole source" position or that a "new" contractor can exceed or even meet GD's performance, this alternative does not appear to be viable.

6.1.4 Alternative F:
Investing $23.6M will result in yearly savings of $1.3M (all in PV, BY82 dollars), achieving a break-even point in approximately 18 years.

6.1.4 Alternative G:
Investing $23.6M (PV, BY 82 dollars) will result in yearly savings of PV $3.9M (BY82), achieving a break-even point in approximately 6 years. However, this alternative requires a strong government commitment that the selected AFB could/would provide all required manpower to accomplish time-critical simulations. Lead times for establishing and obtaining the required manpower allocations would need to be considered since no manpower requirements have been added to the POM. For these reasons this alternative does not seem to viable for the FY1989-1992 contract.

6.2 Ranking

Trading off up front costs, yearly costs, payback time, and independence from specific contractor, lead to the following ranking:

1. Alternatives A and F are tied for first place since either is beneficial to the government. Alternative A, continuing sole source with GD, since it is the only proven and least costly alternative; alternative F since it would establish the optimum competitive basis.

2. Alternative G, establishing a total AF organic capability, is ranked next. It has potential if the required AF personnel can be obtained.

3. Alternative D has potential if the required AF Plant 4 facility modifications can be identified and quantified and if an equitable agreement can be worked out with GD.

4. Alternative E is ranked last since it is the most expensive alternative both in one-time and yearly costs.

Atch:
1. Trip Report
2. GD letter 18 Feb 85
3. GD's Eval of Costs
4. OL-BA letter 9 Jul 85
5. GD's response to A's
6. Table A1, AFR 173-8,
7. AFR 173-13, table 3-3
8. GD's AFEWES Manpower
9. GD letter 28 May 80

TRIP REPORT: R.E. BEHRINGER
24/25 JUN 85
Visit to Air Force Electronic Warfare Evaluation Simulator (AFEWES)

1. PURPOSE OF VISIT: Obtain sufficient information to perform a cost benefit analysis between competing the AFEWES operations contract and awarding it sole source to GD.

2. People Visited:

Maj. Bryson,	OL-BA, AFEWES ASD-Program Director,
Cpt. Shackelford,	OL-BA, AFEWES ASD-Program Manager,
Lt. Staufer,	ASD/RWW, AFEWES Program Manager
LTC Repasy,	OL-BA, AFEWES AD-Technical Manager,
Mr. G.R.Gadbury,	AFPRO at Plant 4, Ft. Worth, TX
Mr. D.Tipton,	GD Program Manager, AFEWES,
Mr. J.R.Justice,	GD Contract Administrator, AFEWES

3. Tour of AFEWES with Mr. D.Tipton, GD Program Manager
AFEWES does both ground and airborne simulations. It has 3 cockpits and 31 ground simulation set-ups available. Each simulation consists of:
a) a computer complex (usually 2 or 3 racks of equipmeht) which is a Master Computer, a Weapons Computer, and a Software Programmable Antenna Genorator (SPAG) Computer.
b) an RF head (2 or 3 racks) which receives the receiver's signals, does analog or digital conversion, and interacts with the Master Computers to translate what it has seen and transmit correct responses. The RF head takes the place of a system's antennas.
c) a rack of clutter (if applicable)
d) one or two racks of receivers
e) the displays (either cockpit or ground); The ground displays consist of 2 or 3 racks of equipment using actual displays as seen by the operators of this equipment. The air displays consist of simulated cockpits using soviet LRUs and displays.

During a simulation, the actual threats are generated and the equipment being tested sets out to defeat the threat. FTD periodically confirms the viability of the simulation. AFEWES records the system's response to the threat. These responses are sent to the testing organization for interpretation and action (unless AFEWES has also been tasked to evaluate/interpret the simulation results). Only such organizations receive copies of the test results as are authorized byt the using test organization.

Observation: Much of the equipment seemed old, large and cumbersome. The patch panels are outdated in appearance and looked as though they have been collecting dust for a long time. Old simulation set-ups are intermingled with new set-ups seemingly indiscriminately.
Since 1982 major updates resulted in stand-alone simulation capabilities. Data has been procured to prevent being locked into sole source operations/maintenance of these simulations.
The major reasons to keep all simulations together are:
1. The convenience of the testing organization (minimization of test facilities) and
2) The Multiple Environment Generator (MEG) which is apparently used for most

Atch. 1

simulations and has been u ted continuously each time a s ulation is addeu o modified.

AFEWES is currently expanding into another floor-section. The new simulations: SA4,6,8,10/11 will be located in the new, central area on the second floor together with the MEG. The MEG is being moved from the ground floor to the second floor; the other simulators are being built new and will be directly installed into the new section.

All data for the SA-4,6,8 simulations will be available. The SA-10/11 simulation will be a hybrid, consisting of old and new equipment and software. Data is being procured for the modifications but not for the existing equipment.

Throughout the AFEWES tour, Mr. Tipton emphasized the benefits of having GD run the test for the AF. He pointed to the "common maintenance" capability since AFEWES uses mainly Honeywell or DEC computers and all GD technicians have been crosstrained to assist in more than one simulation and maintain more than one simulation system. GD maintains a core of approx 30 to 40 technicians/managers who have been with AFEWES an average of 10 years; they continually crosstrain new technicians on all simulations and have a pool of approx 120 trained personnel available to support extra simulations requirements.

AFEWES does both SIMULATION/VALIDATION (SIM/VAL) and CORRELATION. (For SIM/VAL FTD compares the simulation to the actual radar and issues a listing of results. Each user has access to this SIM/VAL and can determine if the particular simulations is responsive to system requirements. CORRELATION compares selected test results to other test facility results.

4. Discussions with Mr. J.R.Justice, GD's Contract Administrator for AFEWES
Mr. J.R. Justice answered various questions on how GD estimated the costs to develop data required to compete the operations contract. He advised that GD felt that none of the existing data could be used since it is engineering-level drafts and that all would need to be generated new. GD assumed we would need:
a) level 2 drawings (existing drawings are level 1)
b) operations manuals (existing references are criptic engineering notes)
c) maintenance manuals (existing documentation consists of handwritten and handdrawn notes and instructions)
(Note: working level personnel indicated during tour that they are currently generating O + M manuals for use in training new personnel ----- not acknowledged by GD management)
GD counted their existing racks of equipment and based their ROMs for drawings on these. (i.e. drawings for 454 racks, 24 drawings/rack = 10,896 drawings at 31 manhours/drawing X \$36 = \$12.16M.)
ROMs for the Manuals are based on the number of simulations:
i.e. 34 simulations X1,800 manhours/operators manual = 61,200 manhours
plus 34 simulations X2,000 manhours/maintenance manual= 68,000 manhours
total: 129,100 manhours
129,200 manhours X \$36/manhour = \$4,65M
GD could not substantiate how they arrived at these manhours and took an act or item to check and advise. The program office (Cpt Shackelford) will evaluate GD's manhours and tasks and provide the AF position to me by 5 Jul.

GD feels that AFEWES test schedule would/could slip by 6 months if a new contractor were to run the operations of the simulations. They did not take into account that such a contractor could/would be trained prior to taking over the operations. The phase-in/phase-out option included in the RFP was never put on contract.

GD has decided to move the new simulations of SA4,6,8,10 to the second floor, directly above the existing AFEWES facility. They have reserved 10,000 square feet facility and expect to grow into another 10,000 sq ft during the course of the next modification contract. Their long-range plans include this growth capability. GD (and the AFPRO and PO) felt that should another contractor take over the operations contract, such a contractor would require a minimum of 11,500 square feet additional area to house his supporting staff. It was the consensus of everyone I spoke with that it would be impractical and impossible to have another contractor operate out of AF Plant 4:
a) Impractical because the AF leases the total facility to GD and pays GD to supply/contract for all support services (water, electricity, mail receiving/distribution, fire insurance, sewage, etc); GD would have to allocate AFEWES costs and sub-lease to such a contractor ------(I did request that GD provide the 1984 total overhead expenses and the AFEWES allocated overhead costs by 5 Jul 85);
b) Impossible because GD would be unable to guarantee the security of the F-16 program. (Observation: since DOD clearances would be obtained, I believe that GD's real concern is "industrial security" rather than DOD security.

It was pointed out to me that GD, in answer to a similar proposition in 1980, informed the SPO they were unwilling to allow another contractor to operate within their facility (see memo from D.G. Ward, 22 Jul 80). The consensus was that "nothing has changed". Mr. Justice told me that even through in response to the last RFP GD proposed a phase-in/phase-out plan for training an outside party to operate AFEWES, GD never intented to acutally implement such a plan.

The current operations contract "079" is used for operating the siumlations and performing "minor" mods to the equipment. "Minor" could not be quantified and is determined/negotiated on a one-on-one basis between Maj Bryson and Mr. Justice. CLINs 04 and 05 are used to implement such minor mods. I requested that GD supply the costs of "pure" operations by 5 Jul to permit an apple/apple analysis. Questioned as to "other" operation contracts of AFEWES with GD, Mr Justice advised that all white-world programs are contracted through 079. The white world simulations performed are approximately 90% of all simulations.

Questioned as to what is "unique to GD" that would prevent another contractors' effective operation of AFEWES, Mr. Justice told me
a) the expertise of GD's AFEWES people (see also Mr. Tipton's response above)
b) GD's participation in Soviet Threat Meetings, continuously updating their intelligence information
c) GD's continuous interaction with the intelligence community

5. Discussions with Mr. R.G. Gadbury, AFPRO at Plant 4.
I requested that Mr. Gadbury revisit his position stated in his letter dated 2[illegible] Jun 80 that it would be impossible to have an outside contractor operate AFEWES. He told me: "my position today is unchanged". Mr. Gadbury also pointed out that Plant 4 is already short on space and the F-16 program is putting up and operating out of temporary facilities. He felt that the additional areas required by another contractor's support personnel would not be tolerated by the

F-16 program office.

6. Meeting with AFEWES System Program Office Personnel
The final meeting at AFEWES was with Maj. Bryson, LTC Repasey, Cpt Shackelford, and Lt. Staufer. The general concensus was that competing the operations of AFEWES at Plant 4 would
a) seriously impact testing schedules since the available documentation can't be handed off without extensive training
b) add technical risk to the test results since interpretation of a simulation often hinges on the subjective judgement of the AFEWES technician that the simulators are operating correctly. GD bases this judgement on the experience of the operators rather than on BIT or data
c) add approximately $16M to projected operations cost for documentation and training with a break-even of approx 14 years (note: the SPO had taken GD's projection without applying AF factors / review-position. Cpt Shakelford to reveiw and provide SPO position by 5 Jul 85).

The two alternatives mentioned were to:
1. Move AFEWES to another location. I requested that GD advise how much it would cost to pack up, ship, reassemble, and verify operability at location X (Eglin, WPAFB, etc).

2. Leave Equipment were it is presently, letting GD continue to operate it and doing minor updates as required to represent the threat accurately B U T decide on where the new AFEWES will be located and ship/install new airborne simulations at such a "new" AFEWES facility.

Cpt Shackelford told me that the operations contract was synopsized and he received 2 or 3 replies all of which were determined (by the SPO) to be unresponsive.

LTC Repasy, AFEWES technical manager colocated from AD, stated that many of the simulations are outdated; many are not being used at all. He felt that all hardware should be transferred to Eglin but that data should only be procured for existing threats. He estimated this to be between 75 to 90% of the simulations. He pointed me to GD's Honeywell-to-DEC conversion plan (18 Feb 85) which recommends prioritized SW conversion. LTC Repasy indicated that GD's priority is pretty accurate and that the simulations they delay probably will not be performed or can be performed with existing data. He indicated also that countering these threats is basic, definitely "within the state of the art" and simulations are no longer required to verify a defensive system's adequacy.

LTC Repasy stated that Eglin AFB would not require official provisioning documentation but would rather assume GD's spares and base their reorders on their consumption of these spares. He felt that any contractor would use the same provisioning basis.

During discussions with LTC Repasy on Eglin's current simulation philosophy I learned the following:
a) Eglin contracts for a sizeable portion of their simulations
b) Whenever Eglin contracts for the O+M of simulations, AF blue suiters stay involved since Eglin does not abdicatge the running of the AFB (as is the case with GD at AF Plant 4). Instead, blue-suiters are involved in all phases of the

simulation: operations, maintenance, simulation validation, and hardware/software modifications. The simulation is managed by a 2 to 3 [illegible] of officers and supported by AF technicians. LTC Repasy felt that on the average the AF provided approximately 15-25% of the total manpower required for the simulation.

7. Enclosed, at Atch 1, is a listing of information I requested during my visit to AFEWES to assist in the Cost Benefit Analysis.

ATCH: List of INFO requested

Information requested (due 5 Jul 85)	OPR
1. total cost of '84 operations (deleting CLINS 4 and 5 which contain mainly costs for minor mods)	JRJ DT
2. total AFEWES overhead expenses in 1984 (to determine projected sub-lease costs)	JRJ
3. Government Capital Investment todate ($60M per Col Weiss' letter to Gen Skanzte on 5 Oct 79)	JRJ
4. Total cost to relocate AFEWES sims to central CONUS location with GD responsible for turn-key operations (packing,shipping installation costs)	JRJ, DT
5. Focilities Modification Costs based on GD's projection to modify the second floor of AF Pl.4 that will house the modified simulations	DT
6. Updated manpower trents showing average experience of GD AFEWES personnel	JRJ
7. Update Cost trent of operations contract (see also 1 above)	JRJ, DT
8. How many of the 434 racks are deleted by latest modifications (i.e. SA4,6,8,10)	DT
9. Cost for provisioning data (if required)	JRJ
10. Average of 40 sims per year over last 25 years: what is avg over last 5 years?	JRJ
11. Validate/factfind GD's cost estimates for drawings other data	SPO
12. Breakout details of costs for Operators Manual	JRJ

18 February 1985
DRT-85-11

Subject: Honeywell-to-DEC Conversion Plan

To: ASD/OL-BA
General Dynamics/Fort Worth Division

Attention: Major A. L. Bryson

Enclosure: (A) Current Honeywell Computer Allocations
(B) Recommended Honeywell-to-DEC Conversion Stages
(C) DEC-to-Radar Interface
(D) Honeywell-to-DEC Conversion Schedule

1. Enclosures (A), (B), (C), and (D) are provided for your information. Enclosure (A) defines those simulations currently on Honeywell and thus is the basis for development of the Honeywell-to-DEC conversion plan. Enclosure (B) describes a three staged plan for accomplishment of the conversion. Stages 1 and 2 can be initiated immediately and can be accomplished in parallel. Stage 3 should not be initiated until after Stage 2 is completed and the start could be as late as FY 88.

2. Enclosure (C) describes a required interface which must be implemented in order to accomplish Stages 2 and 3. Since this interface will be peculiar to one computer, the Stage 2 simulations (all AIs) will be able to run from only one of the DEC computer complexes until Stage 3 is completed.

3. Enclosure (D) is the proposed schedule for implementation of all three stages.

GENERAL DYNAMICS CORPORATION
Fort Worth Division

D. R. Tipton

cc: D. H. Jaggers
T. J. Huston
B. D. Matthews
A. C. Spear
H. D. Tucker
D. C. Wilson

ATCH.

Enclosure (A)

CURRENT HONEYWELL COMPUTER UTILIZATION

HONEYWELL 1

HAVE GARDEN
JAY BIRD
SKIP SPIN
TWIN SCAN
BIG NOSE
FOX FIRE
GENERIC PDAI
TACAN
IR SAMs
IR AI MISSILES

HONEYWELL 2

SA-2 B/F
SA-2D
SA-3
SA-6
WILD CARD
BAR LOCK
THIN SKIN
IFF

HONEYWELL 3

SA-4
SA-5
SA-6
GUN DISH
FLAP WHEEL
WILD CARD

OTHERS

32K COMPUTER
  WILD CARD
  AI MISSILE TEST
JETS COMPUTER

RECOMMENDED HONEYWELL-TO-DEC CONVERSION STAGES

STAGE 1

A. Complete the SA-4 and SA-6 upgrades initiated under Contract F33657-81-C-2012. This eliminates the need for the Honeywell SA-4 and SA-6 systems after the upgrade deliveries.

B. Accomplish the STAND ALONE IR upgrade which provides for operation of the IR SAMs on the SEL computer. This eliminates the need for the Honeywell IR SAM software.

C. Develop an upgraded SA-5 missile simulation on the DEC computers under a black loop contract. This eliminates the need to preserve the Honeywell SA-5 software.

D. Arbitrarily designate the following simulations to have low priority requirements: (a) SKIP SPIN, (b) TWIN SCAN, (c) BIG NOSE, (d) IR AI Missile simulations, (e) WILD CARD, (g) THIN SKIN, (h) IFF, and (I) TACAN. The optical simulation has already been given this status. For these simulations, the hardware will be stored and DEC software not written until a test requirement is identified. Resurrection of one of these simulations in a DEC configuration would require four to eight months depending upon the system.

STAGE 2

A. Improve the DEC Missile Development Facility (MDF) by the addition of eight D/A converters and a strip chart recorder with high frequency response capability. Convert the Honeywell AA-6 missile envelope test software to operate on the MDF (conversion of the AA-6 will provide a model for later conversion of other missile software). This, together with Stage 1.D.f., will eliminate the need for preserving the 32K computer complex.

B. Convert the following AI simulations to DEC by developing the DEC-to-radar interface hardware and new software: (a) HAVE GARDEN, (b) JAY BIRD, (c) FOX FIRE, and (d) Generic PDAI.

C. Accomplish a general upgrade of JETS to include usage of new computers.

Note: After completion of Stages 1 and 2, the following situation will exist:

Honeywell 2	Honeywell 3	DEC	LOW PRIORITY
SA-2B	GUN DISH	SA-4	OPTICAL
SA-2D	FLAP WHEEL	SA-5	SKIP SPIN
SA-3		SA-6	TWIN SCAN
		SA-8	BIG NOSE
		SA-10	IR AI MISSILES
		IR SAMs	WILD CARD
		AA-6 TEST SW	THIN SKIN
		JETS	IFF
		LONG TRACK	TACAN
		HAVE GARDEN	
		JAY BIRD	
		FOX FIRE	
		PDAI	

The Honeywell 1, JETS, and 32K computers become spares for the two remaining complexes which could probably be maintained for five year or more.

STAGE 3

A. Arbitrarily designate the SA-2 simulations to have low priority requirements.

B. Convert the SA-3, GUN DISH, and FLAP WHEEL simulations to DEC by fabricating and installing additional DEC-to-radar interface units and new software.

D. Upgrade the SA-3, GUN DISH, and FLAP WHEEL simulations to include MTI and interface to the GPSR clutter simulation.

DEC-TO-RADAR INTERFACE

Because the system architecture of Honeywell computer-controlled simulations (Figure 1) include communication from the master and SPAG to the radar hardware via analog signals through a patch panel and the system architecture for DEC computer controlled simulations does not, conversion will require development of a DEC-to-Radar interface. Figure 2 shows the DEC architecture after incorporation of this interface. This DEC-to-Radar interface will consist of the items listed in Table 1.

The functions that were previously accomplished in the Honeywell radar interface are now accomplished in a single Unibus computer with analog input/output (I/O). The patch panel is still used to tie together the computer complex, the RF heads (without built-in computer controlled calibration), and the radar consoles (or cockpit). Communication between computers will be by UPLs and BPLs. Because of the increased complexity of this additional tier of computer control, the new interface design includes a floppy disk, a CRT, and signal display for ease of setup and maintenance.

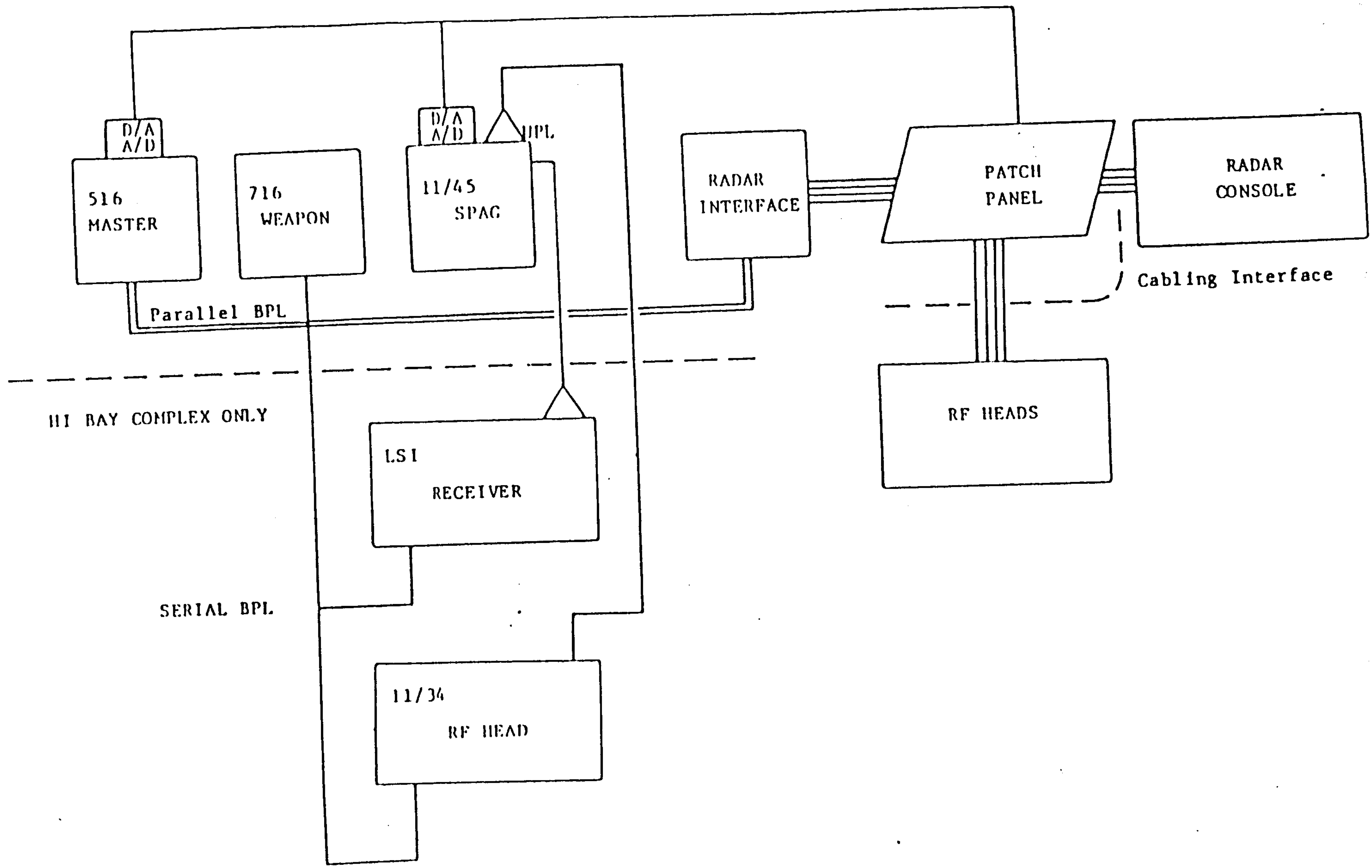


Figure 1. HONEYWELL SYSTEM BLOCK DIAGRAM

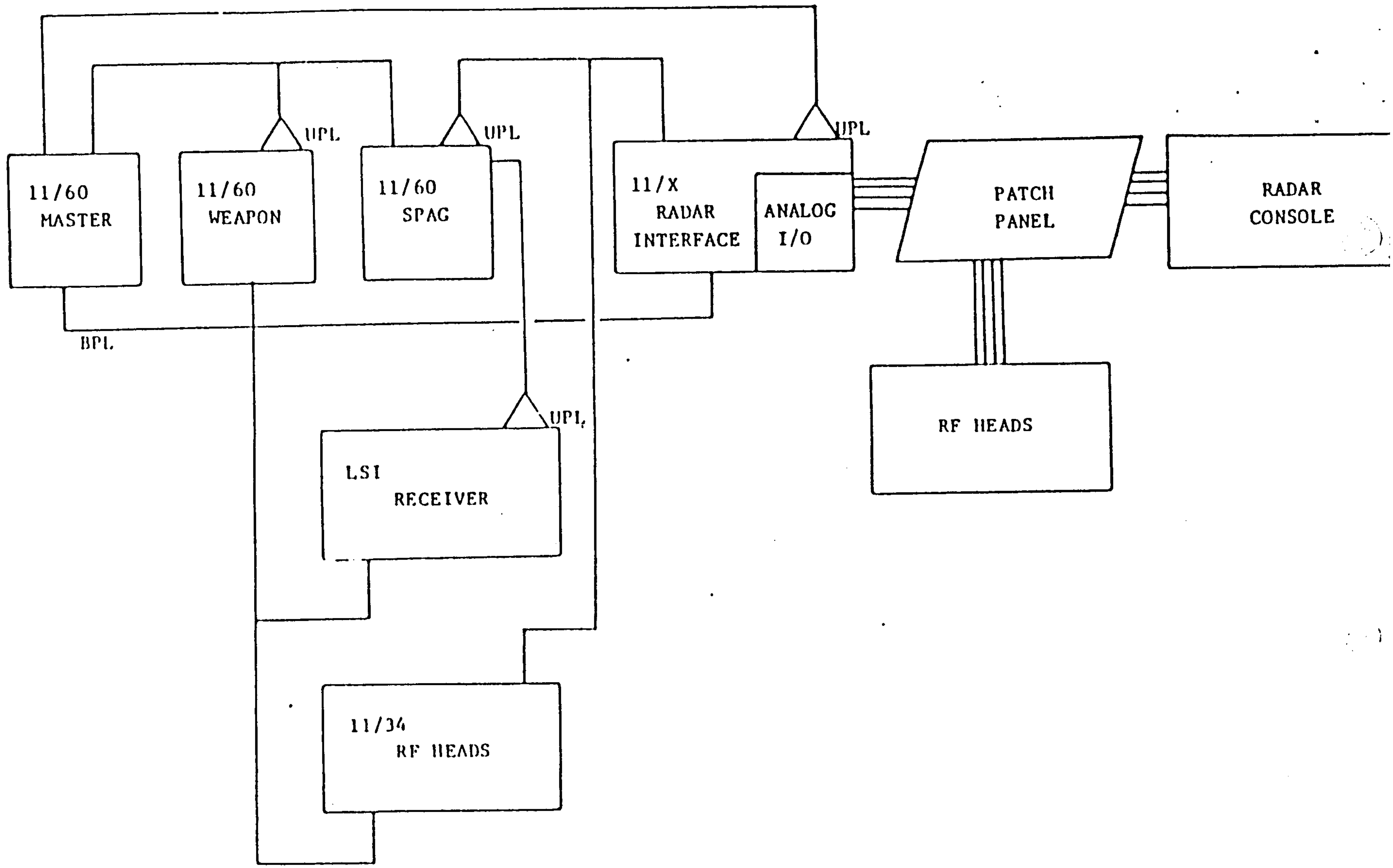


Figure 2. DEC SYSTEM BLOCK DIAGRAM

1. Radar Computer PDP 11/xx
2. Discrete I/O
3. A/D's
4. D/A's
5. Range Track Circuits
6. Angle Track Circuits
7. Target Sync. Circuits
8. UPL Receivers (2)
9. UPL Transmitter
10. BPL Slave
11. Floppy Disk Drives
12. CRT
13. Scope and Data Monitors
14. Real Time Clock

Table 1. DEC RADAR INTERFACE EQUIPMENT LIST

Enclosure (D)

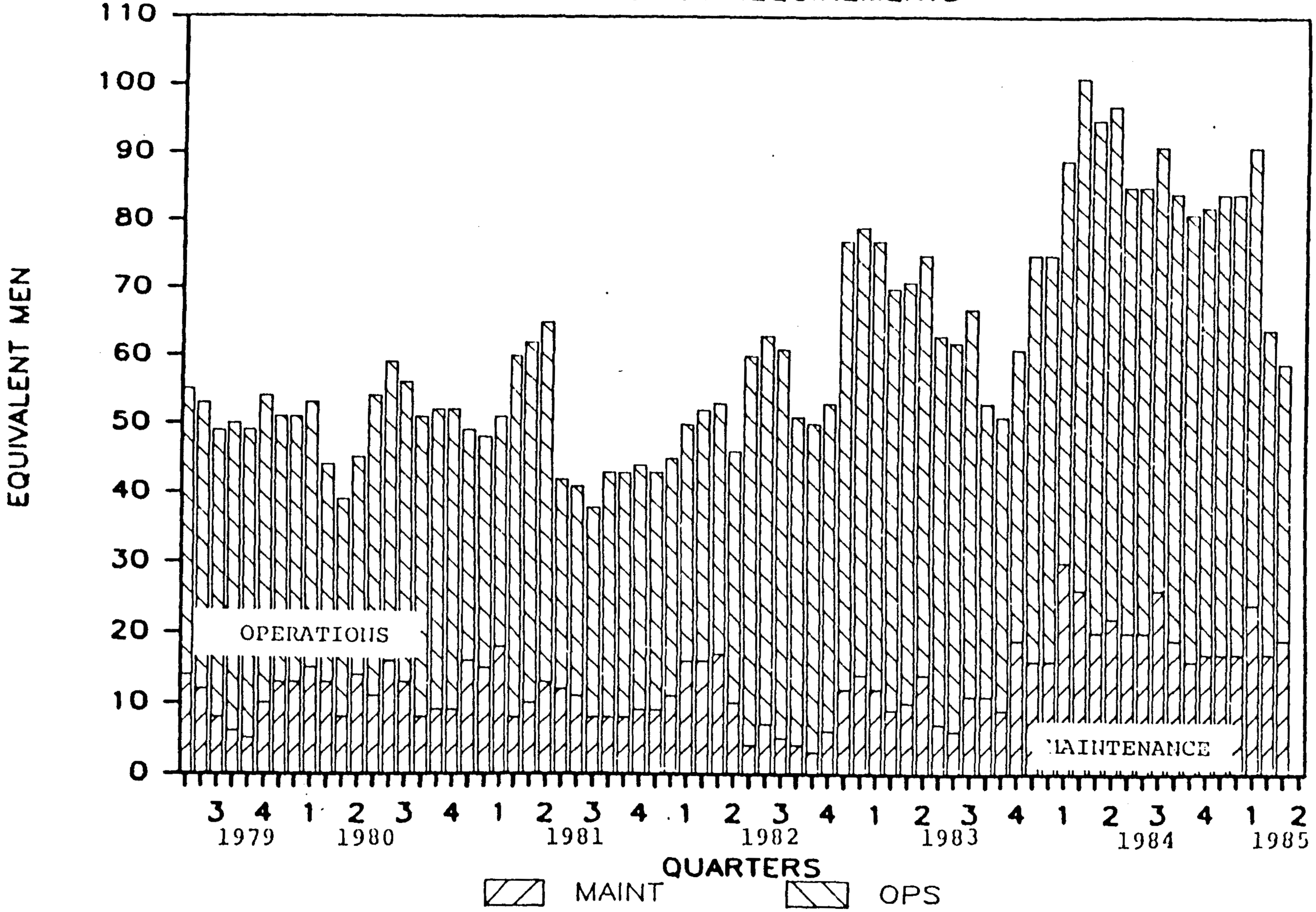
ENCLOSURE (D)

HONEYWELL-TO-DEC CONVERSION SCHEDULE

ACTIVITY	1985	1986	1987	1988	1989	1990	1991
	CALENDAR YEAR						
STAGE 1							
SA-4 PHASE II	==========	==========					
SA-6 PHASE II	==	==========	==========				
SA-5 UPGRADE	=====	==========	=====				
STANDALONE IR SAM'S	======	====					
STAGE 2							
MDF							
HARDWARE	====						
AA-6	===						
AI SIMULATIONS							
DEC-TO-RADAR INTERFACES	=======	===					
HAVE GARDEN		=====					
JAYBIRD		=====					
FOXFIRE		=====					
PDAI		====					
JETS UPGRADE		=======	==========	==			
STAGE 3							
DEC-TO-RADAR-INTERFACES			==========				
SA-3 CONVERSION			==	==			
SA-3 UPGRADE				=====			
GUNDISH CONVERSION				=====			
GUNDISH UPGRADE				=====			
FLAPWHEEL CONVERSION				==	==		
FLAPWHEEL UPGRADE					=====		

AFEWES OPERATION

MANPOWER REQUIREMENTS



[illegible]ts are NOT on this list,
[redacted]

The cable Interface is the Honeywell switching network . .

[redacted]

Honeywell Computers

DEC Computers

(3)

E/F 3,4	E/F 5	G/H	H	OLD H/I	I	OLD J	SINGLE I	BN I	SINGLE J	CABLE INT	IM	C 5/6	CI	NEW H/I	NEW J	MONO	NEW [redacted] H/I	TACAN [redacted] HEAD	IFF HEAD	COMM MATRIX	NEW CPTR COMPL'S	COMM CPTR COMPL
		●								●	●											
		●								●			●									
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Atch 3

THINGS WRONG WITH

A NEW/UNQUALIFIED CONTRACTOR

OPERATING

AFEWES

AFEWES IS A CRITICAL DOD ASSET

- o PRIMARY FACILITY FOR DEVELOPMENT OF EW SYSTEMS THAT ARE CRITICAL TO AIRCRAFT SURVIVAL
- o MINIMIZES EW FLIGHT TEST AND COST
- o VALUE PROVEN ON MAJOR PROGRAMS
- o ONLY CREDIBLE EW LABORATORY EVALUATION CAPABILITY AVAILABLE

AFEWES SUPPORTS MANY KEY PROGRAMS

- USAF — F-4, B-52, F-111, F-15, B-1, F-16 E-3, EF-111, SPECIAL A/C, ALQ-119, ALQ-131, ALQ-117, ALQ-94, ALQ-137, ALQ-99, ALQ-135, ALQ-184, ASPJ, HAVE CHARCOAL, ALQ, 161, INEWS, LINEBACKER, EWJT

- ARMY — UH-1, UH-60, OV-1, AQUILA, ALQ-80, ALQ-136, ARJS, RFED

- NAVY — F-4, A-7, F-14, F-18, EA6B, ALQ-126, ALQ-99, ASPJ, ALQ-162

- FOREIGN — ISRAEL, BELGUIM, NETHERLANDS, KOREA, SWITZERLAND, FRANCE, SWEDEN, UK, CANADA, NORWAY, RAPPORT, ALQ-171, BARRACUDA, SKY SHADOW, ALQ-162, ALQ-131

34 THREATS SIMULATIONS NOW OPERATIONAL

SA-2B/F	HAVE GARDEN
SA-2D	SKIP SPIN
SA-3	BIG NOSE
SA-4	SPIN SCAN
SA-5 (TARGET ILLUMINATOR ONLY)	TWIN SCAN
SA-6	PULSE DOPPLER
SA-7 (A AND B)	FOX FIRE
REDEYE	JAYBIRD
SA-8	SVOD/RBSN
SA-10	SRO-2/NRZ-2
WILD CARD	MEG
GUN DISH	JETS
FLAP WHEEL	COMM
LONG TRACK	IR
BARLOCK	IADS (C^3, SA-4, SA-6, SA-8, LONG TRACK)
THIN SKIN	

PRESENT CONTRACTOR POSSESSES A UNIQUE CAPABILITY

- CONCEIVED AND DEVELOPED THE AFEWES CLOSED LOOP, REAL TIME, ACTUAL RF THREAT SIMULATION IN 1958

- HAS THE ONLY EXPERIENCE AVAILABLE IN AFEWES OPERATION - CONDUCTED AN AVERAGE OF 40 TEST PROGRAMS PER YEAR DURING THE LAST 25 YEARS

- MAINTAINS A LARGE POOL (120 FULL TIME) OF HIGHLY QUALIFIED ENGINEERS AND TECHNICIANS FOR OPERATIONS, MAINTENANCE, AND UPGRADE

  - 120 PEOPLE WITH AN AVERAGE EXPERIENCE OF 8.5 YEARS

  - 37 PEOPLE WITH 10 OR MORE YEARS DIRECT APPLICABLE EXPERIENCE

  - 11 PEOPLE WITH OVER 20 YEARS DIRECT APPLICABLE EXPERIENCE

  - 39 PEOPLE WITH SPECIAL INTELLIGENCE CLEARANCES

- ADDITIONAL 200 PERSONNEL WITH AFEWES EXPERIENCE EMPLOYED ON CONTRACTOR'S OTHER PROGRAMS

- MAINTAINS UNIQUE RESOURCES NECESSARY TO PERFORM TEST ANALYSIS AND CONDUCT MISSION SURVIVABILITY STUDIES

- IN ADDITION, PRESENT CONTRACTOR HAS SIZEABLE TECHNICAL, MANAGERIAL, AND FINANCIAL RESOURCES THAT BACK UP THE AFEWES TEAM

PRESENT CONTRACTOR'S PERFORMANCE PROVEN HIGHLY SATISFACTORY

- o EXCELLENT TRACK RECORD OF CONTRACTOR BASED UPON 26 YEARS OF DEMONSTRATED PERFORMANCE
  - ACCOMMODATES A FLUCTUATING AF SCHEDULE WITH MINIMUM IMPACT
  - PROVIDED A PRODUCT WHICH IS CONSIDERED THE STANDARD FOR COMPARISON
  - HIGH DEGREE OF ON-SCHEDULE PERFORMANCE
  - QUALITY DEMONSTRATED AND ATTESTED TO BY NUMEROUS DOD OFFICIALS
- o CONTRACTOR STABLE, FINANCIALLY SOUND, AND WILLING TO ASSUME THE RISK OF FIRM FIXED PRICE CONTRACT
- o SINGLE CONTRACTOR PROVIDES A MAXIMUM AMOUNT OF HARDWARE PER DOLLAR BY ACCOMPLISHING BOTH THE UPGRADE AND OPERATIONS
- o CONTRACTOR IS RESPONSIVE TO AF DIRECTION .

CURRENT CONTRACTOR READILY ACCOMMODATES
A VARIABLE WORK LOAD

- GOVERNMENT REQUIRED SIMULATOR WORK LOAD IS TYPICALLY VARIABLE $>$ 3:1

- AN EASILY VARIED CADRE OF SKILLED MANPOWER REQUIRED

- CURRENTLY AFEWES PROGRAM ACCOMPLISHED WITHIN A LARGE ORGANIZATION WHICH
  - HAS BOTH BREADTH AND DEPTH IN CRITICAL SKILLS
  - EASILY ADAPTS TO A VARIABLE DEMAND
  - DOES NOT COMPROMISE SCHEDULE

THE CONTRACTOR HAS DEMONSTRATED THIS
CAPABILITY FOR THE LAST TWENTY-SIX YEARS

AFEWES OPERATIONS & MAINTENANCE BY CURRENT

CONTRACTOR IS EFFICIENT AND COST EFFECTIVE

- o MAINTENANCE IS A KEY CONSIDERATION
  - DELIVERABLE DATA HAS NOT BEEN A CONTRACTUAL REQUIREMENT - NO MAINTENANCE HANDBOOKS AVAILABLE
  - DEVELOPMENTAL DRAWINGS, ENGINEERING NOTEBOOKS, AND CORPORATE MEMORY REQUIRED FOR MAINTENANCE
  - EASY ACCESS TO DESIGNERS ENHANCES MAINTENANCE AND MINIMIZES DOWN TIME
- o SIMULATION OPERATION BY ANOTHER CONTRACTOR WOULD REQUIRE MORE TIME AND MONEY
  - TRANSITIONAL PERIOD WOULD DELAY CRITICAL TESTING AND BE A DUPLICATION OF EFFORT
  - LACK OF ACCESS TO DESIGN PERSONNEL WOULD DELAY OPERATIONS
  - SPECIAL INTELLIGENCE TEST OPERATIONS WOULD HAVE TO BE DELAYED
- o SIMULATOR CONTINUITY LOST
  - CORRELATION WITH PRIOR TEST PROGRAMS DIFFICULT
  - CONTINUITY OF ON-GOING PROGRAMS QUESTIONABLE

TRANSITION WILL BE EXPENSIVE

DRAWINGS

454 EQUIPMENT RACKS X 24 DWGS/RACK = 10,896 DRAWINGS

COST

10,896 DWGS X 31 MHRS/DWG X \$36/MHR = $\boxed{\approx \$12.16 \text{ MIL}}$

TIME

10,896 DWGS X 31 MHRS/DWG + 2,080 MHRS/MYR + 20 PEOPLE = $\boxed{\approx 8 \text{ YEARS}}$

OPERATION & MAINTENANCE MANUALS

34 SIMULATIONS X 1,800 MHRS/OPERATION MANUAL (AVG)	=	61,200
34 SIMULATIONS X 2,000 MHRS/MAINTENANCE MANUAL (AVG)	=	68,000
TOTAL		129,200

COST

129,200 MHRS X \$36/MHRS = $\boxed{\approx \$4.65 \text{ MIL}}$

129,200 MHRS ÷ 2,080/MYR + 10 PEOPLE = $\boxed{\approx 6.2 \text{ YEARS}}$

MARCH 1985

CALCULATION OF TIME TO BREAK EVEN

	GENERAL DYNAMICS			NEW CONTRACTOR
DIRECT LABOR	1.00 [1]			1.00 [1]
ENGR. O.H.	0.610	1.100		0.50 [2]
FRINGE	0.430			
SUBTOTAL	2.040			1.50
G&A @ 7.7%	0.157		@ 3%	0.045 [2]
PROFIT @ 10%	0.220		@ 10%	0.154
TOTAL	2.417			1.699

ABOVE ESTIMATES YIELD ≈30% SAVING WITH NEW CONTRACTOR

THEN

$4 MIL CONTRACT/YEAR X 30% = $1.2 MIL SAVINGS/YEAR FOR USAF

HOWEVER

$16.81 MIL TRANSITION COST ÷ $1.2 MIL SAVINGS/YEAR = 14 + YEARS TO BREAK EVEN

NOTE 1. NORMALIZED AND ASSUMED EQUAL FOR ALL CONTRACTORS
2. ASSUMED VALUES FOR JOB SHOP TYPE COMPANIES

TRANSITION TO A NEOPHYTE WILL CAUSE PROBLEMS

- TESTING EFFICIENCY WILL SUFFER DURING TRANSITION - AT LEAST 6 MONTHS DOWN TIME
- TRANSITION DATA REQUIREMENTS WILL BE COSTLY AND IMPACT CURRENT CONTRACTOR'S ACTIVITIES
- TRANSITION COSTS ARE A POOR INVESTMENT - WILL TAKE 14 YEARS TO BREAK EVEN
- LACK OF ANALYTICAL & TEST EXPERIENCE WILL LOWER QUALITY OF TEST DATA
- LACK OF MAINTENANCE EXPERIENCE WILL LENGTHEN TIME TO PERFORM TESTS

NO AFEWES "CORPORATE MEMORY" RETAINED

COLOCATION OF COMPETING CONTRACTORS IN THE SAME FACILITY WILL CREATE MANY PROBLEMS

- o DUPLICATION OF EXISTING OVERHEAD FUNCTIONS REQUIRED
  - RECEIVING, STORAGE, AND HANDLING OF GFE EQUIPMENTS
  - DATA REPRODUCTION AND PROCESSING FACILITY REQUIRED
  - MUST MAINTAIN SEPARATE COST ACCOUNTING CENTER

- o ADDITIONAL SUPPORT FUNCTIONS REQUIRED
  - SEGREGATED ACCESS TO FACILITIES REQUIRED
  - MUST CLEAR, ESCORT, AND CHECK ALL AFEWES VISITORS
  - MUST PROVIDE MEDICAL AID AND FIRE PROTECTION

- o DEPENDENCE ON CURRENT CONTRACTOR FOR UTILITIES, PLANT SERVICES, AND SECURITY
  - MUST ALLOCATE OR SEGREGATE UTILITIES COST FOR AFEWES FACILITY
  - MODIFICATIONS FOR AFEWES UNDER CURRENT FACILITIES CONTRACT WILL BE DIFFICULT

COHABITATION OF TWO COMPETITORS HAS RARELY BEEN SATISFACTORY. IN ADDITION, AFEWES, WHICH IS EMBEDDED WITHIN THE CURRENT CONTRACTOR'S OPERATION, WOULD CREATE UNIQUE OVERHEAD PROBLEMS.

ADDITIONAL AREA REQUIRED FOR SECOND CONTRACTOR

FUNCTION		AREA (SQ FT)
PROGRAM MANAGEMENT		1500
o PROG MGR	o SECRETARY	
o CHIEF ENGR	o ADMINISTRATORS	
o CONTRACTS	o SECURITY	
o CONF ROOM	o VENDOR RMS	
ENGINEERING		5000
o TEST DIRECTORS	o HARDWARE	
o SYSTEMS	o DRAWINGS	
o SOFTWARE	o CONFIG MGT	
LABORATORY SUPPORT		5000
o MAINTENANCE	o PARTS ORDERING	
o STORAGE SPACE	o PARTS RECEIVING	
o REPRODUCTION	o PARTS INSPECTION	
	TOTAL SUPPORT AREA	11500

THIS ADDITIONAL SPACE NOT CURRENTLY AVAILABLE NEAR AFEWES

COST EFFECTIVENESS OF

COMPETITIVE PROCUREMENT QUESTIONABLE

GOVERNMENT MUST:

o OBTAIN PHASE IN/PHASE OUT PLAN FROM CURRENT AFEWES CONTRACTOR	\$75K
o BUY THE DRAWINGS AND TECH ORDERS FOR THE NEW CONTRACTOR TO OPERATE AFEWES	\$16.81 MIL
o OBTAIN SPECIAL CLEARANCES FOR A MINIMUM OF 30 PEOPLE FOR THE SUCCESSFUL COMPETING CONTRACTORS	\$150K
o FUND BOTH THE CURRENT CONTRACTOR AND SUCCESSFUL COMPETING CONTRACTOR FOR A SIX-MONTH TRANSITION PERIOD	\$1.0 MIL

GOVERNMENT INVESTMENT OF ≈\$18 MIL TO COMPETE AN ANNUAL OPERATIONS CONTRACT OF \$4 MIL QUESTIONABLE - WILL TAKE 14+ YEARS TO RECOVER INVESTMENT; I.E., BREAK EVEN

AFTER TRANSMITION WORLD RENOWN R&D CAPABILITY
OF CURRENT CONTRACTOR WILL BE DISMANTLED

USAF AND DOD LOSE

- o ABILITY TO RESPOND IN A TIMELY MANNER TO A CHANGING THREAT POSTURE

- o ABILITY TO UTILIZE AN EW CORPORATE MEMORY DEVELOPED OVER A 26 YEAR TIME SPAN

- o CONFIDENCE IN SIMULATOR DATA AND ANALYSIS

SUMMARY

OPERATION OF AFEWES BY NEW CONTRACTOR

WILL BE:

- LESS EFFICIENT
- LOWER QUALITY
- MORE COSTLY WHEN TRANSITION COST INCLUDED
- MORE TIME CONSUMING PER TEST

85 07 '09 15:03 F04 * AFPR XP DET 2

DEPARTMENT OF THE AIR FORCE
OL-BA, AERONAUTICAL SYSTEMS DIVISION (AFSC)
AFPRO PLANT 4, GENERAL DYNAMICS, P.O. BOX 371
FORT WORTH, TEXAS 76101

REPLY TO ATTN OF: ASD/OL-BA

9 July 1985

SUBJECT: Review of General Dynamics Calculations of Transition of AFEWES Cost

TO: ASD/RWPE
Attn: Ms. Berrigner
Wright-Patterson AFB OH 45433

1. The subject of transition cost is not new. The initial study was conducted by the government in 1980 in support of contract F33657-81-C-0079. In that the government is in the process of formulating a follow-on procurement, this subject has been revisited. As you have all of the information on the 1980 review, I will only address the current update.

2. General Dynamics, the AFEWES contractor, reviewed the 1980 position and presented their results in a briefing entitled "Things Wrong with Competition," dated May 85. (Your office has a copy of this report.) This study basically says that a new contractor would require equipment drawings and operations/maintenance manuals, the combined cost of which would be 16.81 million dollars. This position represents a $.21M increase over their 1980 position of 15.6 million dollars.

3. Other issues which were researched were manpower and housing (facility) required and government break-even position given a $16.81M investment in data which they assessed to be 14 years. Although these issues are important, the most significant factor we feel is that of the money required for the data ($16.81) and the break-even point (14 yrs) since this is only a three-year contract. As such, the government could never break even on the test contract.

4. We feel that the numbers the contractor used, although slightly high based on the current contract rate for engineer support ($1.423/MWK), are still representative estimates. The government concurred with their 1980 position and since the current position is only an update to that position, we feel that these numbers are representative of the impact of a different AFEWES test contractor.

Lloyd S. Shackelford

LLOYD S. SHACKELFORD, Capt, USAF
Deputy Director, ASD/OL-BA

Atch 4
to '85 CBI

(. T BENEFIT ANALYSIS QUEST :S

1. Q. What is the dollar value of the AF EWES assets?

   A. Government owned $39.2M
   General Dynamics owned $600K
   (Test Equipment, Computer,etc.)

2. Q. When does General Dynamics do suvivability analysis?

   A. When requested by the Government (i.e., EF-111 effort in 1982)

3. Q. Why does this single Contractor provide a maximum amount of hardware per dollar by accomplishing both upgrades and testing?

   A. Training minimized since testing personnel coordinate closely with designers; minimum design and integration time as we integrate systems into the AF EWES Test Facility; elimination of ICWG and other tedious contractor relationships occurs.

4. Q. What level of drawings are there on the AF EWES upgrades?

   A. Level One (current contract requirement). No deliverable drawings on previous contracts.

5. Q. What are the manhours per drawing?

   A. Mechanical design and drawing preparation for level one drawings at 31 mh per drawing is based upon accumulated actuals for AF EWES type programs.

6. Q. What is the impact on the ongoing simulator development if documentation on the older systems is ordered?

   A. Some impact would be experienced on both testing and upgrade efforts, although some effort could be offloaded to technical writers. It is not feasible to assign much effort away from the designers who are most familiar with the intelligence data (i.e., IDIPs) and the foreign design techniques. Larger impact would be expected on testing programs however as a result of simulations being taken off-line.

7. Q. Could some other Contractor come into AF Plant No. 4?

   A. Although not presently prohibited by contract, another Contractor would have difficulty in providing their own security (guards, and fire protection), parking, utilities, medical, etc.

Atch 5

8. Q. What is an ROM to move the AF EWES to Eglin AFB?

   A.

- Dismantle & Package	$ 3,600M
- Transport to Eglin	.025M
- Reinstall & Checkout	3,100M
- Facility Modification (i.e. existing facility mod)	7,500M
- Drawings	12,160M
- Manuals	10,770M
- Training	4,000M

9. Q. What is the current testing contract authorization summary?

   A.

Testing	40%
Other	60%

   * Other includes improvements and simvals.

10. Q. There has been an average of 40 simulations per year 1970-1980 on AF EWES, what is the average for 1980-1984?

    A. 27 per year. Equipment tested is now more complex giving more complicated and longer test programs.

11. Q. How much would provisioning data cost?

    A. $750K ROM for RSP4 after drawings or $12.16M.

12. Q. Is there any proprietary data associated with AF EWES?

    A. General Dynamics does not have any of its own.

13. Q. The manhours per page for operations and maintenance manuals were derived from what?

    A. Projections for current AF EWES development of those manuals for SA-4 and SA-6 upgrades.

TRANSITION WILL BE EXPENSIVE

DRAWINGS

454 EQUIPMENT RACKS X 23 DWGS/RACK - 9,338 DRAWINGS

COST

10,896 DWGS X 31 MHRS/DWG X \$36/MHR = $\boxed{\approx \$12.16\ \text{MIL}}$

TIME

9,338 DWGS X 26 MHRS/DWG ÷ 2,080 MHRS/MYR - 20 PEOPLE = $\boxed{\approx 8\ \text{YEARS}}$

OPERATION & MAINTENANCE MANUALS

34 SIMULATIONS X 2,900 MHRS/SOFTWARE MAINTENANCE & OPERATIONS MANUAL (AVG) =	98,600
34 SIMULATIONS X 5,900 MHRS/HARDWARE MAINTENANCE & OPERATIONS MANUAL (AVG) =	200,600
TOTAL	299,200

COST

299,200 MHRS X \$36/MHRS = $\boxed{\approx \$10.77\ \text{MIL}}$

299,200 MHRS ÷ 2,080/MYR ÷ 10 PEOPLE = $\boxed{\approx 14.4\ \text{YEARS}}$

JULY 1985

CALCULATION OF TIME TO BREAK EVEN

	GENERAL DYNAMICS			NEW CONTRACTOR
DIRECT LABOR	1.00 [1]			1.00 [1]
ENGR. O.H.	0.610	1.100		0.50 [2]
FRINGE	0.430			
SUBTOTAL	2.040			1.50
G&A @ 7.7%	0.157		@ 3%	0.045 [2]
PROFIT @ 10%	0.220		@ 10%	0.154
TOTAL	2.417			1.699

ABOVE ESTIMATES YIELD ≈ 30% SAVING WITH NEW CONTRACTOR

THEN

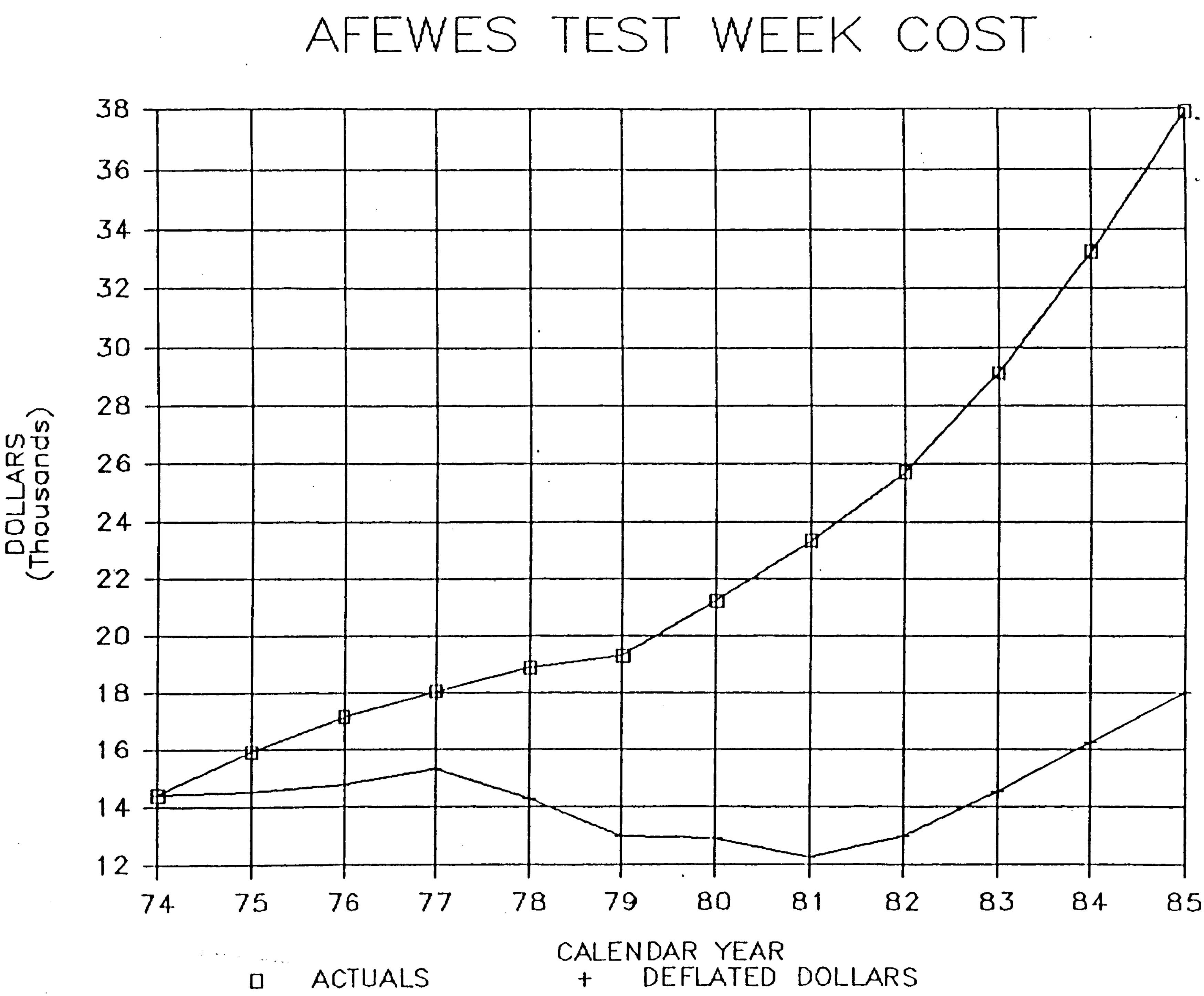
$4 MIL CONTRACT/YEAR X 30% = $1.2 MIL SAVINGS/YEAR FOR USAF

HOWEVER

$22.93 MIL TRANSITION COST - $1.2 MIL SAVINGS/YEAR = $\boxed{\text{19 + YEARS TO BREAK EVEN}}$

NOTE 1. NORMALIZED AND ASSUMED EQUAL FOR ALL CONTRACTORS
2. ASSUMED VALUES FOR JOB SHOP TYPE COMPANIES

JULY 1985


AFEWES TEST WEEK COST
DOLLARS (Thousands)
38
36
34
32
30
28
26
24
22
20
18
16
14
12
74
75
76
77
78
79
80
81
82
83
84
85
CALENDAR YEAR
□ ACTUALS
+ DEFLATED DOLLARS

COST EFFECTIVENESS OF

COMPETITIVE PROCUREMENT QUESTIONABLE

GOVERNMENT MUST:

o OBTAIN PHASE IN/PHASE OUT PLAN FROM CURRENT AFEWES CONTRACTOR	$75K
o BUY THE DRAWINGS AND TECH ORDERS FOR THE NEW CONTRACTOR TO OPERATE AFEWES	$22.93 MIL
o OBTAIN SPECIAL CLEARANCES FOR A MINIMUM OF 30 PEOPLE FOR THE SUCCESSFUL COMPETING CONTRACTORS	$150K
o FUND BOTH THE CURRENT CONTRACTOR AND SUCCESSFUL COMPETING CONTRACTOR FOR A SIX-MONTH TRANSITION PERIOD	$1.0 MIL

GOVERNMENT INVESTMENT OF≈$24 MIL TO COMPETE AN ANNUAL OPERATIONS CONTRACT OF $3 MIL QUESTIONABLE - WILL TAKE 19+ YEARS TO RECOVER INVESTMENT; I.E., BREAK EVEN

JULY 1985

PROGRAM/PROJECT YEAR DISCOUNT FACTORS

Table A[1/]		Table B[2/]
Present Value of $1 (Single Amount - To be used when cash-flows accrue in different amounts each year).		Present Value of $1 (Cumulative Uniform Series - To be used when cash-flows accrue in the same amount each year).
Project Year	10%	10%
1	.909	.909
2	.826	1.736
3	.751	2.487
4	.683	3.170
5	.621	3.791
6	.565	4.355
7	.513	4.868
8	.467	5.335
9	.424	5.759
10	.386	6.145
11	.351	6.495
12	.319	6.814
13	.290	7.103
14	.263	7.367
15	.239	7.606
16	.218	7.824
17	.198	8.021
18	.180	8.201
19	.164	8.365
20	.149	8.513
21	.135	8.649
22	.123	8.771
23	.112	8.883
24	.102	8.985
25	.092	9.077
26	.084	9.161
27	.076	9.237
28	.069	9.306
29	.063	9.369
30	.057	9.427

1/ Factors are based on continuous compounding of interest at the stated effective rate per annum, assuming cash flows at the end of the year.

2/ Table B factors represent the cumulative sum of the factors in Table A at the end of any given year. Table B may not agree with Table A due to rounding of each separately from a four-place decimal table to maintain accuracy.

•Table 3-3. Military AF Wide Standard Composite Rates by Grade.

Fiscal Year 1985 (Effective 1 January 1985)

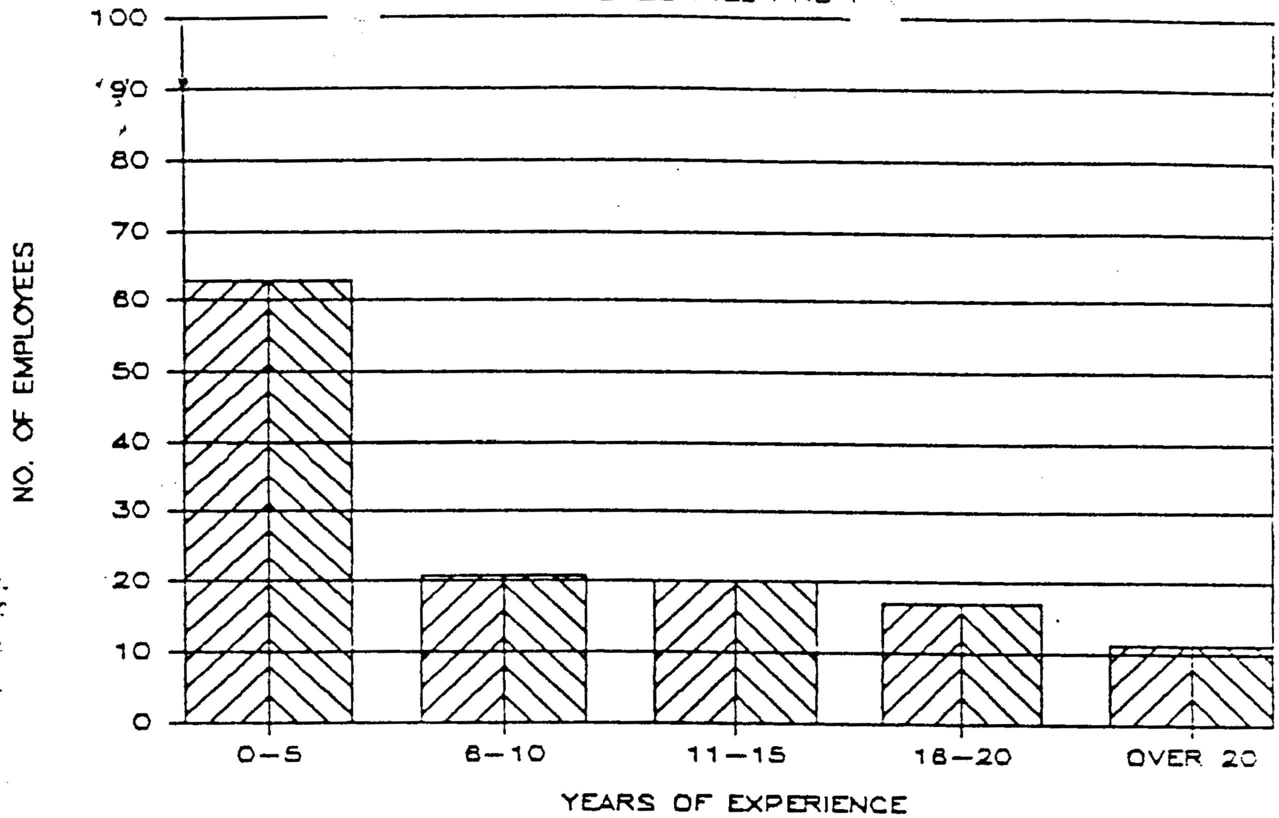
Grade	Basic Pay	Retirement Accrual (50.7% of Basic Pay)	BAQ & VHA	Incentive and Special Pay	Miscel-laneous	Composite Standard Rate w/o PCS	Permanent Change in Station	Total Annual Composite Rate
O-10	68,700*	34,831	526	2,308	6,923	113,288	1,955	115,243
0-9	68,700*	34,831	1,538	579	7,158	112,806	1,955	114,761
0-8	66,402	33,666	2,265	538	6,308	109,179	1,955	111,134
0-7	59,129	29,978	2,488	1,041	5,818	98,454	1,955	100,409
0-6	48,295	24,486	5,916	2,764	5,337	86,798	1,955	88,753
0-5	39,635	20,095	6,721	3,392	4,804	74,647	1,955	76,602
0-4	33,072	16,768	6,102	3,879	4,227	64,048	1,955	66,003
0-3	27,258	13,820	4,617	1,679	4,094	51,468	1,955	53,423
0-2	21,279	10,788	3,346	846	3,125	39,384	1,955	41,339
0-1	15,567	7,892	2,983	704	2,634	29,780	1,955	31,735
Average	28,631	14,516	4,814	2,104	3,948	54,013	1,955	55,968
E-9	27,257	13,819	4,151	125	4,716	50,068	1,185	51,253
E-8	22,532	11,424	3,584	123	4,335	41,998	1,185	43,183
E-7	19,000	9,633	3,197	110	4,034	35,974	1,185	37,159
E-6	15,868	8,045	2,720	95	3,771	30,499	1,185	31,684
E-5	12,918	6,549	2,232	80	3,538	25,317	1,185	26,502
E-4	10,820	5,486	1,842	46	3,382	21,576	1,185	22,761
E-3	9,075	4,601	1,368	26	3,150	18,220	1,185	19,405
E-2	8,345	4,231	845	18	3,027	16,466	1,185	17,651
E-1	6,993	3,545	523	4	2,831	13,896	1,185	15,081
Average	12,253	6,212	1,986	59	3,455	23,965	1,185	25,150
Cadets	5,803	-	-	-	1,869	7,672	109	7,781

*Capped to comply with current ceiling on senior executives.
NOTE: Numbers may not add due to rounding.

OPR: HQ USAF/MPPB

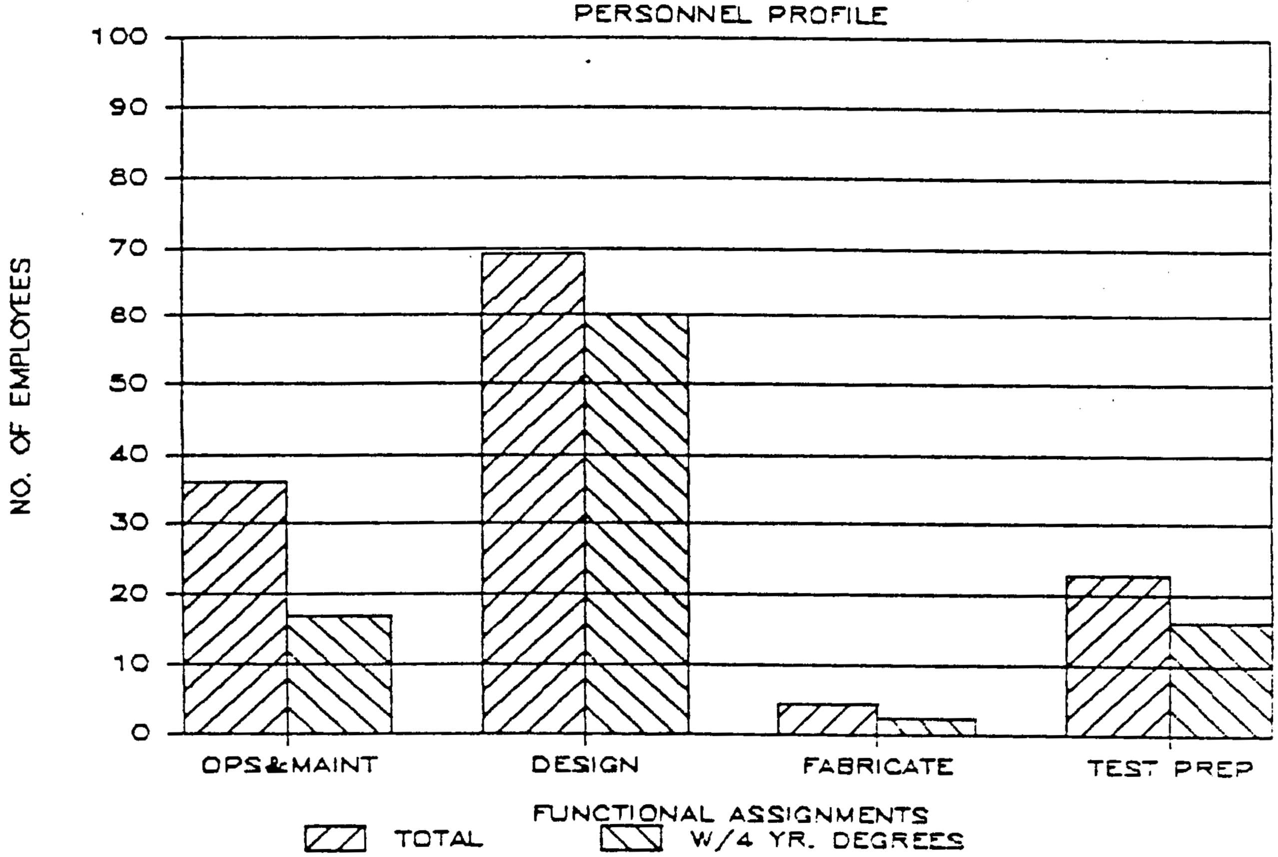
ATCH 7

PERSONNEL PROFILE



AFEWES OPERATION AND MAINTENANCE

PERSONNEL PROFILE



Atch

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS CENTER (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

Memorandum For: Lt Col Linda K. Palmer
46 TW/OL-AG (AFEWES)
Mail Zone 2161, PO Box 371
Fort Worth, TX 76101-0371

12 Apr 95

From: Capt Emma A. Guillermo
ASC/YDQS-T (B-1 SPO)
2275 D Street, Suite 16, Mail Stop 16
Wright-Patterson AFB, OH 45433

Subject: Base Realignment Closure - AFEWES

1. The B-1 Defensive System Upgrade Program is tenatively planning to conduct hardware-in-the-loop testing in the Air Force Electronic Warfare Environment Simulator (AFEWES) for a six-month effort from Feb 99-Aug 99. However, before testing the upgraded defensive system, the facility may require modifications. Prior to Feb 99, four months (Sep 98-Jan 99) was planned to modify AFEWES to test our specific requirements.

2. Closure of AFEWES may interfere with the B-1 SPO's effort to thoroughly test our upgraded defensive system. It is imperative that AFEWES be available for testing in order to meet our test schedule and comply with the Electronic Combat Test Process AFM 99-112.

3. If you have any questions, please call me at DSN 785-5942.

Emma A. Guillermo
EMMA A. GUILLERMO, Capt, USAF
B-1 Defensive System Upgrade Program
Test Manager

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

To Dave Jaggers	From Lt C. P.
Co.	Co.
Dept.	Phone #
Fax #	Fax #

Headquarters
Swedish Air Force
EW Section

To

Mr Alan J. Dixon, Chairman
Defence Base Closure and Realigment Commisson
1700 N. Moore Street
Suit 1425
Arlington, VA 22209

Copy to Dave Jaggers, Lockheed Martin, USAF Plant #4, Fort Worth, TX, USA
Maj. Jeff Cheney, USAF, Lockheed Martin, USAF Plant #4, Fort Worth, TX

Letter of concern

The Swedish Air Force (SAF) and the Material Department of the Armed Forces (FMV) have carried out EW test in AFEWES since 1977 and have plans to continue to use the facility.

During these test we have gained an increased knowledge of the performance of our systems as well as the behavior of different threat systems. This has been very valuable to us in our development of defence systems. We have found the personal skilled, helpful and dedicated and we have, during the years, also established a personal friendship to several members.

The Swedish Air Force has now been made aware of the plans of moving AFEWES to another location. By doing this, we fear there will be a substantial loss of experienced personal and we would like to express our concern of AFEWES' ability to help us during the next 3-5 years.

Bo Frössling

SAF
EW Section
Test & Analyzes

Anders Dickmark

SAF
Head of EW Section

THE PUBLISHED JUSTIFICATION IS ERRONEOUS

- THE AIR FORCE STATEMENTS ABOUT COLOCATION, WORKLOAD, AFFTC CAPACITY, DUPLICATION, AND COST TO MOVE ARE UNSUPPORTED BY FACTS.
  - THE AIR FORCE STATEMENTS ARE VASTLY DIFFERENT FROM THE DATA SUBMITTED BY THE 46TH TEST WING AT EGLIN AIR FORCE BASE.
  - THE AIR FORCE STATEMENTS ARE VASTLY DIFFERENT FROM THE CONCLUSION OF THE TEST AND EVALUATION RELIANCE INVESTMENT BOARD (TERIB).
- THE AIR FORCE STATEMENT ON JOB IMPACTS ADDRESSES ONLY THE GOVERNMENT JOBS AFFECTED AND DOES NOT ADDRESS THE MOVEMENT OF ABOUT 100 CONTRACTOR JOBS FROM TEXAS TO CALIFORNIA.

AFFTC CAPACITY

AF COMMENT

- AVAILABLE CAPACITY AT AFFTC IS SUFFICIENT TO ABSORB AFEWES WORKLOAD

FACTS

- AFFTC MAY HAVE THE CAPACITY TO REPLACE THE NINE GOVERNMENT POSITIONS (FIVE DIRECT, FOUR INDIRECT).
- AFFTC DOES NOT HAVE THE PERSONNEL TO OPERATE/MAINTAIN AND UPGRADE THE AFEWES.
  - LFWC POSITIONS TO BE REPLACED ARE ABOUT 50 ENGINEERS/TECHNICIANS IN SUPPORT OF OPERATIONS/MAINTENANCE AND ABOUT 50 IN SUPPORT OF UPGRADES.
  - AFFTC WILL HAVE TO CONTRACT FOR THIS WORK.
- AFFTC DOES NOT HAVE AVAILABLE FACILITIES TO HOUSE THE AFEWES. A NEW BUILDING (OR A MAJOR REARRANGEMENT WILL BE REQUIRED).
- AFFTC HAS NO HARDWARE-IN-THE-LOOP SIMULATION CAPABILITY, CONSEQUENTLY, TEST USERS WILL BE UNABLE TO CONDUCT AFEWES TESTING DURING THE MOVE AND MUST ACCEPT DEGRADED CAPABILITIES UNTIL THE TRANSITION IS COMPLETE.

MOVING THE AFEWES WILL CREATE SERIOUS PROBLEMS

MAINTENANCE RISK WILL INCREASE SIGNIFICANTLY

- ✔ DELIVERABLE DATA HAS NOT BEEN A CONTRACTUAL REQUIREMENT - ONLY ONE OPERATIONS HANDBOOK (SA-11M) FUNDED IN RECENT YEARS AND IT IS FOR ENGINEERS/TECHNICIANS WITH AFEWES EXPERIENCE
- ✔ DEVELOPMENTAL DRAWINGS, ENGINEERING NOTEBOOKS, AND CORPORATE MEMORY ARE REQUIRED FOR MAINTENANCE WITH CURRENT LEVEL OF DOCUMENTATION
- ✔ USAF WILL FIND IT EXTREMELY DIFFICULT (IF NOT IMPOSSIBLE) TO SUPPORT 1960'S VINTAGE HONEYWELL 516 BASED SIMULATORS
- ✔ USAF WILL NOT HAVE EASY ACCESS TO DESIGNERS

SIMULATION OPERATION WILL REQUIRE SIGNIFICANTLY MORE TIME AND MONEY

- ✔ DOCUMENTATION MUST BE PROCURED
- ✔ TRANSITIONAL PERIOD WILL DELAY CRITICAL TESTING
- ✔ LACK OF ACCESS TO DESIGN PERSONNEL WILL DELAY OPERATIONS
- ✔ SAR TEST OPERATIONS WILL HAVE TO BE DELAYED
- ✔ IT WILL TAKE YEARS TO DEVELOP THE EXPERTISE NECESSARY TO REPLACE THE 37 YEARS OF CORPORATE MEMORY THAT EXISTS IN FORT WORTH

SIMULATOR CONTINUITY LOST

- ✔ CORRELATION WITH PRIOR TEST PROGRAMS WILL BE DIFFICULT
- ✔ CONTINUITY OF ON-GOING PROGRAMS WILL BE QUESTIONABLE

ATTACH (A)

AFEWES CLOSURE WOULD HAVE SIGNIFICANT IMPACTS ON DOD / ALLIED T&E

DIGITAL MODELS → MEASUREMENT FACILITIES → INTEGRATION LABS → ? → INSTALLED. SYSTEM TEST FACILITY → FLIGHT TEST

- *INABILITY TO PERFORM DENSE ENVIRONMENT EFFECTIVENESS TESTING*
- *INABILITY TO PERFORM STATISTICALLY RELEVANT IR ALERT / RESPONSE TESTING*
- *INABILITY TO PERFORM OPERATIONALLY REALISTIC SEMI-ACTIVE MISSILE T&E*
- *INABILITY TO PERFORM FULLY-DYNAMIC, MULTI-SPECTRAL (IR / RF) T&E*
- *INABILITY TO PERFORM END-GAME MANEUVER T&E*

WITHOUT AFEWES, DOD AND ALLIED AIRCRAFT WOULD ENTER COMBAT WITHOUT FULLY PROVEN / REFINED EC SYSTEMS

HITL CONSOLIDATION ISSUES

AFEWES Move to BAF or ACETEF

EDWARDS AFB

Advantages

- o Reduces risk of performance in installed configuration
- o Reduces testing logistics to one location
- o Provide common stimulation source and expertise of system under test from breadboard through installed configuration
- o Requires HITL/ISTF chamber interface waveguides and IR signal executive
- o ECSEL capability integrated at ISTF
- o Closed loop effort at Point Mugu is terminated
- o Supports growth of ACETEF to a category I facility

Disadvantages

- o Costs \$50 - \$60 Million to move selected systems
- o Loss of capability and expertise of personnel who don't move
- o Requires 12 -18 months of down time to move facility starting in FY98
- o Move completion FY99 at the earliest (MILCON 2 YRS + 1 YR AFEWES MOVE)
- o Move will effect T&E programs starting in FY96 with any AFEWES move
- o Cost to move ECSEL capability to BAF or ACETEF

Issues

- o Loss of availability for F-22 and F-18E/F in Fy97/98
- o Recompetition of AFEWES contract in FY96
- o Peak testing of F-22 avionics in FY98/99would cause slippage in other programs
- o Cost of MILCON for new building to house AFEWES costs \$8 million

T&E INFRASTRUCTURE EXECUTIVE AGENT

BOARD OF DIRECTORS

BoOD STUDY

ELECTRONIC COMBAT

EC HITL / ISTF CONSOLIDATION STUDY

HARRY BANKS
HITL/ISTF SUB-GROUP LEAD
4 February 1994

Document Separator

Inside the Pentagon's

Inside the Air Force

an exclusive weekly report on Air Force programs, procurement and policymaking

Vol. 6, No. 13, March 31, 1995

OSD TO CREATE NEW FORUM FOR SERVICE SPACE ISSUES: JSMB FOR DOD, CIA ONLY

Despite the misgivings of both the Army and Navy, the membership of the Joint Space Management Board (JSMB) is expected to be limited to four officials, who will act purely as interagency links between the Defense Department and the Central Intelligence Agency. However, a new layer of space management may be created to assure the services a voice in deliberations over space issues -- an as-yet-unnamed space "board of directors" that would serve as a last resort for settling interservice space-related squabbles.

In a March 10 memo to Vice Chairman of the Joint Chiefs of Staff Adm. William Owens, Under Secretary of Defense for Acquisition and Technology Paul Kaminski outlined two possibilities for the JSMB: that it be comprised

continued on page 6

Industry officials say service underestimated impact of closure . . .

USAF BRAC CHOICES COULD DISRUPT ELECTRONIC WARFARE TESTING

The Air Force's decision to close two small test and evaluation facilities could disrupt electronic combat effectiveness testing for Air Force electronic warfare systems for up to three years and result in significantly higher costs than what the service projected in its recent recommendations to the Base Closure and Realignment Commission. Industry officials contend the Air Force substantially underestimated the potential employment impact of closing both the Air Force Electronic Warfare Evaluation Simulator (AFEWES) activity at Ft. Worth, TX, and the Real-Time Digitally Controlled Analyzer Processor (REDCAP) facility at Buffalo, NY, and maintain that the excess capacity and redundancy cited by the Air Force is overstated.

continued on page 10

Findings "not good" for Northrop . . .

EXPECTED BOMBER STUDY RESULTS WOULD RELY ON THREAT ASSESSMENTS, FUNDS

Sources close to the heavy bomber force study being conducted by the Institute for Defense Analyses report that the study is likely to assert that additional B-2 stealth bombers would be necessary as a hedge against surprise "pop-up" threat, but only if lift forces are unable to deliver other strike assets to the theater in time. The funds for these extra B-2s would have to be added by Congress. Conversely, if the nation's early warning systems and other intelligence assets give adequate notice of an impending crisis and lift is in place, fiscal constraints prohibit the purchase of 20 more B-2s, as some in Congress, the Air Force, and defense industry have requested. The results of the study are scheduled to be delivered to Defense Secretary William Perry April 15, and to Congress on May 1.

continued on page 12

Sparking service concerns about cost, commonality . . .

AIR FORCE, NRO AGREE TO PURSUE SEPARATE SBIR ACQUISITION TRACKS

The Air Force's and the National Reconnaissance Office's recent move to pursue "separate but equal" acquisition programs for the new Space Based Infrared System (SBIRS) has set off alarms in the other services, which are concerned that two tracks will ultimately result in an expensive, redundant program. However, senior Pentagon officials say the commitment to a streamlined SBIRS acquisition program with as much commonality as possible remains intact.

Last summer, the Defense Department headed up an effort to eliminate overlap and redundancy while satisfying all early warning requirements across the entire federal government. Known as the "summer study," the effort

continued on page 4

Fiddling While Rome Burns

House and Senate conferees meeting on the FY-95 defense rescission and supplemental appropriation bill adjourned March 29 without reaching a compromise and have not yet scheduled a meeting for next week, which leaves the Defense Department in a difficult position: The service chiefs have all testified to Congress that without a supplemental appropriation by March 31 to cover costs incurred during FY-95 contingencies, they will have to raid fourth quarter operations and maintenance accounts to pay their bills -- amounting to at least $2.6 billion -- adversely affecting readiness. Of that total, the Air Force will have to find $900 million. The House is not in session today, so is not available to meet with its Senate counterparts, according to congressional sources.

Israeli sources said the BPI approach becomes critical when the tactical ballistic missile is equipped with chemical, biological or nuclear warheads. Israeli defense officials, in particular, have designated theater ballistic missile defense programs, such as the Arrow bilateral missile defense program, as a key national priority.

According to Marc Lesser, contracting officer for the project, this is an extension of a "series of BMDO contracts agreed to with Wales, Ltd. going back to the late 1980s." Originally, BMDO's contract was with the Israeli Ministry of Defense. Wales was selected to carry out the work during government-to-government negotiations over the project. Wales is presently performing research and development work integral to the architecture study. Under this contract modification, Wales will provide system design updates, conformance assurance of related activities, and sensitivity studies and analyses for the Israeli Middle East Theater Defense Architecture Study and Development Program.

U.S. and Israeli sources said the effort will involve lasers, kinetic energy and high-explosive weapons mounted on manned and unmanned aircraft. The U.S. Air Force is also developing a boost-phase intercept program, but favors a manned platform with an airborne laser rather than a kinetic-kill vehicle. The KKV, however, is still being considered by the United States, service sources said.

INDUSTRY: USAF UNDERESTIMATES BRAC IMPACT . . . begins page one

Earlier this month, Sen. Alfonse D'Amato blasted the Air Force, charging that the service was trying to use the base closure process to avoid critical electronic combat effectiveness testing for the service's high-priority F-22 fighter program (*Inside the Air Force*, March 10, p1). D'Amato cited problems with the B-1 bomber's electronic countermeasures suite, which he said was inadequately tested, as a reason to ensure that F-22 electronic warfare capabilities are thoroughly evaluated.

Under the service's recommendation to the base closure commission, both REDCAP and AFEWES would close sometime in FY-98, according to the Air Force's Feb. 1995 report to the defense secretary on base closure recommendations. The Air Force Flight Test Center at Edwards AFB, CA, is slated to absorb the workloads from AFEWES and REDCAP.

The Air Force, in its recommendations to the defense secretary, opted to close AFEWES and REDCAP because the service projected future workloads at those facilities to be 28 percent and 10 percent of capacity, respectively. The Joint Cross-Service Group assessed the future workloads for test and evaluation facilities by "averaging the workload for FY-92 and FY-93 and multiply[ing] this average by an index of 0.72. The 0.72 index was provided by the [Pentagon's] Comptroller based on the declining T&E budget through 2001," according to an Air Force response to questions from *Inside the Air Force*.

The service also estimated the employment impact to be the loss of nine jobs from the closure of AFEWES and five jobs for REDCAP. Although the number of service personnel supporting the two facilities is very small, the Air Force's estimates failed to consider dozens of contractor personnel who would likely be affected by basing actions, industry sources said.

To close AFEWES and REDCAP, the Air Force anticipates a one-time cost of $5.8 million and $1.7 million, respectively.

However, as recently as March 23, Lockheed, "at the request of the Air Force, provided detailed cost data for AFEWES relocation that totalled over $65 million," according to responses by AFEWES-contractor Lockheed Fort Worth Company (LFWC) to questions from *Inside the Air Force*. The projected $65 million bill includes disassembling, transporting, reassembling and integrating AFEWES equipment at its new home at Edwards AFB. "The equipment to be moved includes, potentially, all 39 threat simulators, support equipment and spares in which the Air Force has invested $325 million," according to LFWC.

Furthermore, an "operational readiness impact for up to three years" is expected while the AFEWES simulators are "disassembled, moved, reassembled and integrated, and Edwards AFB personnel are trained on simulator operation and maintenance," LFWC stated.

AFEWES is a government-owned, contractor operated electronic warfare hardware-in-the-loop test facility run by LFWC, which employs about 50 personnel to support AFEWES operations and maintenance and another 50 to support AFEWES upgrades, according to a Lockheed. Should the facility close, "it is unclear what would happen to the employees," with some likely to be absorbed by the company, but "there would be no guarantee that jobs could be found for all," according to LFWC.

The AFEWES facility includes hardware and software systems that simulate surface-to-air missiles, airborne interceptor radars, anti-aircraft artillery radars, and command control and communications networks, according to a Lockheed description of the program. LFWC claims such equipment is unique, "not only in the United States but in the world." Among the unique capabilities at AFEWES are a "multiple emitter generator," and an infrared laboratory capable of a large quantity of IR threat simulations, according to LFWC.

The REDCAP facility, located in Buffalo, NY, is operated by the company Calspan, and employs "about 50 people directly on REDCAP," including one Air Force representative, with an additional 25 personnel serving in

BASE CLOSURE ANALYSIS EMPHASIZED T&E RANGES OVER HARDWARE SYSTEMS

As the Air Force prepared its recommendations on test and evaluation facilities to the defense secretary for the 1995 base closure process, the service followed a rigorous process of analysis to determine which of its installations warranted closure or realignment. To assess the overall capabilities of the services, a Joint Cross-Service Group evaluated test facilities against a number of criteria, including physical value, critical air and sea space, hardware in the loop, installed system test facilities, and integration labs, as well as topographic and climatic features.

Test and evaluation centers received a weighted "grade" depending on "the mission of the facility, with most weight being assigned to the component reflecting the primary mission," according to the Air Force's Feb. 1995 report to the defense secretary on the service's recommendations to the Base Closure and Realignment Commission.

Of the three categories of T&E facilities evaluated, electronic combat centers earned a total weight of 15 versus a weight of 70 assigned to armaments and weapons test centers. Air vehicle test centers received a weight of 15, bringing a total of 100 between the three T&E categories. In judging test and evaluation centers, the joint cross-service group placed substantially greater emphasis criteria such as "air and sea space" and "open air range" than on "hardware-in-the-loop" and installed systems, according to the Air Force's base closure report to the defense secretary.

Prior to settling on the decision to close the Air Force Electronic Warfare Evaluation Simulator activity and Real-Time Digitally Controlled Analyzer Processor facility and move test capabilities to Edwards, the Joint Cross-Service Group considered transferring both the REDCAP and AFEWES workloads to Navy Air Warfare Center installations at either Patuxent River, MD or at Pt. Mugu, CA. The Air Force determined that such moves would "not provide either the cost savings or the large aircraft test capabilities that a move to Edwards accomplishes," according to the service report.

support functions, according to a source familiar with the facility. REDCAP allows electronic warfare equipment such as jammers to be tested against simulated integrated air defense systems tailored to represent a specific operating environment like Southwest Asia or the Korean Peninsula.

The cost to move REDCAP capabilities to Edwards could be "a factor of 10 higher" than what the Air Force estimates in its BRAC recommendations as well, the source said. The facility's technical equipment "was never made to be shipped," the source said.

LFWC and other industry officials also take issue with the Air Force's assessment of low future workloads for REDCAP and AFEWES. The AFEWES infrared laboratory, for example, "is forecast to be almost 100 percent utilized" for the next two years, LFWC stated. "There is no reason to believe . . . that [AFEWES] utilization will decrease to 28 percent," LFWC added. In order to decrease overall electronic combat program development costs, "the Air Force and DOD actually emphasize more hardware-in-the-loop and installed system test facility testing as part of the 'EC Test Process,'" according to LFWC.

For its part, the REDCAP facility in the last year was utilized nearly to capacity, such that no additional workloads could have been accommodated, a source said. At the same time, "if you wanted to make REDCAP look bad, you would say that testing only occurs when there are operators in the chairs" actually performing system evaluations. However, the preparations required for a system to be tested at REDCAP can take more than six months to complete, the source said. A test involving a simulated integrated air defense system, for example, "takes six to nine months to prepare for five weeks of testing," the source said. -- *Tom Cull*

CAPABILITIES AND LIMITATIONS AFTER MOVE

- "ONE STOP" SHOPPING IS AVAILABLE, BUT NO SIGNIFICANT INCREASE IN CAPABILITY
  - AFEWES WILL BE AVAILABLE FOR AFEWES-ONLY HARDWARE-IN-THE-LOOP TESTING
  - AFEWES AND INSTALLED FACILITY TESTING CAN BE CONDUCTED SIMULTANEOUSLY IN AN INTEGRATED FASHION IF TWO SETS OF EQUIPMENTS-UNDER-TEST ARE PROVIDED
  - THE OPEN AIR RANGE (OAR) WILL BE AVAILABLE FOR FLIGHT TESTING BUT THERE IS MINIMAL BENEFIT COLLOCATING AFEWES WITH THE OAR
- INSTALLED FACILITY TEST CAPABILITY STILL LIMITED
  - NOT CAPABLE OF FAR-FIELD TESTING
  - NOT SUITABLE FOR DYNAMIC CLOSED-LOOP EFFECTIVENESS TESTING
    - ✔ FREE SPACE RADIATION REQUIRES AIRCRAFT MOVEMENT AND IS CLUTTERLESS
    - ✔ ANTENNA HATS (OR DIRECT COUPLING) REQUIRE EXPENSIVE AND COMPLICATED INTERFACES TO DO PHASE AOA
  - REQUIRED REAL-FREQUENCY CAPABILITIES FROM ECIT NOT SYNCHRONIZED WITH AFEWES
- AFEWES WILL BE A SMALLER FACILITY
  - OLDER, POORLY DOCUMENTED SIMULATIONS WILL PROBABLY NOT BE MOVED DUE TO COST
  - CAPABILITY TO SUPPORT EXISTING EW SYSTEMS WILL BE DEGRADED
    - ✔ CURRENTLY, CORPORATE MEMORY AND EASY ACCESS TO SIMULATION DESIGNERS ENHANCES MAINTENANCE AND MINIMIZES DOWN TIME

1. **QUESTION:** How many people, including Lockheed personnel, are employed at AFEWES? In what capacity do contract employees serve? What would happen to those contract employees if the facility were to close?

ANSWER: The AFEWES is a Government-Owned, Contractor-Operated (GOCO) Electronic Warfare Hardware-In-The-Loop (HITL) test facility located at Air Force Plant #4 (Lockheed Fort Worth Company). The 46 Test Wing (parent command) has an operating location at Air Force Plant #4 to oversee AFEWES operations that includes 3 Air Force officers and 1 civilian (secretary). Lockheed Fort Worth Company (formerly General Dynamics) has been the O&M contractor for the AFEWES since its inception in 1958. Approximately 50 contractor personnel (engineers and technicians) support AFEWES operations and maintenance and 50 support AFEWES upgrades. If the facility were to close, it is unclear what would happen to the employees. Lockheed Fort Worth Company would attempt to absorb as many as possible, but this would depend entirely on the company's business prospects. Clearly there would be no guarantee that jobs could be found for all.

2. **QUESTION:** The Air Force did not see a significant cost to move needed equipment from AFEWES to Edwards AFB once the Ft. Worth facility closes. What does Lockheed estimate the cost to move to be? What accounts for the costs? What equipment must be moved?

ANSWER: The Air Force estimated the cost to move the AFEWES to Edwards AFB to be $5.8M. As recently as 23 March 1995, Lockheed, at the request of the Air Force, provided detailed cost data for AFEWES relocation that totalled $65M. The cost includes disassembly, transport, reassembly, and integration of the AFEWES simulators at Edwards AFB. It also includes, (1) the cost for facility preparation support at Edwards AFB and the modification of a 39,000 sq. ft. building to house the simulators, (2) the cost to update simulator drawings and develop operation and maintenance manuals (the Air Force has funded minimal documentation over the years since the same company that built 90% of the simulators (Lockheed) operates and maintains the equipment). This documentation would be critically important if Edwards personnel will be operating the equipment, (3) the cost of training for Edwards personnel, and (4) one year maintenance support while Edwards personnel are learning how to operate and maintain the equipment. Unfortunately, the one cost that can not be estimated is the loss of expertise associated with the engineers and technicians who have designed, operated, and maintained AFEWES simulations over the last 37 years.

The equipment to be moved includes, potentially, all 39 threat simulations, support equipment, and spares in which the Air Force has invested $325M.

3. **QUESTION:** How is the AFEWES capability unique? What is it about AFEWES that is not duplicated elsewhere?

ANSWER: The AFEWES is one of the primary EW test facilities, not only in the U. S., but in the world. This is substantiated by the facility's customer base, which includes USAF, USN, Israel, UK, Sweden, Turkey, Germany, Italy, Belgium and others. It is unique in that no where can you find the large quantity of, (1) RF Closed-Loop, Man-In-The-Loop, Surface-to-Air Missile (SAM), Airborne Interceptor (AI), Anti-Aircraft Artillery (AAA), and Command, Control, and Communication Threat Simulations, and (2) IR SAM and Air-To-Air Missile Threat Simulations at one facility. The 39 threat simulators and support systems can and have been used to evaluate EC systems at all stages of their life cycle from concept to brassboards to DT&E and OT&E, and modifications to fielded systems. Unique capabilities include, (1) a multiple emitter generator that is unequaled in terms of emitter density and fidelity, (2) an IR laboratory that is rapidly becoming the DoD IR test facility due to its large quantity of IR threat simulations and the capability of evaluating flares, IR jammers, and missile warning receivers either individually or integrated, (3) a large number of RF and IR HITL threat simulators that simply do not exist at any other facility, and (4) the inherent capability of testing the modern InfraRed multi-spectral EC systems.

4. **QUESTION:** What is the future workload for the AFEWES facility? Is the Air Force's estimate of 28 percent accurate?

ANSWER: It is unclear how the AFEWES future workload was determined. Over the last ten years, the average AFEWES utilization using radar simulator usage hours as a measure has averaged 90% of the negotiated standard for full utilization. Using the Air Force's own monthly Range Utilization Measurement System (RUMS) report, AFEWES utilization has also averaged 90% for CY93 and CY94. It can also be pointed out with pride that during Desert Storm every aircraft type flying for the coalition forces had its EC system optimized in the AFEWES.

Future workload is extremely difficult to predict beyond 12 months for any test facility. It is a safe assumption, however, that the future workload for all DoD EC test facilities will be lower for the foreseeable future based on the reduction in defense spending for EC systems. There is no reason to believe, however, for AFEWES, that utilization will decrease to 28%. To lower overall EC program development costs and ensure that EC systems are indeed more thoroughly checked out, the Air Force and the DoD actually emphasize more Hardware-In-The-Loop (HITL) and Installed System Test Facility (ISTF) testing as part of the "EC Test Process". For the next two years, the AFEWES IR lab alone is forecast to be almost 100% utilized.

5. **QUESTION:** Could work continue at the AFEWES facility for allies and industry customers, even if the facility is ultimately closed?

ANSWER: Testing can continue at the AFEWES for all DoD, foreign, and industry customers until the Air Force begins AFEWES relocation, currently scheduled for 1998. Unfortunately, there will be an operational readiness impact for up to three years while the simulators are disassembled, moved, reassembled, and integrated, and Edwards AFB personnel are trained on simulator operation and maintenance.

6. **QUESTION:** Is, or was, electronic combat effectiveness testing for the F-22 fighter slated to occur at AFEWES? When? If so, would that testing now be conducted at Edwards?

ANSWER: This question should be addressed to the Air Force.

POINT PAPER FOR BRAC HEARING

INTRODUCTION

The Air Force Electronic Warfare Evaluation Simulator (AFEWES) is a Government-Owned, Contractor Operated (GOCO) test facility which evaluates aircraft survivability against Radio-Frequency (RF) and Infrared (IR) threat systems. Since 1958, Lockheed Fort Worth Company, formerly General Dynamics, Fort Worth Division, has been the sole contractor associated with its development and operation. AFEWES is widely recognized as the most capable facility of its type in the world. Since its beginning, AFEWES testing has supported the Cuban Missile Crisis, the Vietnam War, Operation Eldorado Canyon against Libya, Operation Desert Storm and Bosnian Relief Operations. Important contributions continue to this day for a SAR customer with 1-1 priority whose platform/mission cannot be identified.

There is virtually no factual basis to support "disestablishment and relocation" of AFEWES to the Air Force Flight Test Center (AFFTC) at Edwards AFB, CA as recommended to the BRAC. **In fact, the proposed action is in conflict with Congressional language in FY 95 SAC report.** The following remarks address each element of the rationale used by the USAF in the recommendation to the BRAC as well as the actual facts applicable to each issue.

1) **RATIONALE:** **Projected AFEWES Workload = 28%**
FACTS
a) AFEWES Workload (1985-94) averages 91% of the Contracted Utilization Rate.
b) Official AF Formulas calculate 1993-94 Workload at 88% and 92% respectively.
c) Rationale did not consider International utilization.
d) New capabilities available in 1995 will increase utilization further.

2) **RATIONALE:** **This Action Achieves Significant Cost Savings.**
FACTS
a) Recommendation to BRAC estimated $5.8M for move resulting in $800K annual savings.
b) 1994 BoOD Study estimated AFEWES relocation costs at $50-60M.
c) 24 MAR 95 estimate provided to USAF officials was $66.7M.
d) $66.7M relocation costs will reduce net savings and extend cost recovery period.

3) **RATIONALE:** **This Action Achieves Significant Workload Consolidation.**
FACTS
a) Apparently refers to a reduction of 9 government positions.
b) AFEWES operated for 20 years without on-site government presence.
c) Cost savings can be achieved by reducing USAF Management and not moving AFEWES.

4) **RATIONALE:** **AFFTC Capacity Can Absorb AFEWES Workload.**
FACTS
a) Insufficient Documentation exists for any other agency to efficiently operate and maintain specialized AFEWES equipment.
b) The AFFTC Ground Test Workload is sufficiently low to necessitate acquisition of an established T&E Business base to remain economically viable.

5) **RATIONALE:** **AFEWES Infrastructure Duplicated At Other AF T&E Facilities.**
FACTS
a) Contradicted by 1994 BoOD Study. "AFEWES capabilities are not duplicated."
b) Only 15% of AFEWES Capability is duplicated at any other DoD T&E facility.
c) If duplicated, why such intense competition within the USAF for relocated assets?

6) **RATIONALE:** **Impact Confined To Reduction Of 9 Jobs.**
FACTS
a) Greater than 100 jobs affected at LFWC.
b) Impact on Test Customers not even considered.
c) Down time during move also not considered.

SUMMARY

Since this action:
1) Will cost $60-70M more than estimated and is in conflict with other DoD estimates,
2) Will result in a net loss in T&E capability,
3) Failed to consider customer test requirements and facility down time,
4) Is in conflict with FY 95 Senate Appropriations Committee direction,
5) Would achieve greater cost savings without relocating the facility,

HOW CAN THE PROPOSED ACTION AGAINST AFEWES POSSIBLY BE IN THE BEST INTEREST OF THE USAF, DoD, OR THE AMERICAN TAXPAYER?

Document Separator

04/05/95

FLAWED INPUTS TO FY 95 BRAC
THREATEN
ELECTRONIC COMBAT T&E LABS

The Air Force Electronic Warfare Evaluation Simulator, AFEWES, is a Government-owned, Contractor-operated, Hardware-In-The-Loop (HITL) facility which evaluates the EFFECTIVENESS (survivability) of DoD and Foreign aircraft systems in lethal engagements with RF and IR threats. It is widely recognized by past and present users as perhaps the most capable facility of its type in the world. Since its beginning in 1958, AFEWES has supported the development and refinement of virtually every Electronic Combat system employed, so successfully, by Coalition Forces in Operation Desert Storm.

Similar noteworthy contributions have distinguished AFEWES over its 37 year history. During the 1960's AFEWES testing supported strategic Reconnaissance aircraft during the Cuban Missile Crisis. B-52 Attrition studies during Project LINEBACKER II as well as the refinement of defensive countermeasures for a variety of DoD aircraft typify AFEWES contributions during the Vietnam War era of the 1970's. AFEWES developed cooperative SOJ techniques in the 1980's to support Operation Eldorado Canyon, the retaliatory action against Libya. Defensive Infrared countermeasures for transport aircraft were developed in the 1990's in direct support of Bosnian Relief operations. Similar contributions continue to this day for a Special Access customer, with 1-1 priority, whose platform and mission cannot be identified in this paper.

On 2 March 1995, DoD recommendations to the FY95 Base Realignment And Closure (BRAC) Commission were announced by Secretary of Defense William J. Perry. Included in this announcement were recommendations to "disestablish and relocate" AFEWES. The rationale used by the US Air Force to justify this recommendation was replete with factual inconsistencies and oversights. Many aspects of the official rationale are indicated below with a more accurate indication of the <u>actual</u> <u>facts</u> in each area:

1) <u>Projected Workload = 28%</u>. This figure is grossly underestimated. Over the last 10 years, AFEWES' annual utilization has averaged 91% of the Contracted Baseline Radar Simulator Utilization Rate. Monthly utilization reports, based an official Air Force formula, have quantified AFEWES utilization in the 88-92% range for the period 1993-1994. Projections of future workload are consistent with this trend. Also, new capabilities which become operational within the next year will expand utilization even further.

2) This Action Achieves Significant Cost Savings. The DoD announcement estimates a "one-time" cost of $5.8M to move "selected" AFEWES assets; ultimately resulting in annualized savings of $800K. Multiple DoD and USAF studies have been conducted in recent years and have all produced the same conclusion: Relocation of AFEWES is not in the Government's best interest. A significant DoD study completed in 1994 estimates actual AFEWES relocation costs for selected assets at $50-60M. The MILCON costs alone, to prepare a facility to accept the AFEWES equipment, was estimated at $8M. **Apparently the results of this study were ignored by the USAF in formulating the BRAC recommendation.**

In fact, it was not until 22 March 1995, fully three weeks following the 2 March recommendation to the BRAC, that Air Force officials contacted the AFEWES O&M contractor directly, to determine the specific costs associated with AFEWES relocation. The composite costs, submitted to the USAF on 24 March 1995, were $66.7M!

The reference to moving only "selected assets" and "disposal of" many older threat simulations (SA-3, SA-4, ...?) belies any understanding of the continuing importance of these threats to AFEWES' International users in today's unstable world. Also lacking is any recognition of the cost benefit of International utilization to proportionate reduction in the USAF annual O&M cost obligation for AFEWES.

The actual utilization costs incurred by a typical AFEWES Test Customer represent only a minor percentage of equivalent open-air flight test. On an annualized O&M basis, the average "out-of-pocket" costs borne by the USAF, above and beyond those paid by users of the facility, is only $300K/year for the period 1985-1994. Although initiatives to further reduce AFEWES costs are being pursued by the current O&M contractor, the current costs associated with AFEWES T&E are clearly insufficient to justify the proposed BRAC action.

3) This Action Achieves Significant Workload Consolidation. The workload consolidation referred to is apparently related to the reduced number of government personnel required to manage AFEWES at the AFFTC location. This reduction in personnel apparently forms the basis for the $800K annual O&M savings discussed above. For a majority of its 37-year history, the AFEWES was successfully operated at its current Air Force Plant No. 4 location without an on-site military presence. The advent of modern videoconferencing technology would allow daily

AFEWES O&M management, if necessary, to be accomplished from the remote AFFTC location, thereby preserving the estimated $800K cost savings, and avoiding the significant, unnecessary cost of physically relocating the facility.

4) AFFTC Capacity Can Absorb AFEWES Workload. The essence of this statement indicates that the current workload of the AFFTC ground test facility is sufficiently low to necessitate absorption of an established T&E business base, to remain economically viable.

The unstated assumption implicit in the DoD announcement suggests that AFEWES capabilities, if relocated, will continue to provide the same high-quality of test support which has been established by its current contractor over the past 37 years. Such is not the case. The current AFEWES contractor, Lockheed Fort Worth Company, has served as both the *developer* and the *operator* of the facility since 1958. This fact has afforded the USAF significant cost savings by necessitating only minimal documentation for most AFEWES threat simulations. The existing documentation base is insufficient for personnel at any other facility to efficiently configure and operate the 39 specialized systems currently contained in AFEWES. The cost estimate for upgrading existing documentation to support AFEWES operations by another contractor is approximately $18M, alone.

5) AFEWES Infrastructure Duplicated At Other AF T&E Facilities. The grain of truth in this assertion lies in the fact that HITL resources which represent perhaps 4-6 individual AFEWES threat systems do, in fact, exist at other DoD laboratories. Most of these alternative simulations, however do not enjoy comparable validation against threat intelligence, as does AFEWES. It is absolutely false to imply that the full complement of 39 threat systems contained in AFEWES are duplicated anywhere else in the world. The rationale above belies even a rudimentary understanding of unique AFEWES attributes available at Air Force Plant No. 4.

a) Unmatched IRCM & Missile Warning System T&E capability.
b) Unequalled Semi-Active Missile T&E capability.
c) RF Environmental Density/Fidelity without equal.
d) Combined CM/End Game Evasion with man-reactive F-16 cockpit.
e) Access to CFE for External Networking Applications.
f) Multi-Spectral T&E capability.

The fact that AFEWES' capabilities are not duplicated elsewhere is also reiterated in the 1994 DoD Study referenced earlier.

6) <u>Impact (Confined to) Reduction of 9 Jobs</u>. The DoD statement apparently refers exclusively to Government positions only. Approximately 100 contractor personnel, associated with AFEWES Upgrade and O&M activities, would also be adversely affected by this action.

Of far greater significance, however, is the fact that the USAF impact assessment, completely failed to consider the impact of AFEWES relocation on DoD and Foreign Users with testing requirements in 1995 and beyond. The following list identifies AFEWES customers with which Testing Requirements have either been finalized or technical discussions have been initiated.

- <u>DoD</u>: C-17, B-2, B-1, F-15, F-22, Band IV IRCM, Army ATRJ, Army Advanced Missile Warning Receiver, Navy IDECM, DoD SAR Program (Priority 1-1)
- <u>FOREIGN</u>: UK DIRCM, Sweden, Germany, Italy

The decision to include AFEWES "disestablishment and relocation" within the DoD recommendation to the BRAC was made "at the last minute" by Senior USAF civilian officials. The "11th hour" nature of this decision suggests that political considerations instead of any thorough analysis of the facts identified above, provide the basis for this action. Unfortunately, Secretary of Defense William J. Perry and JCS Chairman General John Shalikashvili accepted the USAF recommendations without exception.

Similarly questionable rationale was provided by the USAF to justify equivalent action against a facility complementary to AFEWES, the Real Time Electromagnetic Digitally Controlled Analyzer Processor (REDCAP) in Buffalo, NY. AFEWES and REDCAP, electronically networked together, using well-established communications technology, can represent, in an "end-to-end" sense, the modern Electronic Combat battlefield necessary to evaluate the survivability of next generation EC Avionic Systems. A study of Electronic Networking was mandated in the FY95 Senate Appropriations Committee Report as a prerequisite to any HITL consolidation...efforts. To our knowledge, this study has yet to be initiated. **This Congressional requirement was apparently also not considered by the USAF in the formulation of its recommendation to the BRAC.**

In response to the 2 March 95 announcement, Senator Alphonse D'Amato (R, NY) gave an impassioned speech on the floor of the U.S. Senate bringing into question, the ACTUAL motives of the USAF for singling out these two small T&E facilities (combined FY95 Budget of less than $20M), and failing to close any of 10 major USAF Test Facilities (combined FY95 Budget of $1.722B).

The time-honored adage, "IF IT AIN'T BROKE, DON'T FIX IT" clearly applies to the plight of AFEWES and REDCAP. Given the austere Defense funding environment and unstable international situation in which we find ourselves, how much of this "PROGRESS" are American taxpayers expected to withstand? Significant unnecessary Capital investment ($60-70M)? The promise of anticipated cost savings which will never be realized? Net reductions in critically needed Electronic Combat Test capability in an increasingly unstable world?

If this unjustified action against AFEWES and REDCAP cannot be reversed by the cold reality of sound technical and fiscal reason, sadly, the real losers in this tragic political debate will be US and Allied aircrews who will be forced to enter combat in the future with less than fully EFFECTIVE Electronic combat systems to ensure their survival to "fight another day".

Document Separator

Inside the Pentagon's

Inside the Air Force

an exclusive weekly report on Air Force programs, procurement and policymaking

Vol. 6, No. 10, March 10, 1995

THAILAND CONSIDERS F-16, F-15, F/A-18E/F FOR ITS FORCES

The government of Thailand is preparing to announce a competition for a new purchase of tactical fighter aircraft, according to Air Force and industry officials. It will be considering Lockheed's F-16, and McDonnell Douglas' F-15 and F/A-18 E/F. Thai officials refused to comment on the upcoming buy. It is unclear what additional foreign fighter aircraft the Thai government may request information on as well.

Thailand already has two squadrons of F-16s, according to Lockheed officials. Eighteen F-16s have been delivered and 18 more are on order, they said. Industry sources expect that Thailand will most likely purchase additional F-16s, as they already have the infrastructure to support the aircraft. "I don't think Thailand could afford to start investing in F-15s, which by the time you buy all the spares and work out a training regimen for them, will cost about $80 million a copy," a source said.

The chances that the U.S. government will approve a sale of F-15s in Southeast Asia is slim, according to industry sources. Current arms transfer policy is aimed at maintaining regional balances. As no F-15s are currently deployed in the region, the State Department may be loathe to introduce the highly capable aircraft. "Only the United States, Saudi Arabia and Japan have them," the source said.

However, McDOnnell Douglas officials are not throwing in the towel just yet, especially since Thailand has yet to make its requirement public. "Thailand has always been a strong U.S. ally in Southeast Asia, especially during Viet Nam," a McDonnell Douglas official said. A number of industry officials told *Inside the Air Force* that they consider Southeast Asia to be the biggest growth market for U.S. weapon systems.

Sen. D'Amato presses F-22 test issue . . .
AIR FORCE BASE CLOSURE CANDIDATES DRAW FIRE ON CAPITOL HILL

Crying foul, an influential legislator took to the floor of the Senate last week to upbraid the Air Force for trying to use the base closure process to avoid electronic combat effectiveness testing for the service's high-priority F-22 fighter program. The Air Force's recommendation to the Base Closure and Realignment Commission to close two small test and evaluation facilities where testing for the electronic combat effectiveness of the F-22 advanced tactical fighter would take place drew fire on Capitol Hill March 2 from Senate Appropriations Committee member Sen. Alfonse D'Amato (R-NY), long a critic of the service's F-22 test plans.

While the Air Force cites excess capacity and redundancy as reasons to close the service's Real-Time Digitally

continued on next page

'Til the Fat Lady Sings

Under orders from the General Services Board of Contract Appeals, the Air Force must re-evaluate two submissions in a $300 million contract for local area network communications components and services. On Dec. 12, 1994, the Air Force awarded one of two ULANA II contracts to TRW, which Unisys protested on three counts: that the award does not provide the best value to the Air Force, that the performance risk analysis performed during source selection was flawed and that "TRW's use of one its subsidiaries was inappropriate," according to a TRW source. GSBCA threw out all but the "best value" argument on March 3, and directed the Air Force to reconsider the award. TRW is mum on its plans for a protest of its own if Unisys emerges victorious in the next round.

Controlled Analyzer Processor (REDCAP) activity and the Air Force Electronic Warfare Evaluation Simulator (AFEWES) activity, D'Amato charged in remarks on the Senate floor that the Air Force axed those facilities because the service "has something to hide" about electronic combat effectiveness testing for the F-22.

The Senate Appropriations Committee's report on the FY-95 defense appropriations bill directed the assistant secretary of the Air Force to submit a report by March 1 that outlines the cost and schedule impacts of revising the F-22's test and evaluation master plan to include more robust electronic combat effectiveness testing. The report is to include "thorough electronic combat testing" at the REDCAP and AFEWES facilities and should identify funding "required between fiscal years 1996-99 to allow [REDCAP and AFEWES] to thoroughly undertake effectiveness testing in integrated avionics suites," according to the Senate panel's report.

The Air Force was expected to deliver that report to Congress March 9, according to a service response to questions from *Inside the Air Force*. The report, written by an ad hoc team of the Air Force Scientific Advisory Board, concludes that "the Air Force F-22 System Program Office has thoroughly analyzed the test facility opportunities and established a test plan based not only on the facility assessments, but on the costs of both upgrade and use," according to the Air Force statement.

The study sought to determine whether the "available government EC [electronic combat] test facilities," including REDCAP, AFEWES, the Air Combat Environment Test and Evaluation Facility, the Avionics Test and Integration Complex and the Western Test Range, "will be effectively employed to test F-22 subsystems," according to the statement.

"We expect to be sandbagged on the report," a congressional official said, who added the F-22 would most likely come through electronic combat effectiveness testing "with flying colors" and that the Air Force could "run around [with the test results] like it was a straight-A report card," the official said.

Although the F-22 program has been heralded by top Air Force leaders as a model development effort and recently passed its air vehicle critical design review, the stealthy fighter program's test plans have been repeatedly criticized by congressional testing advocates. D'Amato attacked the service's test profile for electronic combat effectiveness, citing the example of the B-1 bomber, which has yet to be outfitted with adequate electronic countermeasures.

The senator promised to "lead the fight to strike F-22 funds" in coming budget deliberations. D'Amato "can fight a guerilla war" over the F-22, given that the program is so tightly budgeted that a relatively small adjustment in funding could mean significantly increased costs down the road, according to a congressional staffer. "If the Air Force wants to play dirty, Sen. D'Amato can teach them a few things about street fighting," the official said.

D'Amato took issue with the list of Defense Department-recommended military facilities forwarded last month to the base closure commission that would close "two very small T&E facilities with a combined FY-95 budget of less than $20 million," while other Air Force T&E facilities went untouched. "The Air Force [tried] to eliminate the facilities that could have rendered a judgment on the effectiveness of the F-22. Obviously, the Air Force has something to hide. If they will not test it, we will not buy it," D'Amato said.

The Air Force recommended closing the REDCAP facility, located at Buffalo, NY, because the facility's projected workload is "only 10 percent of its available capacity," according to the Defense Department's report to the Base Closure and Realignment Commission, released publicly Feb. 28. The impact to the Buffalo area from the closure of REDCAP would be "a maximum potential reduction of 5 jobs," according to the DOD base closure report.

The service tagged AFEWES, at Fort Worth, TX, for closure because its workload will require only 28 percent of capacity. The Air Force Flight Test Center at Edwards AFB, CA, will absorb the workload for both REDCAP and AFEWES, since those systems' "basic hardware in the loop infrastructure is duplicated at other Air Force T&E facilities," according to the DOD report.

Electronics testing is not the only controversial test issue. The F-22's live-fire test plan is currently under review by an independent National Academy of Sciences-sponsored panel. At issue is whether the Defense Department may waive full-up survivability testing, despite the fact that it failed to apply for such a waiver before the milestone II acquisition decision was made, as is required by law. -- *Tom Cull*

Inside this issue . . .

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DEWEY / DAVE
FYI
- WAYNE H.

ADDITIONAL STATEMENTS
F-22 ELECTRONIC COMBAT EFFECTIVENESS TESTING
Senate speeches & inserts
(CRTEXT 03/02/95 p.S3431; 83 lines.)

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[pS3431]

ADDITIONAL STATEMENTS

F-22 ELECTRONIC COMBAT EFFECTIVENESS TESTING

Mr. D'AMATO. Mr. President, what is it about F-22 electronic combat effectiveness testing that terrifies Air Force?

The fiscal year 1995 Senate Defense Appropriations Report 103-321 included the following language:

The Committee is concerned that the F-22 test and evaluation master plan [TEMP] may not include sufficient electronic combat effectiveness testing before the onset of production. The Committee believes that it is important for the F-22 to demonstrate its capabilities in an offensive air superiority mission against a full array of likely threats. Those threats should include a modern integration air defense system, at a minimum on a simulated basis to the extent practicable, affordable, and cost effective.

Therefore, the Committee directs that no more than 65 percent of the funds provided for the F-22 program for fiscal year 1995 may be obligated until the Assistant Secretary of the Air Force (acquisition) submits to the congressional defense committees a report outlining the cost and schedule impacts on the F-22 program, and the technical and operational advantages an

disadvantages, of revising the TEMP to include significantly more thorough electronic combat effectiveness testing before initiation of: (1) pre-production vehicle procurement; (2) commitment to low-rate initial operational test and evaluation. #

This report shall include, as a baseline, thorough electronic combat testing at the real-time electromagnetic digitally controlled analyzer and processor [REDCAP] and the Air Force electronic warfare evaluation simulator [AFEWES], and an installed system test facility with a capable wide-spectrum radio frequency generator that is interfaced for real-time control from remote facilities and a high capability dome, visual system cockpit simulator.

The report also shall identify the funding required between fiscal years 1996-99 to allow the electronic combat test facilities cited in the precedin

paragraph to thoroughly undertake effectiveness testing on integrated avionics suites. #

This report requirement was retained in Conference, though, as a courtesy of the House colleagues, the fence was dropped.

Well, March 1, 1995 has come and gone, but no report; however, there has been an interesting development. On February 28, 1995, the Air Force base closure and realignment recommendations were made public. The Air Force operates 10 major test and evaluation [T&E] facilities with a combined budge in fiscal year 1995 of $1.722 billion. Not one was recommended for closure; but two very small T&E facilities with a combined fiscal year 1995 budget of less than $20 million were recommended for closure: the Real-time Electromagnetic Digitally-Controlled Analyzer and Processor [REDCAP] and the Air Force Electronic Warfare Evaluation Simulator [AFEWES], the very facilities where Congress directed the Air Force to consider conducting F-22 electronic combat effectiveness testing. What is the Air Force afraid of?

The one facility mentioned in the Senate report that was not closed, the installation system test facility, belongs to the Navy. Apparently, the Air Force could not get at it.

The most perplexing thing about the aversion of the Air Force to proper testing of the F-22 is that the B-2 program is about to undertake tests at the REDCAP very similar to those being avoided by the F-22. The B-2 test program has been thorough to the point of exhaustive. Is the B-2 successful because it was thoroughly tested, or was it successful so it is being thoroughly tested? Either way, what lesson can we draw about the F-22?

When our needs are so many, and money so short, Congress can ill-afford to buy a pig in a poke. Congress gave the Air Force the opportunity to prove its claims regarding the F-22. The Air Force responded by trying to eliminat the facilities that could have rendered a judgment on the effectiveness of the F-22, Obviously, the Air Force has something to hide. If they will not test it, we will not buy it. Come budget time, I will lead the fight to strike F-22 funds.

SAC FY-95 REPORT
8/1/94

Threat simulator development.—The Committee provides $45,664,000, an increase to the budget request of $5,589,000 and an amount $589,000 above the House recommendation.

The Committee deletes $4,000,000 to slow the pace of upgrades to the Air Force electronic warfare evaluation simulator [AFEWES]. The Air Force may make substantial adjustments in its test and evaluation infrastructure, so accelerated modernization efforts are premature at this time.

The Committee adds $9,589,000 to the budget request for the real-time electromagnetic digitally controlled analyzer and processor [REDCAP] project. The Committee directs that the full amount, $16,589,000, shall be made available only to complete the option C upgrade of the REDCAP facility, to initiate the option E REDCAP upgrade; and to perform data reduction updates.

The Committee provides $912,000, the budget request amount, only to continue activities under the Have Note Program.

The Committee also approves the requested amount, $2,000,000, only to fully fund ongoing activities at the Rome Laboratory Antenna Measurement Facility.

Furthermore, the Committee is aware of proposals to consolidate threat hardware-in-the-loop electronic combat test facilities at a single site. Data linking, rather than moving, facilities could prove to be far more efficient and cost effective. Therefore, at least 120 days prior to the approval of any effort to consolidate, transfer, realign, alter, or downsize any mission or activity at any threat hardware-in-the-loop electronic combat test facilities, the Secretary of Defense shall provide to the congressional Defense committees a

study clearly demonstrating that data linking is: (1) technically infeasible, or (2) less efficient and cost effective than consolidation.

SAC FY-95 REPORT
8/1/94

[In thousands of dollars]

	Budget estimate	House allowance	Committee recommendation	Senate compared with-- Budget estimate	Senate compared with-- House allowance
C-130J	---	5,000	---	---	-5,000
ICBM - EMD	---	---	148,048	+148,048	+148,048
TOTAL, ENGINEERING & MANUFACTURING DEVELOPMENT	4,544,775	3,736,479	4,666,148	+121,373	+929,669
RDT&E MANAGEMENT SUPPORT					
THREAT SIMULATOR DEVELOPMENT	40,075	45,075	45,664	+5,589	+589
TARGET SYSTEMS DEVELOPMENT	7,576	7,576	7,576	---	---
MAJOR T&E INVESTMENT	53,544	53,544	52,530	-1,014	-1,014
RAND PROJECT AIR FORCE	28,039	27,000	27,000	-1,039	---
RANCH HAND II EPIDEMIOLOGY STUDY	3,160	3,160	3,160	---	---
NAVIGATION/RADAR/SLED TRACK TEST SUPPORT	26,023	30,023	29,123	+3,100	-900
INITIAL OPERATIONAL TEST & EVALUATION	33,504	33,504	33,504	---	---
TEST AND EVALUATION SUPPORT	373,376	373,376	370,300	-3,076	-3,076
DEVELOPMENT PLANNING	9,959	7,500	---	-9,959	-7,500
ENVIRONMENTAL COMPLIANCE	42,876	42,876	42,876	---	---
RDT&E AIRCRAFT SUPPORT	34,476	34,476	34,476	---	---
MINOR CONSTRUCTION (RPM) - RDT&E	3,281	3,281	3,281	---	---
MAINTENANCE AND REPAIR (RPM) - RDT&E	51,904	51,904	51,904	---	---
BASE OPERATIONS - RDT&E	106,914	106,914	106,914	---	---
TOTAL, RDT&E MANAGEMENT SUPPORT	814,707	820,209	808,308	-6,399	-11,901

SAC FY-95 REPORT
8/1/94

F-22 engineering/manufacturing development [EMD].—This program element supports development of the Air Force's advanced tactical air superiority fighter. The Committee allocates $2,399,849,000, a reduction of $61,300,000 to the budget request and an amount which is $42,500,000 below the House allowance. These funds were identified by the Air Force as excess to known program funding requirements.

The Committee is concerned that the F-22 test and evaluation master plan [TEMP] may not include sufficient electronic combat effectiveness testing before the beginning of operational test and evaluation and the onset of production. The Committee believes that it is important for the F-22 to demonstrate its capabilities in an offensive air superiority mission against a full array of likely threats. Those threats should include a modern integrated air defense system, at a minimum on a simulated basis to the extent practicable, affordable, and cost effective.

Therefore, the Committee directs that no more than 85 percent of the funds provided for the F-22 program for fiscal year 1995 may be obligated until the Assistant Secretary of the Air Force (acquisition) submits to the congressional defense committees a report outlining the cost and schedule impacts on the F-22 program, and the technical and operational advantages and disadvantages, of revising the TEMP to include significantly more thorough electronic combat effectiveness testing before initiation of: (1) pre-production

vehicle procurement; (2) commitment to low-rate initial production; and (3) commencement of initial operational test and evaluation.

This report shall include, as a baseline, thorough electronic combat testing at the real-time electromagnetic digitally controlled analyzer and processor [REDCAP] and the Air Force electronic warfare evaluation simulator [AFEWES], and an installed system test facility with a capable wide-spectrum radio frequency generator that is interfaced for real-time control from remote facilities and a high capability dome, visual system cockpit simulator.

The report also shall identify the funding required between fiscal years 1996–99 to allow the electronic combat test facilities cited in the preceding paragraph to thoroughly undertake effectiveness testing on integrated avionics suites.

POTENTIAL CONGRESSIONALS

REGARDING

AFEWES "DISESTABLISHMENT & RELOCATION"

31 MARCH 1995

ISSUE 1: COMPLIANCE WITH CONGRESSIONAL DIRECTION

The FY-95 Senate Appropriations Committee (SAC) Report states "The committee is aware of proposals to consolidate Threat Hardware-in-the Loop EC Test Facilities at a single site. Data Linking, rather than moving, facilities could prove to be far more efficient and cost effective. Therefore, at least 120 days prior to the approval of any effort to consolidate, transfer, realign, alter, or downsize any mission or activity at any threat HITL Electronic Combat Test Facilities, the Secretary of Defense shall provide to the Congressional Defense Committees a study clearly demonstrating that Data Linking is (1) technically infeasible or (2) less efficient and cost effective than consolidation."

A test funded by the USAF and recently completed within the AFEWES has proved, conclusively, that, with the inclusion of state predictor algorithms, AFEWES Terminal Threat Systems can be electronically networked with manual cockpit simulators anywhere worldwide without appreciable degradation in the accuracy / fidelity of test results.

An Air Force technical study, which was specifically focused on Hardware-in-the-Loop (HITL) simulation has recently been completed and briefed to USAF officials. This study clearly identifies electronic linking, not facility relocation, as the approach best suited to meet USAF T&E technical and fiscal requirements.

Is this the study performed in response to SAC direction? If so, what is the basis for the USAF recommendation to relocate AFEWES? If not, please identify the title and number of the applicable report, as well as the date it was submitted to the Congress.

31 MARCH 1995

ISSUE 2: INACCURATE COST ASSESSMENT

The USAF recommendation to the FY-95 BRAC stated "The total estimated one-time cost to implement this recommendation is $5.8 million. The net of all costs and savings during the implementation period is a cost of $2.6 million. Annual recurring savings after implementation are $0.8 million with a return on Investment expected in seven years. The net present value of the costs and savings over 20 years is a savings of $5.8M." Upon what data is this financial analysis based? Also, explain the basis for annualized savings of $800K/year.

The average AFEWES O&M costs over the last 10 years borne by the USAF were only $300K. If relocated to AFFTC, will the USAF O&M liability for AFEWES be reduced? What are the projected O&M costs for AFEWES, if relocated to AFFTC, and upon what facts is your estimate based?

The 1994 DoD Board of Operating Directors Study estimated the cost of AFEWES relocation at $50-60M, which included an $8M MILCON and an estimated payback period of 50-100 years! Was this study not considered in the formulation of the USAF recommendation to the BRAC? If not, why not?

Not until 22 March 1995, fully 3 weeks after the 2 March 1995 BRAC announcement, did the USAF ask the current AFEWES O&M contractor for a precise estimate of actual Relocation costs. The cost, provided to the USAF on 24 March 95 was $66.7M. Why was this cost data not obtained prior to the BRAC recommendation?

Using the $66.7M estimate of relocation costs, please calculate and provide the following:

1. Net of all costs and savings during the implementation period?

2. Number of years for expected Return on Investment?

3. Net Present Value of Costs and Savings over 20 years?

With the figures calculated above, can the USAF still justify the BRAC recommendation in financial terms?

If yes, where will the additional $60.9M ($66.7M - 5.8M) required to relocate AFEWES' <u>complete</u> capabilities, come from? Which Air Force Programs/Program Elements (PE's) will be "taxed" to provide the required funds? Please be fully specific by PE and Fiscal Year.

7 April 1995

ISSUE 3: AFEWES CAPABILITY DUPLICATION?

The USAF recommendation to the FY-95 BRAC Commission states that "AFEWES basic Hardware-in-the-Loop infrastructure is duplicated at other Air Force Test and Evaluation facilities." Our research indicates that this is a significant misstatement. The overwhelming majority of AFEWES' 39 specialized Hardware-in-the-Loop threat systems exist nowhere else in the world. In fact, the 1994 BoOD study also concluded "EC HITL capabilities are not duplicative and each serves a specific function in the EC Test Process."

Specifically, identify the alternative validated USAF T&E facilities which currently duplicate the following AFEWES capabilities at Air Force Plant 4?

- *Fully-dynamic, Infrared Alert/Response testing with actual FME seekers at correct IR wavelengths?*
- *Real-time, Real-frequency evaluations of RF power-managed EC systems in Theatre-specific laydowns at operationally realistic signal density/fidelity?*
- *Correlated multi-spectral (RF & IR) test capability at actual frequency/ wavelength as required by modern EC systems?*
- *RF Semi Active Missile ECM testing, over a broad Field of View, at actual frequency, with real-time, threat-specific kinematics?*
- *Combined countermeasure (pilot maneuver + active/expendable EC) Test Capability in the missile end-game with validated threats and manned reactive high-fidelity cockpits?*

If, however, as stated in the BRAC recommendation, AFEWES capabilities are, indeed, duplicative, how does the USAF explain recent internal AF discussions focused on the division of AFEWES assets between 1) AFDTC, Eglin AFB, FL, 2) the Air Force Det 3, Flight Test Range and 3) the Air Force Flight Test Center, Edwards AFB, CA? These discussions, alone, confirm the fact that AFEWES resources are truly unique by virtue of their being highly sought after by <u>multiple</u> <u>T&E</u> <u>Agencies</u>! Any action, other than relocation of AFEWES to AFFTC is in conflict with the USAF's own recommendation to the BRAC. Exactly, what are the specific USAF plans for AFEWES: single site relocation, multi-site relocation, or disposal?

7 April 1995

<u>ISSUE 4</u>: <u>UNREALISTIC ESTIMATED AFEWES WORKLOAD</u>

The USAF recommendation to the FY-95 BRAC Commission stated "Projected workload for AFEWES was only 28% of its available capacity." Specifically, how was this projected workload calculated? Our research indicates that from 1985-1994, AFEWES utilization averaged 91% of the Contracted Utilization Baseline. Utilization for 1993 and 1994, computed using an <u>Official</u> <u>Air</u> <u>Force</u> <u>formula</u> was 88% and 92% respectively. Additionally, new capabilities coming on line within the next year are suspected to sustain or increase this level of utilization. Were these factors included in the formulation of the USAF estimate? Was International Utilization, which offsets the Air Force annual O&M liability for AFEWES, also considered?

31 MARCH 1995

ISSUE 5: INCOMPLETE IMPACT ASSESSMENT

The USAF recommendation to the FY-95 BRAC Commission stated "Assuming no economic recovery, this recommendation could result in a maximum reduction of 9 Jobs (5 direct jobs and 4 indirect jobs) over the 1996 to 2001 period in the Fort Worth-Arlington, Texas Primary Metropolitan Statistical Area." In excess of 100 civilian contractor personnel associated with AFEWES would also be affected. Why were there civilian personnel not included in the USAF assessment?

Of even greater significance is the fact that the USAF apparently failed to consider the impact on test customers requiring access to AFEWES during the period of relocation. Specifically, which Domestic and International customers will be impacted? What is the "down time" associated with the relocation of AFEWES? How will each displaced customer's test requirements be satisfied during the period when AFEWES is not available. When will comprehensive AFEWES capabilities, sufficient to satisfy both Domestic and International user requirements be fully operational at AFFTC?

ISSUE 6: REPLACEMENT OF QUALIFIED WORKFORCE

A 1994 DoD Board of Operating Directors (BoOD) study estimated that if AFEWES were relocated, 60% of the experienced workforce would not move. Currently, at the AFEWES, the current O&M contractor has an aggregate experience base in excess of 1500 man years. If the USAF recommendation to the FY-95 BRAC Commission is implemented and the 1994 BoOD estimate is correct, how does the USAF plan to replace the net loss of 900 man years of qualified AFEWES T&E experience, particularly in light of the fact that complete, MIL-STANDARD documentation has not been procured by the USAF for a majority of the AFEWES simulations?

31 MARCH 1995

ISSUE 7: LOSS OF UNIQUE T&E CAPABILITY

The USAF recommendation to the FY-95 BRAC Commission states "Workload and selected equipment from AFEWES will be transferred to AFFTC. AFEWES will be disestablished and any remaining equipment will be disposed of."

Specifically, which AFEWES systems will be relocated to AFFTC? Which resources will be relocated to other T&E facilities? Specify the identity and location of each. Similarly, which AFEWES systems will be disposed of? Does the list of systems selected for disposal contain any "older" threats which continue to be of interest to Allies of the United States? How will the Hardware-in-the-Loop Testing needs of our Allied partners be met in the future? Has the cost impact of reduced International use of AFEWES been included in the Financial Analysis portion of the BRAC recommendation?

31 MARCH 1995

ISSUE 8: ACTUAL RATIONALE FOR AFEWES RELOCATION TO AFFTC

The USAF recommendation to the FY-95 BRAC stated "Available capacity at AFFTC is sufficient to absorb AFEWES's workload." It is our understanding that the T&E workload at AFFTC has diminished in recent years and acquisition of an established business base may be required to ensure continued economic viability.

What is the current and projected future utilization rate of the AFFTC Ground Test Facility if AFEWES is not relocated? Specifically, what customers/systems have been/will be supported? Which of these requirements are FIRM (funding received)?

Conversely, the workload at AFEWES has remained essentially constant over the past 10 years at an average utilization rate of 91% of the Contracted Baseline, even with the demise of the Soviet Union in 1991. Similar utilization rates are being maintained at the REDCAP facility in Buffalo, NY. Clearly, acquisition of the AFEWES and REDCAP could appreciably expand the current business base of AFFTC, albeit at the cost of significant reductions in net T&E capability.

The EC Test Process, for good reason, clearly identifies Hardware-in-the-Loop (HITL) facilities such as AFEWES & REDCAP and Installed System Test Facilities (ISTF's) such as the ECIT as fundamentally unique and complementary forms of simulation.. Unresolved technical obstacles place significant limits on any synergies to be derived from electronic integration of AFEWES resources co-located with an Anechoic Chamber such as the Benefield Anechoic Facility (BAF) included within the AFFTC complex. Explain in detail, the value-added, technical benefit to be derived from AFEWES relocation to AFFTC. Specifically, what additional enhanced test and evaluation capabilities will be achieved above and beyond those currently provided by AFEWES at the Air Force Plant 4 location?

31 MARCH 1995

ISSUE 9: LOSS OF STAND-ALONE HITL CAPABILITY

Repeatedly, the Air Force has extolled the virtues of the Electronic Combat (EC) Test Process to Congress. (In fact, the Air Force did such a good job of selling Congress on the scientific validity of this approach that Congress inserted language in the FY 1994 Appropriations Act which directed OSD to develop a comparable EC Test Process for the entire DoD.) Moreover, in its annual defense of budget requests--and on other occasions when it supported the Service's agenda--the Air Force has repeatedly touted the Air Force Electronic Warfare Evaluation Facility (AFEWES), located at Air Force Plant No. 4, Fort Worth, TX, and the Real-Time Electromagnetic Digitally Controlled Analyzer and Processor, located at Calspan Advanced Technology Center, Buffalo, NY, not only as its premier facilities in the Hardware-in-the-Loop (HITL) category but also as essential facilities for the implementation of the EC Test Process.

Now, when it suits its purposes (and these are so obscure that one cannot help but suspect ulterior motives), the Air Force asks Congress to believe that it can afford to get along without these, heretofore, essential facilities for the sake of a mere pittance in savings on the scale of the typical BRAC cost reductions. While the language in the Air Force's BRAC recommendatIons admittedly talks of reconstituting the two HITL facilities at Edwards AFB, CA, we are aware that any relocated assets would in fact be integrated into an installed system test facility and/or an open-air range. In short, the net result of AFEWES and REDCAP closure would be loss of the Air Force's stand-alone HITL test capability.

HOW DOES THE AIR FORCE HOPE TO IMPLEMENT THE EC TEST PROCESS--AND THEREBY ENSURE THE COMBAT EFFECTIVENESS OF ITS DEFENSIVE AVIONIC SYSTEMS--WITHOUT RECOURSE TO THIS ESSENTIAL CATEGORY OF TEST FACILITIES?

31 MARCH 1995

DEFENSE DISTRIBUTION REGION WEST OVERVIEW

12 Apr 90 - DMRD 902 APPROVED BY DEPSECDEF
Consolidate DoD Distribution Activities under DLA

24 Jun 90 - BAY AREA PROTOTYPE (DDRW) ESTABLISHED
(Merged two stand alone Depots (Tracy and Sharpe) and Oakland

22 Apr 91 - Continued consolidations with McClellan and Sacramento Army Depot

- Independent Evaluator (LMI) established to evaluate performance and savings/costs of the prototype

4/7/95

DEFENSE DISTRIBUTION REGION WEST OVERVIEW (Continued)

Jul 91 - Sacramento Army Depot on BRAC

6 Feb 92 - LMI, GAO and OSAD published reports indicating prototype a success

16 Mar 92 - Continued consolidations with San Diego, Barstow, and Puget Sound

16 Feb 93 - Remaining consolidations occured with Oklahoma, San Antonio, Red River, Corpus Christi, Ogden/Hill and Tooele

Aug 93 - Oakland Depot and Tooele on BRAC

4/7/95

DEFENSE DISTRIBUTION REGION WEST
CONCEPT OF OPERATIONS

- Established San Joaquin Depot (Tracy/Sharpe) as one facility, the Primary Distribution Site (PDS) for the Region for receipt, issue and storage
- Instituted a loan/borrow procedure at the PDS to move resources between Tracy/Sharpe to accomodate workload requirements
- Established the Regional Freight Consolidation Center at the PDS for transportation efficiencies to support DLA Depots, Army, Marine Corps, Air Force and Navy customers

4/7/95

DEFENSE DISTRIBUTION REGION WEST CONCEPT OF OPERATIONS (Cont.)

- The RFC supports <u>all</u> Pacific Rim customers (Alaska, Japan, Okinawa, Korea, Indian Ocean, Arabian Gulf, etc.)
- Reduced capital equipment requirements through redistributions throughout the region and DLA
- Improved use of existing storage facilities in order to maximize space
- Eliminated outlying storage warehouses and created distribution hubs at the facilities to improve productivity, return space back to Services

DEFENSE DISTRIBUTION REGION WEST
CONCEPT OF OPERATIONS (Cont.)

- Improved distribution operations/customer service through productivity and quality of worklife enhancements
- Implemented transportation initiatives to maximize transportation services
- Work toward elimination of duplicate stock points to reduce stock picking/receipt processing

Reduced Costs--Best Value to Customer

4/7/95

PRIMARY DISTRIBUTION SITE
TRANSPORTATION HUB

- PURPOSE: To support Department of Defense's Business
- CONCEPT: Establish PDS with a Hub on West Coast and East Coast to support Regional conflicts
- LOCATION CRITICAL:
  --Access to Port's Specialized Equipment
  --Ease of obtaining conveyances (vans, chassis, flatracks, etc.)
  --Access to Air, Port, rail terminals
  --Ability to expedite turn around time for equipment/material to support conflicts
  --Transportation costs lower

4/7/95

PRIMARY DISTRIBUTION SITE (PDS) BACKGROUND - ACCESSIBILITY

- Industrial Hub: Located in an existing industrial hub in the Central Valley. Commercial Carrier hub facilities, a rail consolidation hub and various distribution facilities are located within a 60-90 mile radius.
- Centralization: PDS is located 65 miles south of Sacramento and 65 miles east of San Francisco.
- Surface Movement: PDS has access to major highways such as Interstate 5, Interstate 205, Highway 99, and Interstate 580

4/7/95

PRIMARY DISTRIBUTION SITE (PDS) BACKGROUND (Cont.)

- Air Access: Also has access to three major commercial airports within a 75 mile radius and access to Travis AFB for Government airlift. In addition, Stockton Airport has capability to handle C-5 military cargo planes.
- Port Access: PDS is located approximately 60 miles east of the Port of Oakland, MOTBA, Western Military Traffic Management Command and 15 miles south of Rough and Ready Island (Port of Stockton)

4/7/95

PRIMARY DISTRIBUTION SITE (PDS) BACKGROUND (Cont.)

- Rail: PDS, Sharpe facility is located next to a major rail consolidation hub for Union Pacific Railroad. Rail lines exist at both facilities.
- Equipment: Close to ports/rail hubs for fast turn around for specialized equipment to support mobility and rollbacks.

4/7/95

PRIMARY DISTRIBUTION SITE OPERATING PHILOSOPHY

- <u>Two Stand Alones</u>: Chosen as prototype because only area in country where <u>ALL</u> functions and <u>ENTIRE</u> physical facilities for two stand alone Depots (Sharpe and Tracy) merged to become one organization.
- <u>Capital Equipment</u>: No capital investments were necessary to establish the Regional HQ at Sharpe/Tracy nor the PDS

4/7/95

PRIMARY DISTRIBUTION SITE OPERATING PHILOSOPHY (Cont.)

- One Organization: PDS merged two distribution operations and established single operational divisions/branches to run both facilities which promoted effective and efficient use of available resources and standardization of procedures to minimize material handling.
- Reduce Management Layers: By merging the two organizations into one, management layers were reduced and eliminated; i.e., one division chief instead of two, one civilian personnel office instead of two, one procurement activity instead of two, etc.

4/7/95

PRIMARY DISTRIBUTION SITE OPERATING PHILOSOPHY (Cont.)

- Consolidation Point: PDS had an existing container consolidation point which was further expanded to include Air Force customers out of the McClellan Containerization Point; later inclusion of Navy Quicktrans and Marine Corps Consolidation Point.
- Location: San Joaquin was selected as the primary hub because of location to customers (large portion overseas); proximity to transportation hubs for rail, water, air terminals, current capabilities and capacities and potential for expansion.

4/10/95

PRIMARY DISTRIBUTION SITE BACKGROUND

STOCK POSITIONING

HQ DLA Policy to store at PDS based on vendor location, Depot capacity, mechanization, support to off-site maintenance activities, location of major sources of demand, and specialized requirements already in place.

- Hardware Consumables
- Clothing and Textiles
- Medical
- Subsistence
- Steel
- Wire/Cable
- Tires (Navy/Army)

4/7/95

PRIMARY DISTRIBUTION SITE

SAVINGS/SUCESSES

- REDISTRIBUTED EQUIPMENT/STORAGE AIDS TO OTHER DEPOTS — $2.3M
- RECEIVED REDISTRIBUTED EQUIPMENT/ STORAGE AIDS FROM OTHER DEPOTS — $495,000
- NUMEROUS PROCESS/MECHANIZATION IMPROVEMENTS HAVE BEEN ACCOMPLISHED AT BOTH FACILITIES SINCE CONSOLIDATION
- QUALITY OF WORK LIFE IMPROVEMENTS ACCOMPLISHED: UPFRONT INVESTMENTS HAVE BEEN MADE TO INSTILL WORKPLACE PRIDE

4/7/95

PRIMARY DISTRIBUTION SITE

SAVINGS/SUCESSES (Cont.)

- SAN JOAQUIIN DEPOT PERSONNEL SAVINGS:

FY92 BASELINE:	= 2,090	
FY90 - FY92 REDUCTIONS:	-419	$7.2M
FY95 END STRENGTH:	= 1,513	
TOTAL REDUCTIONS:	-577	$12.4M

- SAN JOAQUIN PRODUCTIVITY FACTOR:

FY92 BASELINE:	= 2,226 LINES/FTE
FY95	= 2,554 LINES/FTE

- WORKLOAD FROM FY94 TO FY95 PROJECTED IS TARGETED TO BE 6% HIGHER IN FY95

4/7/95

DEFENSE DISTRIBUTION REGION WEST
DEFENSE DISTRIBUTION DEPOT SAN JOAQUIN

PROCESS/MECHANIZATION IMPROVEMENTS ACCOMPLISHED

- The selection process at Sharpe was streamlined from nine basic steps to five which eliminated double handling of material and mechanization of movement where possible to eliminate manual handling.

- Outloading operations improved to eliminate excessive forklift handling staging of material.

- Improved small parcel handling at Sharpe from a highly manual, labor intensive process to use of mechanization, conveyors, scales, and data processing equipment.

- Installed storage carousels at Tracy for storage of Base Supply material.

- Installed new foam packaging system with freon free foam to enhance air quality.

- Corrected building design/mech flaws in Building 330.

- Installed ramp docks in Building 330 to improve outloading operations.

- Installed automatic tote stacker in Building 330 which will be used to remove, stack, and assist in movement of empty totes.

- Two new rollup cargo doors were installed at Warehouse 691, Sharpe.

- A magliner and attached loading dock were placed in track 21 to improve loading capabilities for bulk outside shipments.

- Installed a compactor/baler for Building 330.

- Storage racks in the Freight Terminal Area, an air meter and the air freight area were relocated in Building 330 for improved work flow layout.

- Repositioned drive motors on the conveyor lines in the high rise area which provide safer work areas.

- Installed 10 racks near Tilt Tray System at Tracy to increase productivity and organize work area. Racks for packer supplies.

- Conveyor system in Warehouse 16B-2 enhanced for better material flow to spur lines.

- Receiving Mechanization Project (Sharpe) $931K.

- Consolidated Subsistence Facility Mechanization, $14,087,859.

- Paint Spray Facility, $167,000.

- Package Packing, Offer and Shipping Material Handling System, $3,983,000.

- Package Consolidation/Packing/Shipping Material Handling System, $4.2M.

- Automated Tray-Pack Production Operation, $361K.

- Sheet Metal Envelope Storage System, $1.4M.

- Multi-Level High Density Fast Pick Storage System and Work in Process Queue System, Building 330, $1,858,289.

FACILITY IMPROVEMENTS ACCOMPLISHED

- Removed asbestos to various warehouses.

- Installed lights in packing areas.

- Repaired and replaced cargo doors to warehouses.

- Extended overhead crane in Building 649.

- Replaced fire hydrant and valves.

- Replaced Sawdust Collection System, Building 42.

- Construct Regional Mail Distribution Center--Building 205.

- Repaired various warehouse concrete floors.

- Replace heaters in various buildings.

- Replace boiler, Building 508.

- Upgraded lighting in warehouses.

- Repair 4160V Electrical Distribution System.

QUALITY OF WORK LIFE IMPROVEMENTS ACCOMPLISHED

- Prep/paint bins, Warehouse 16A-3, Tracy.

- Painted walls, sealed and remarked floors, refurbished office and restrooms in Warehouses B-2, B-3, A3-5, A1-3, A1-4, N2-1, B4, N-1, 330, 482, 483, 484, 691, 608, 485 (Sharpe).

- Installed $88K of Quality of Life items such as: breakroom tables, chairs, microwave ovens refrigerators, ice machines, air conditioners, pedestal floor fans and water jugs. The above items were distributed to both Sharpe and Tracy facilities and used in lunch and breakroom areas.

- Refurbished restrooms in Warehouse 3, 5, 6, and 11 at Tracy. Refurbished lunchrooms in Warehouse 11, 12, 5 6, and 16B-3 Tracy.

- Offices and restrooms were demolished in Warehouse SN-2, Sharpe. Module offices and breakrooms were installed.

- Removed old wooden cargo and personnel doors on east and west side of Warehouse
- SN-2, Section 5, Sharpe and replaced with metal doors.

- Electric photo sensitive dock lights were installed on the east and west site of SN-2, Sharpe.

- Installed platform and guard rails in Small Parcel area.

DEFENSE DISTRIBUTION REGION WEST

DEFENSE DISTRIBUTION DEPOT SAN JOAQUIN

QUALITY OF LIFE IMPROVEMENTS
PLANNED

* Equipment Improvements Planned

-Ongoing replacement of overage forklifts

-Replacement of yard spotter trucks

-Purchase/install woodchipping equipment

-Replace overage test equipment in Quality Lab

-Purchase platform lifts for facilities maintenance

-Replace/upgrade Fire trucks

-Replace overage vehicle lifts in maintenance shops

* Process/Mechanization Improvements Planned

-Refurbish/replace Package Receipt Processing System.

-Provide mechanization/storage systems for planned general purpose warehouse.

-Upgrade Pallet Packing and Shipping System by refurbishing/replacing elevated and vertical pallet conveyors, transfer devices, and monitoring system.

-Replace/refurbish overage Tote Conveyor System.

-Refurbish/upgrade Tilt Tray Sortation System.

-Refurbish/replace Hybrid Vehicle System.

-Refurbish/upgrade motors, drives, chains, carts, and controls of Towline and Bin Storage Towveyor Systems.

-Refurbish Pallet Conveyor System.

* Facility Improvements Planned

-Conduct asbestos survey; prepare management plan.

-Repair radiators, Bldg 179.

-Renovate offices, breakroom, restrooms - various locations.

-Survey sanitary sewer system.

-Reroof buildings - various locations.

-Renovate training facility.

-Repair cafeteria floors.

-Replace windows - various locations.

-Replace/upgrade fire and security alarm systems.

-Repair/replace lighting - various locations.

-Repair/replace pavement - various locations.

-Repair/replace electrical panels - various locations.

-Refurbish/replace heating and air condition - various locations.

-Repaint exterior of buildings - various locations.

* Quality of Work Life Improvements Planned

-Continue painting of warehouse operational areas.

-Continue upgrade/refurbishment of breakroom and lunchrooms.

-Continue upgrade of restrooms.

Document Separator

Defense Distribution Region West

Overview

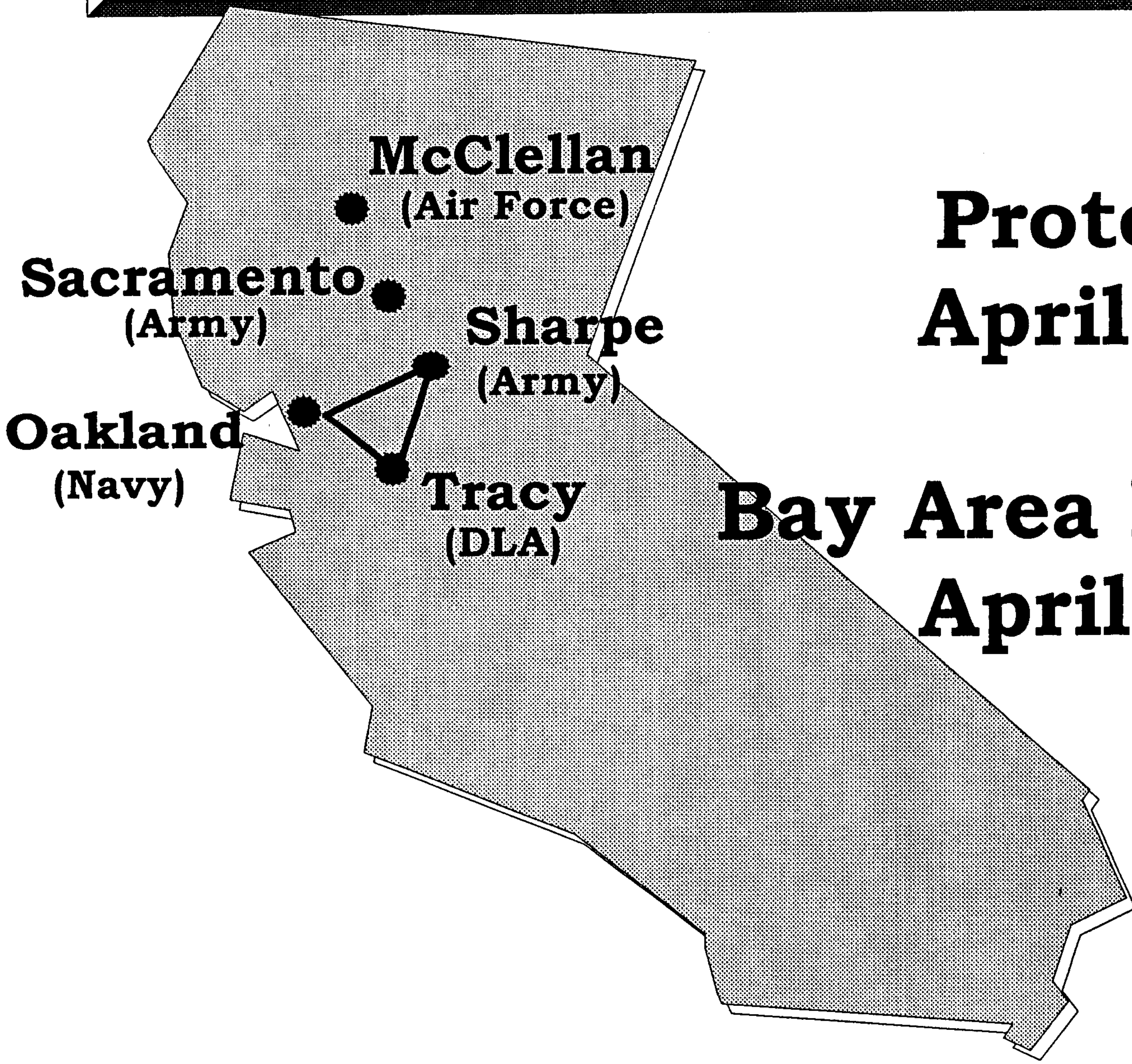
Defense Distribution Region West Overview

12 Apr 90 - DMRD 902 Approved By DEPSECDEF
Consolidate DoD Distribution Activities Under DLA

24 Jun 90 - Bay Area Prototype (DDRW) Established (Merged Two Stand Alone Depots (Tracy & Sharpe) And Oakland

22 Apr 91 - Continued Consolidations With McClellan (Air Force ALC) And Sacramento Army Depot
- Independent Evaluator (LMI) Established To Evaluate Performance And Savings/Costs Of The Prototype

DMRD 902 Consolidation



Prototype
April 1990

Bay Area Expansion
April 1991

Defense Distribution Region West Overview (Continued)

Jul 91 - Sacramento Army Depot on BRAC

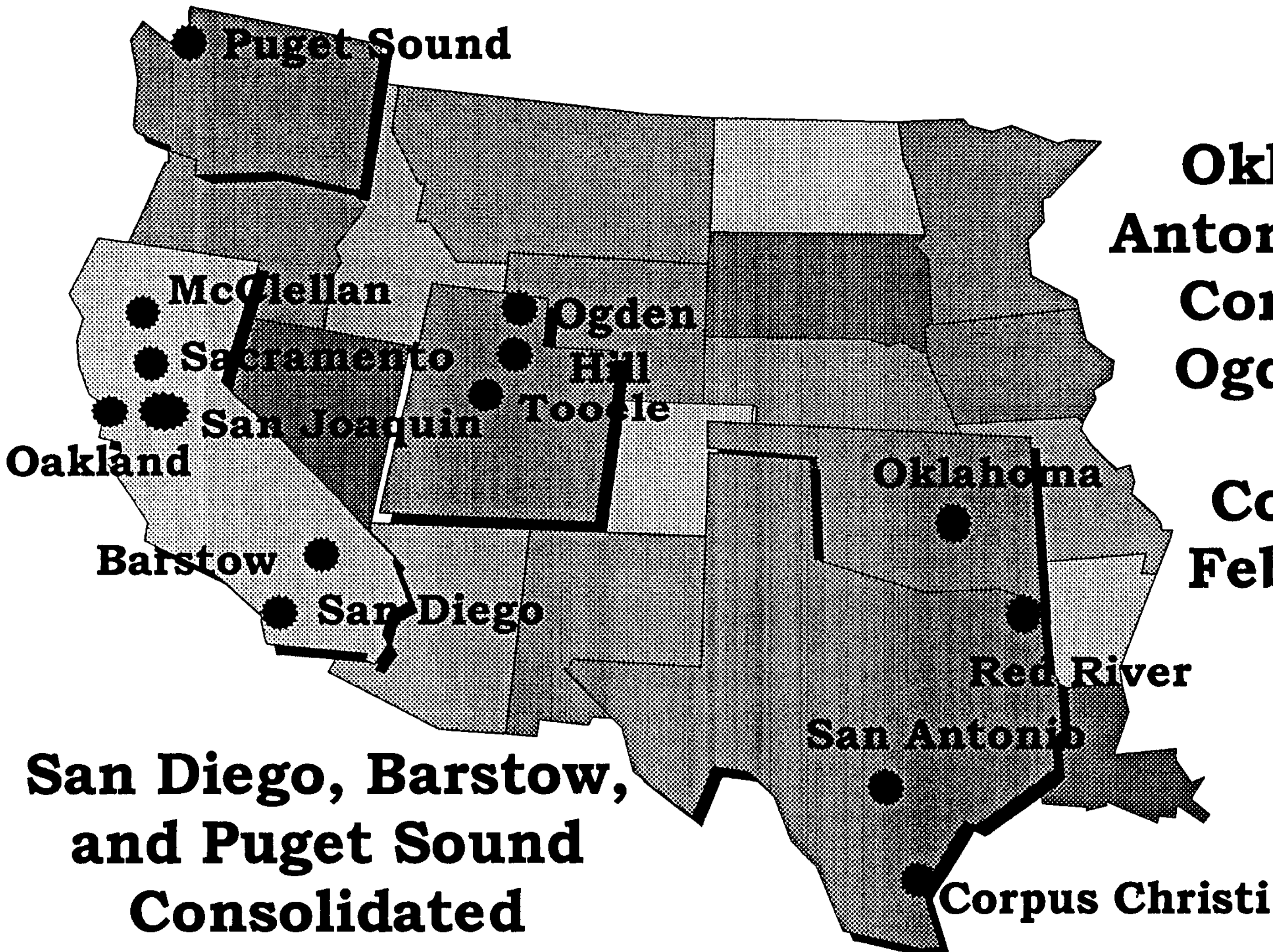
6 Feb 92 - LMI, GAO and OSAD Published Reports Indicating Prototype A Success

16 Mar 92- Continued Consolidations With San Diego, Barstow, and Puget Sound

16 Feb 93 - Remaining Consolidations Occured With Oklahoma, San Antonio, Red River, Corpus Christi, Ogden, Hill and Tooele

Aug 93 - Oakland and Tooele Depot's on BRAC

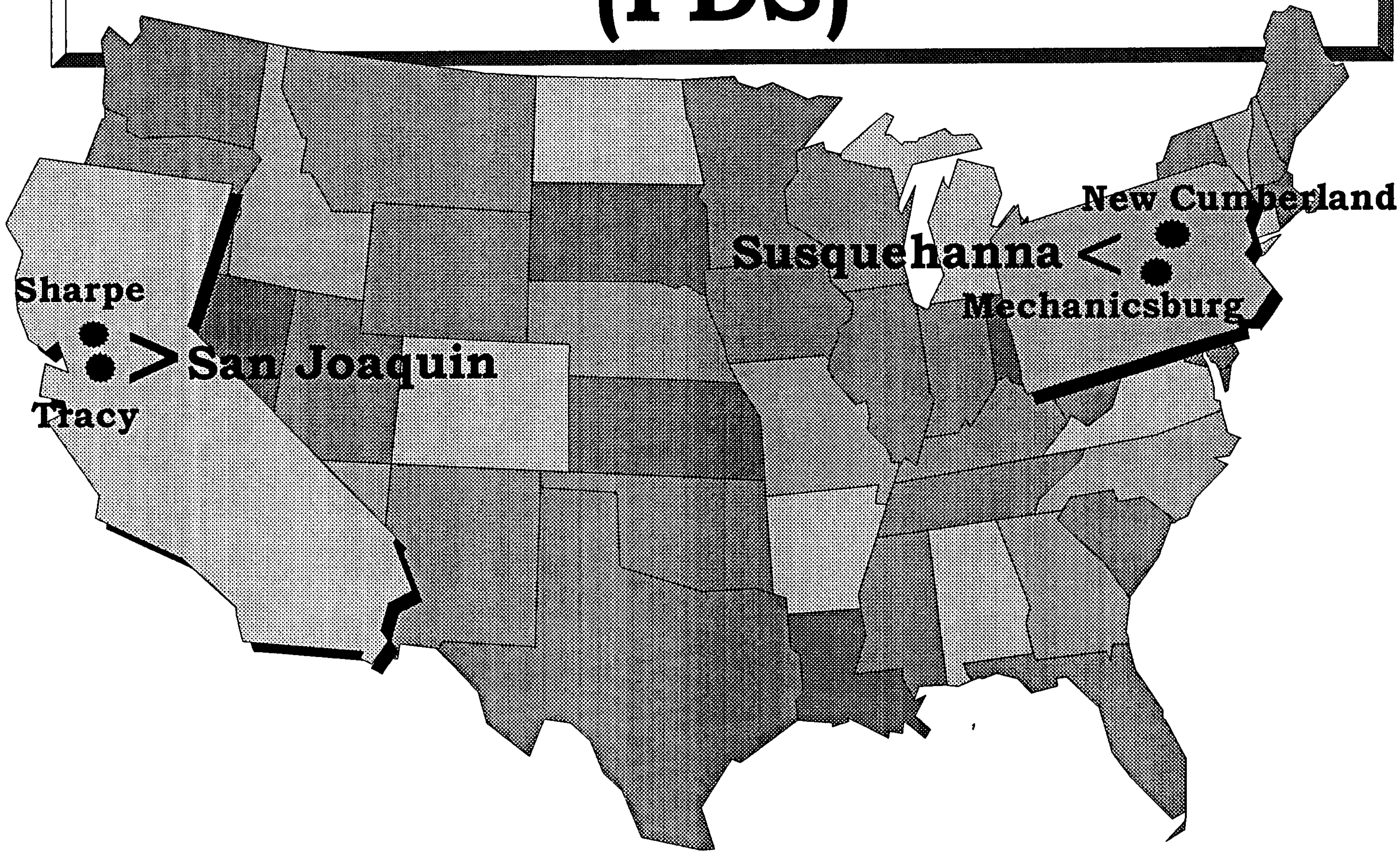
Consolidation Continued



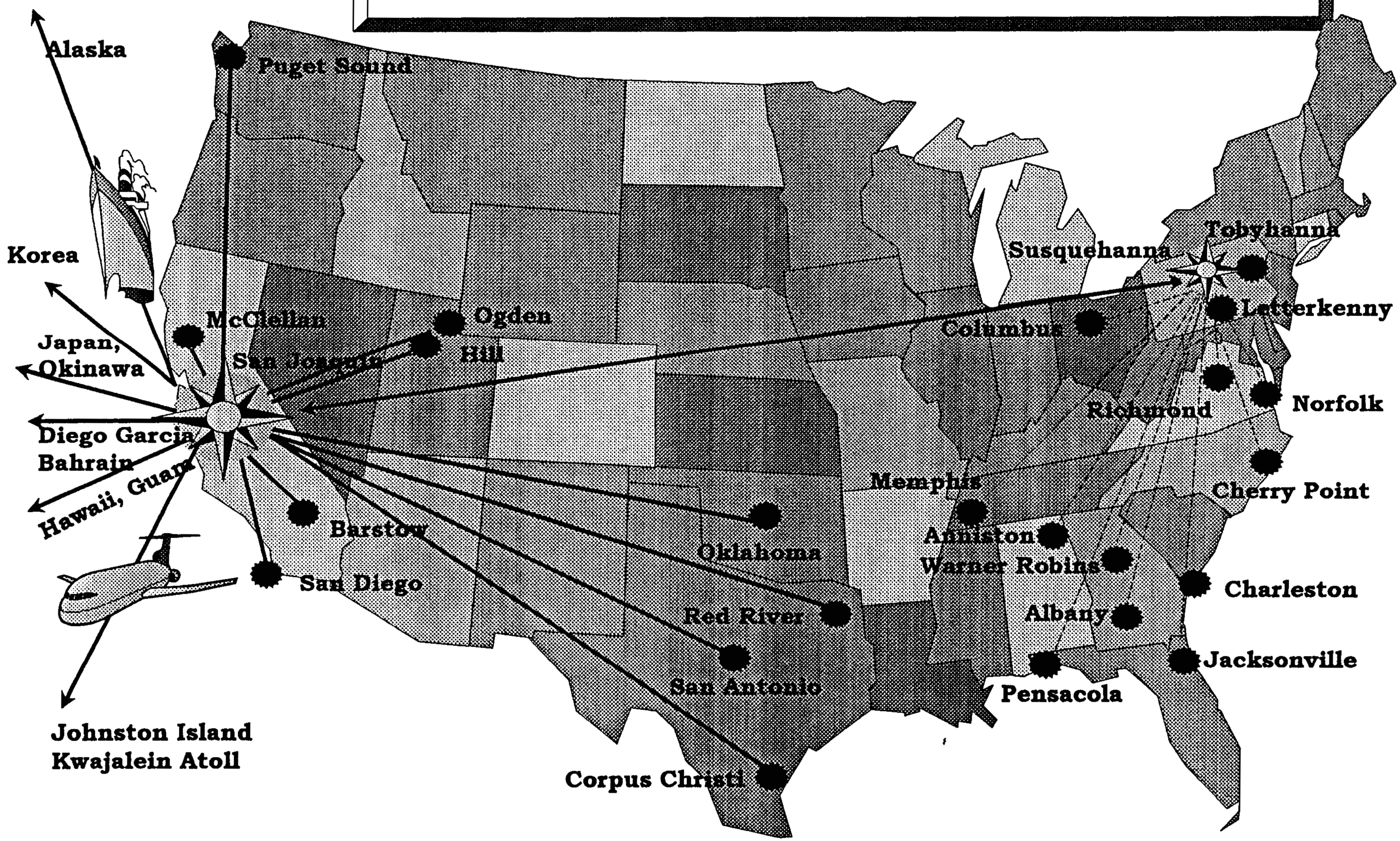
Oklahoma, San Antonio, Red River, Corpus Christi, Ogden, Hill and Tooele, Consolidated February 1993

San Diego, Barstow, and Puget Sound Consolidated March 1992

Primary Distribution Sites (PDS)

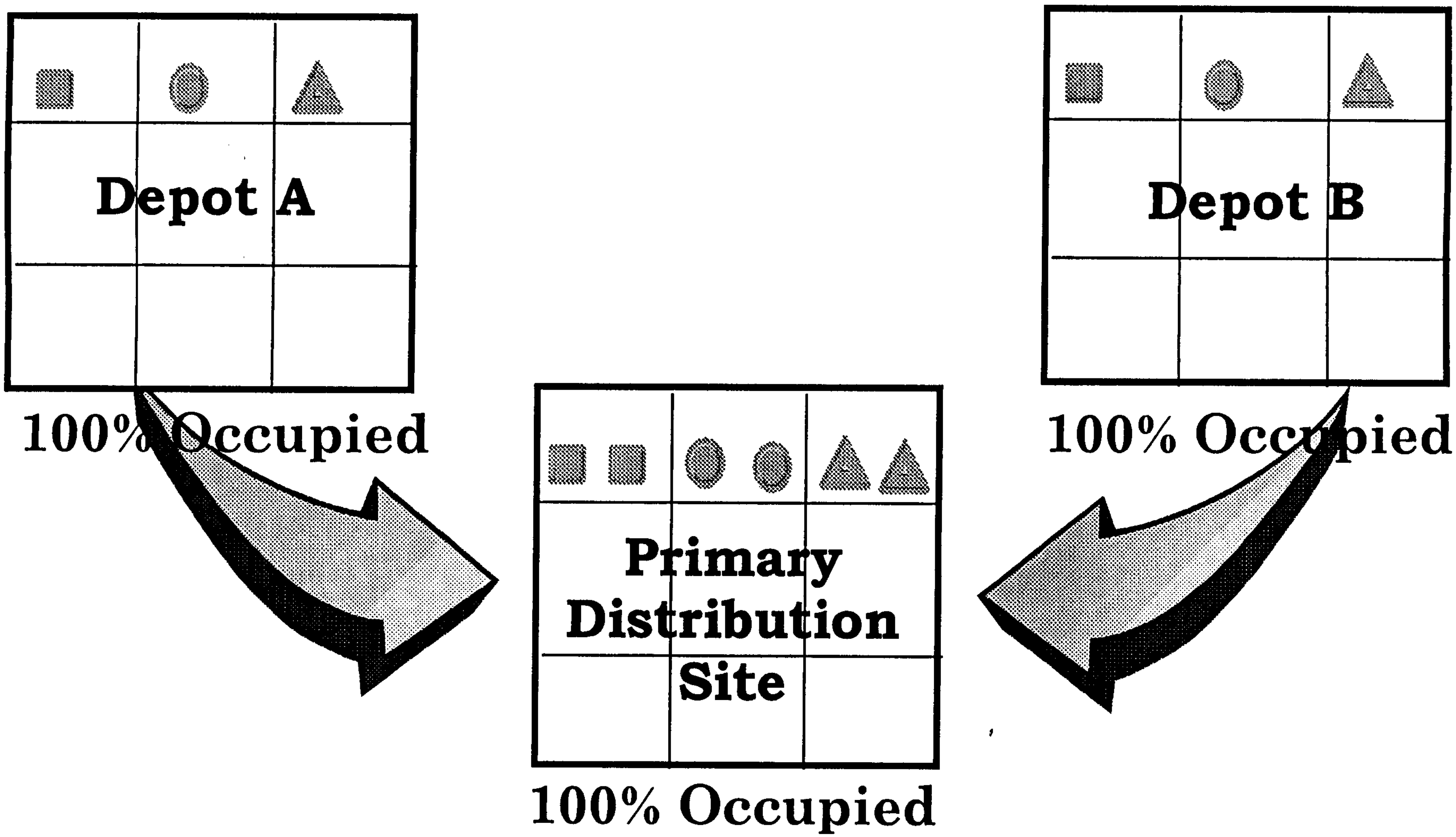


Primary Distribution Site
RFC



Occupancy Rate

85% VS ?



Duplicate Stocks
158,281 DLA NSN's

Receipt Costs (2 Procurement Receipts Per NSN Per Year)

Dual Site Storage

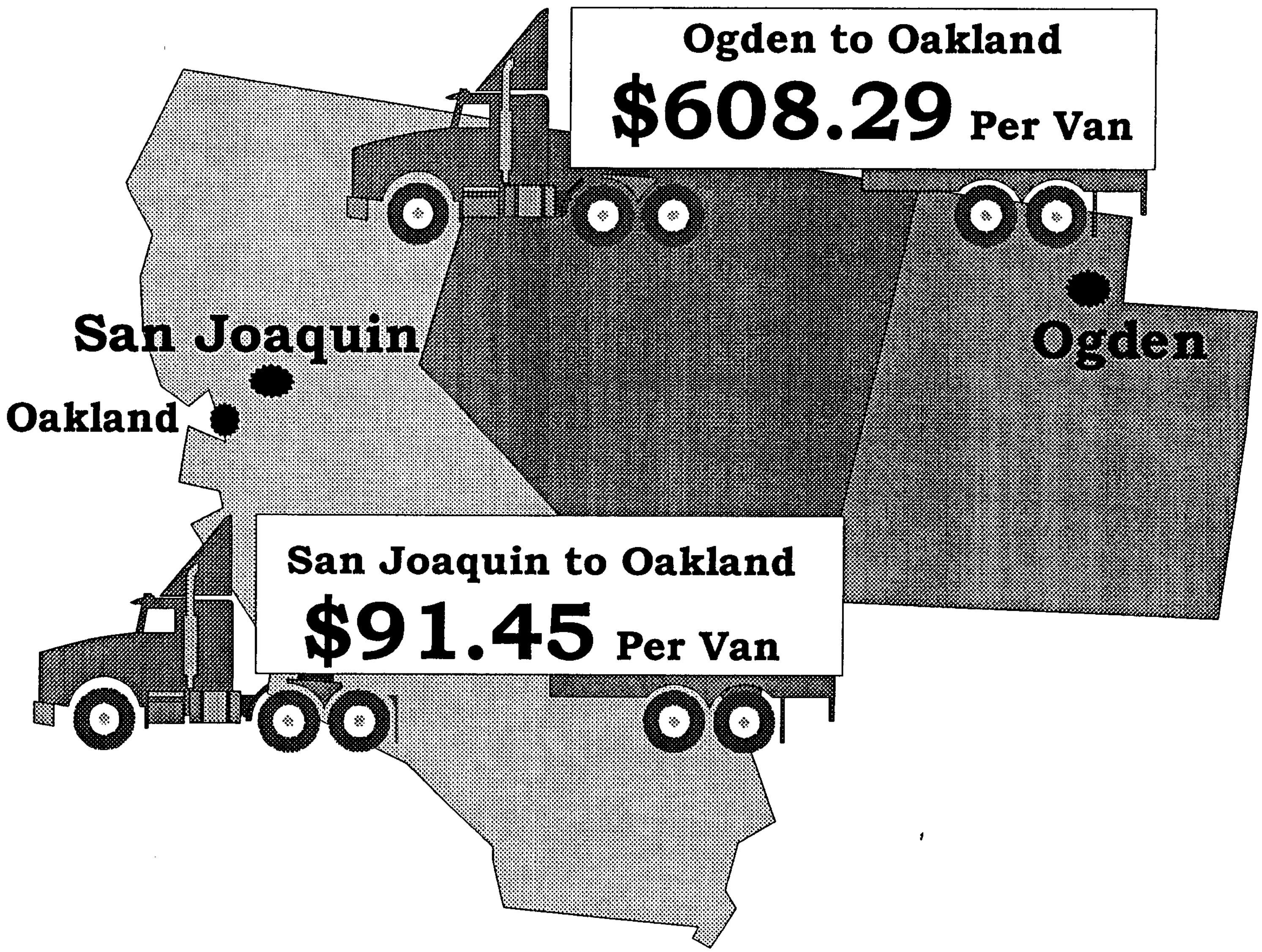
	Receipts		Unit Cost		
Depot A	316,562	X	$29.00	=	$9,180,298
Depot B	316,562	X	$29.00	=	$9,180,298
				Total	$18,360,596

Primary Distribution Site Storage

	Receipts		Unit Cost		Total
PDS Site	316,562	X	$29.00	=	$ 9,180,298

Estimated Receipt Processing Cost Avoidance
Under Primary Distribution Site ***$9,180,298***

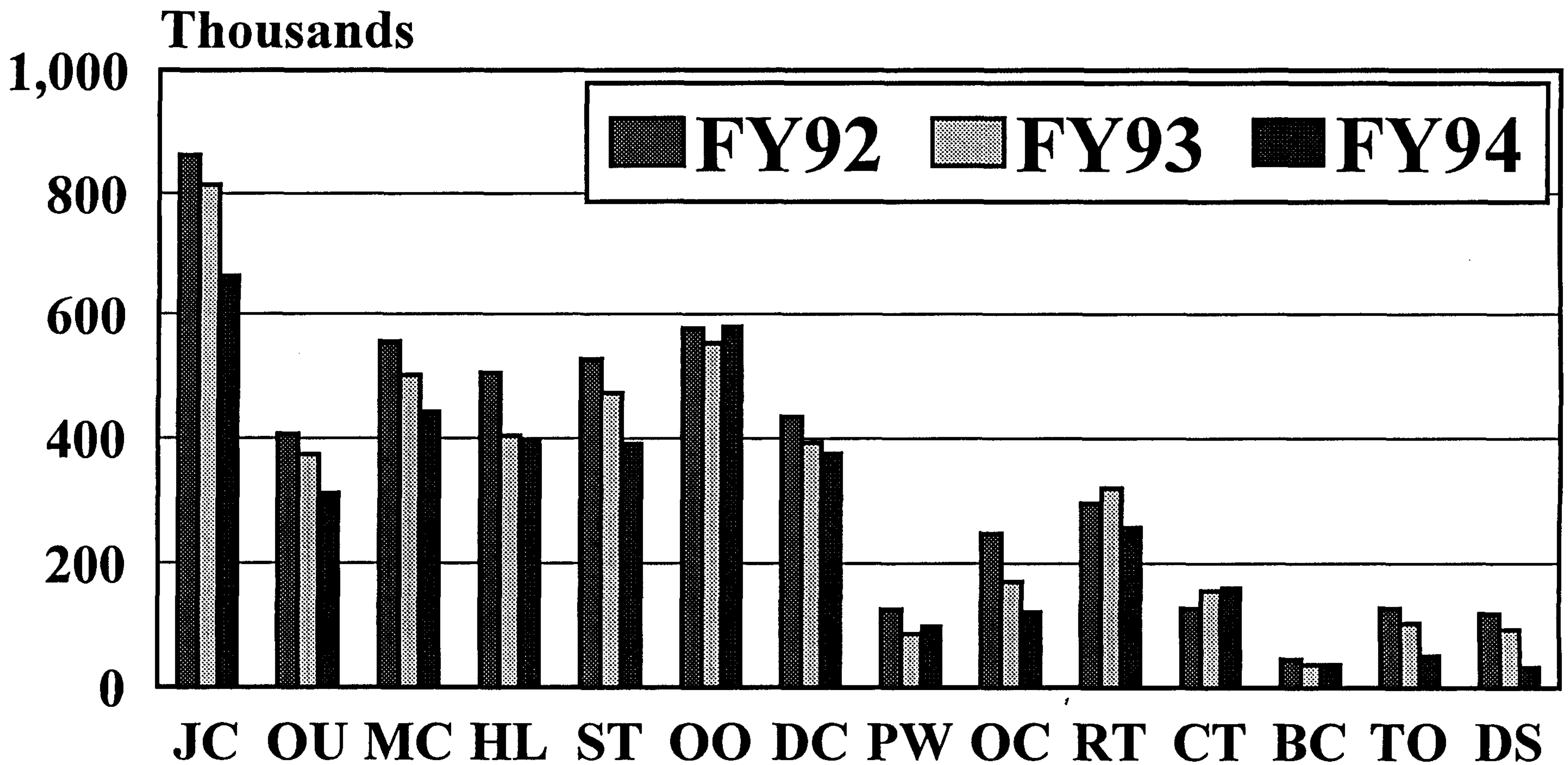
Van Transportation Costs



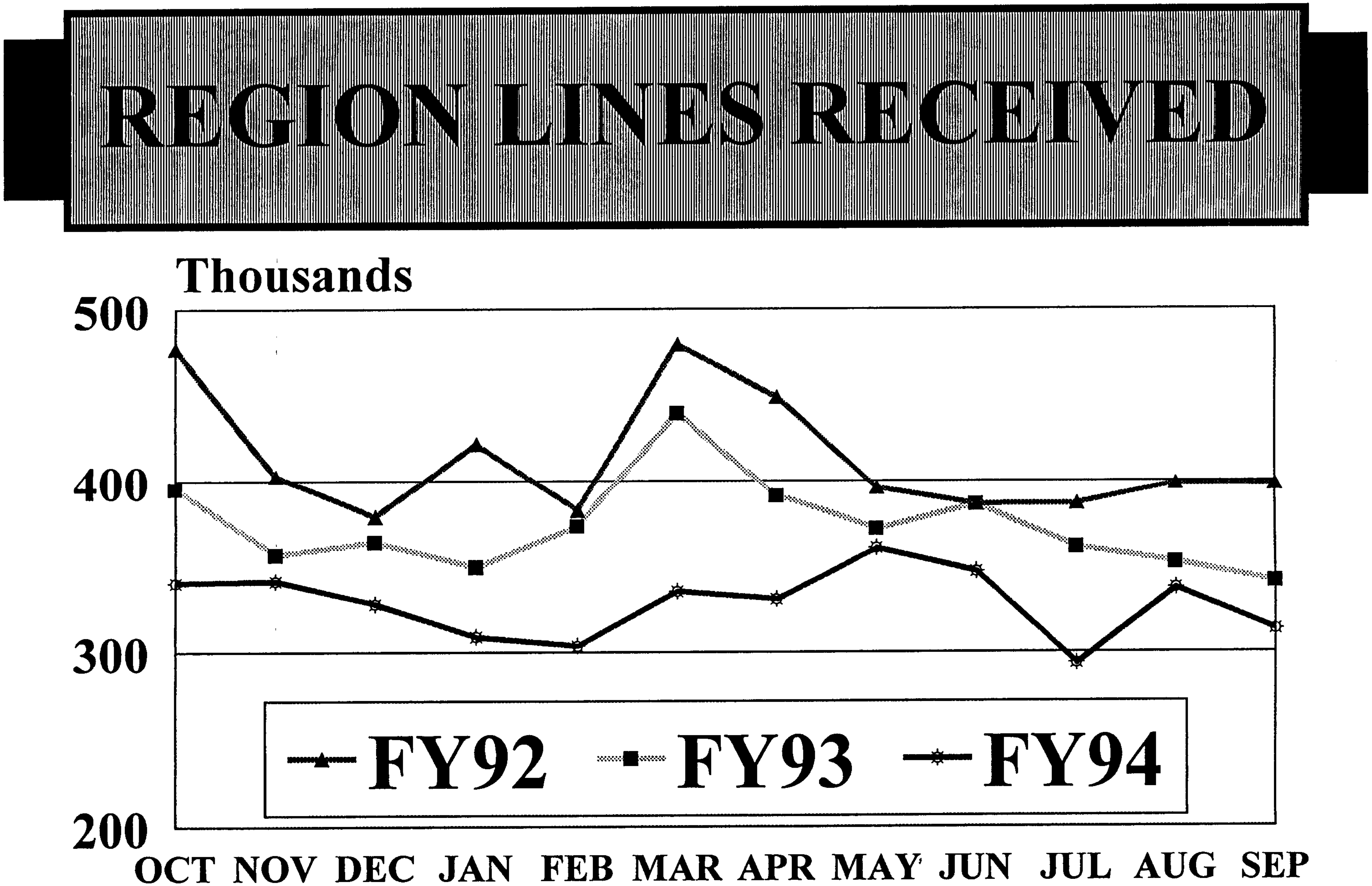
Defense Distribution Region West

Workload Comparison/Analysis
Fiscal Years 1992, 1993 & 1994

LINES RECEIVED BY DEPOT



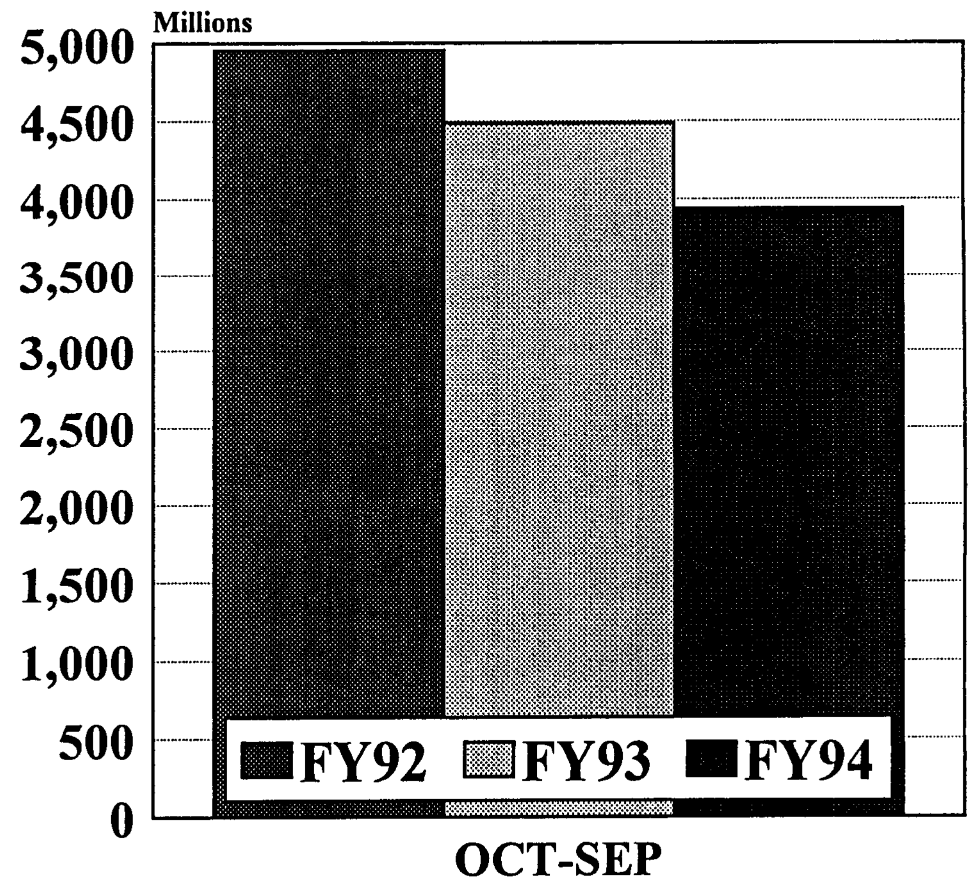
DATA FROM R&A (OCT-SEP)


REGION LINES RECEIVED
Thousands
500
400
300
200
FY92
FY93
FY94
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP

DATA FROM R&A

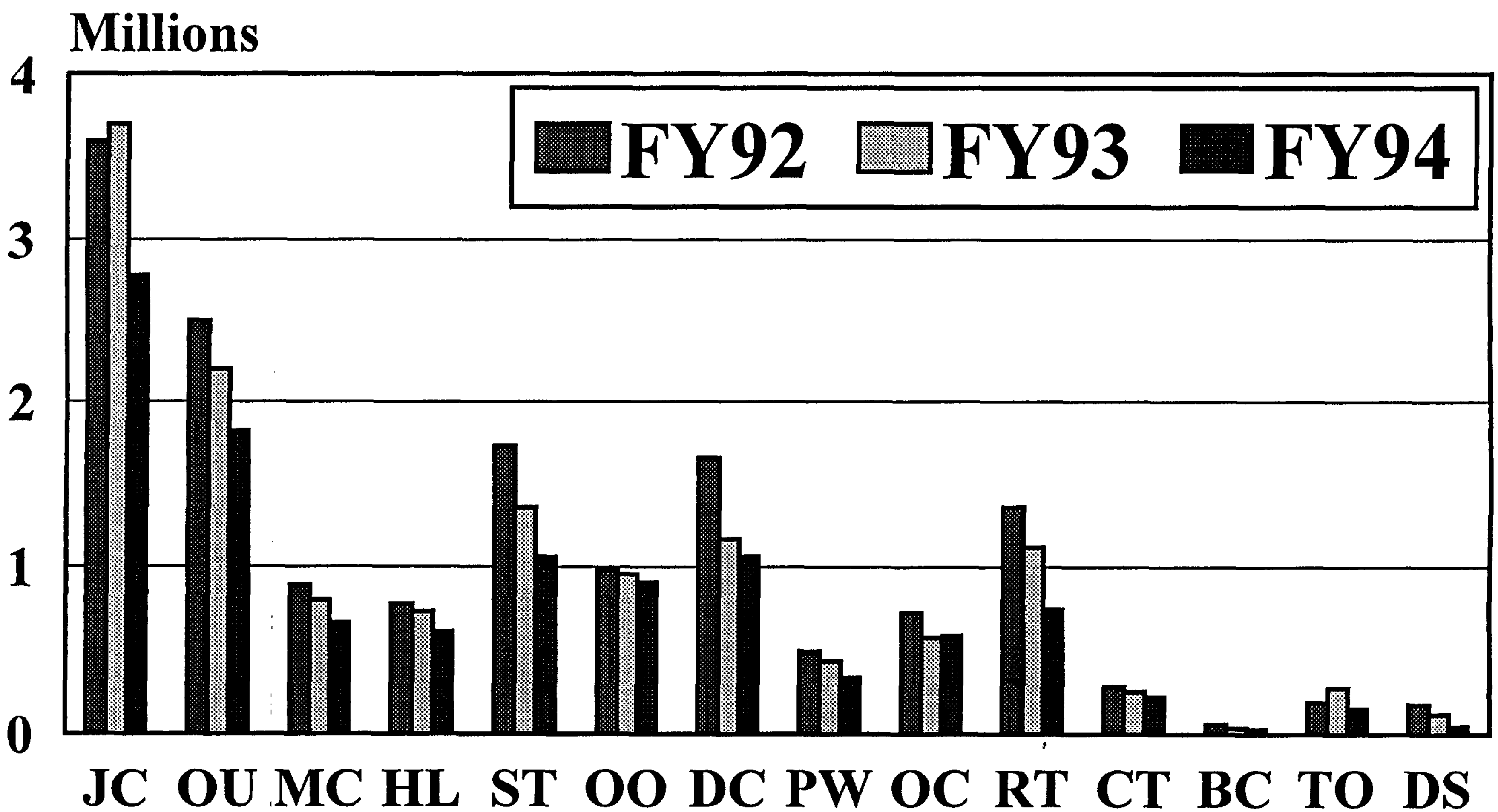
RECEIPT LINES ANALYSIS
FISCAL YEARS 92, 93 AND 94

- **Lines decreased 475,341 in FY93 from FY92 or 9.6%**
- **Lines decreased 543,089 in FY94 from FY93 or 12.1%**
- **Lines decreased 1,018,430 in FY94 from FY92 or 20.5%**



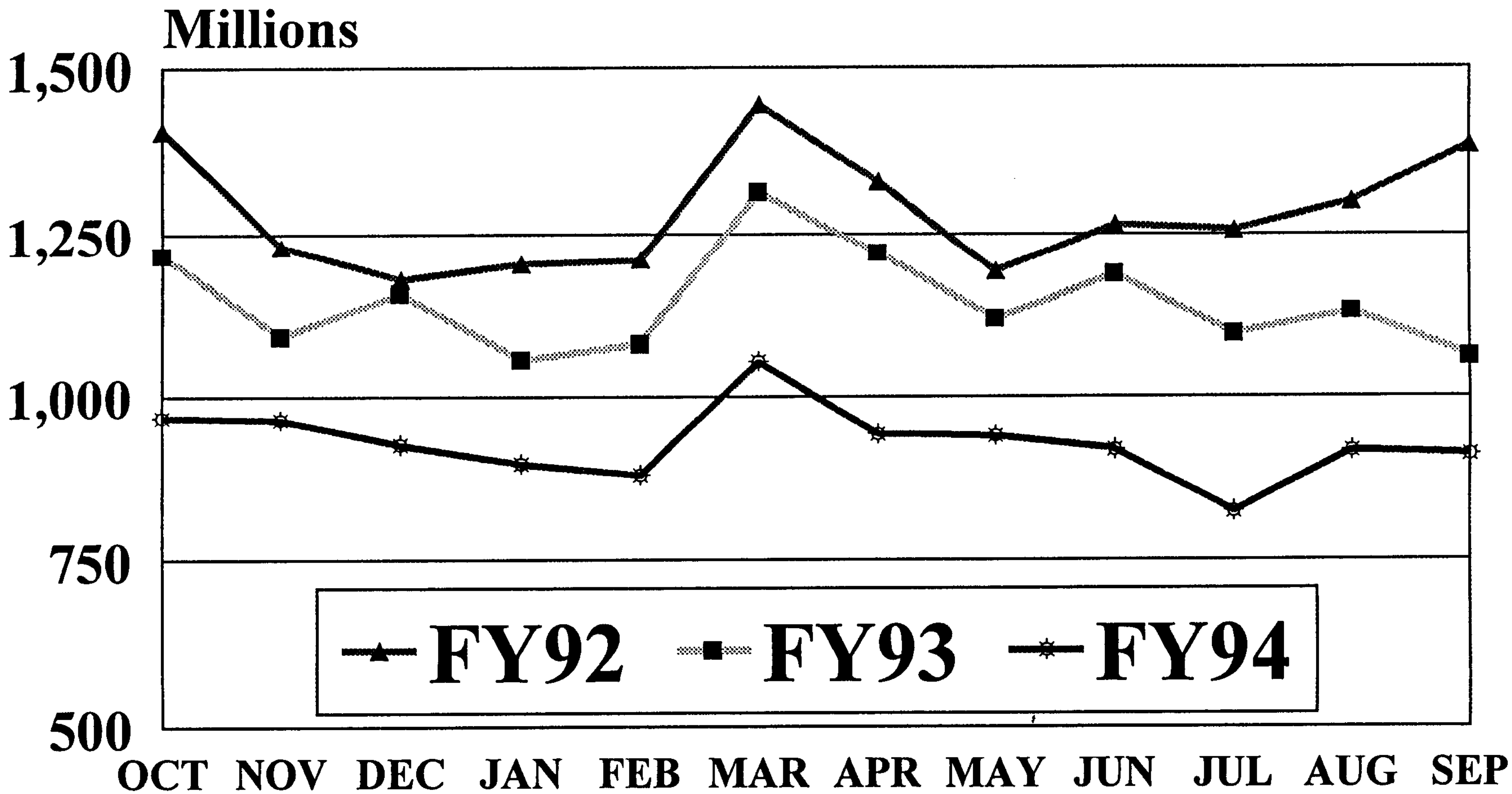
DATA FROM R&A

LINES SHIPPED BY DEPOT
(OCT-SEP)



DOES NOT INCLUDE RFC WORKLOAD

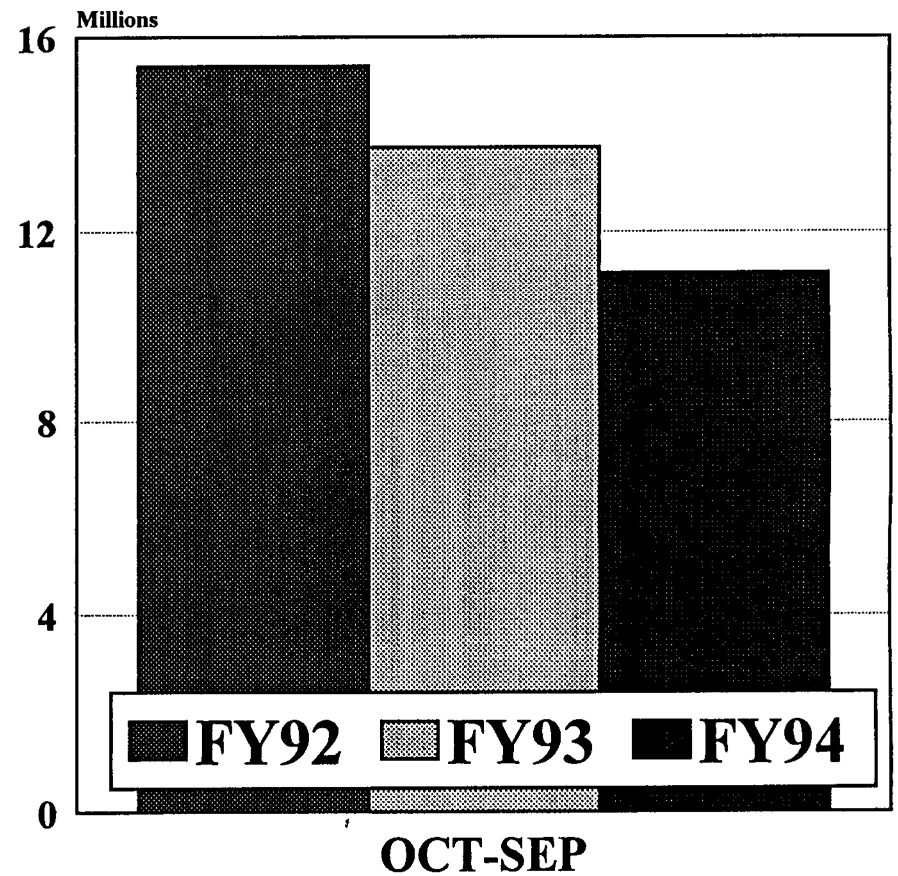
REGION LINES SHIPPED



DATA FROM R&A

LINES SHIPPED ANALYSIS
FISCAL YEARS 92, 93 AND 94

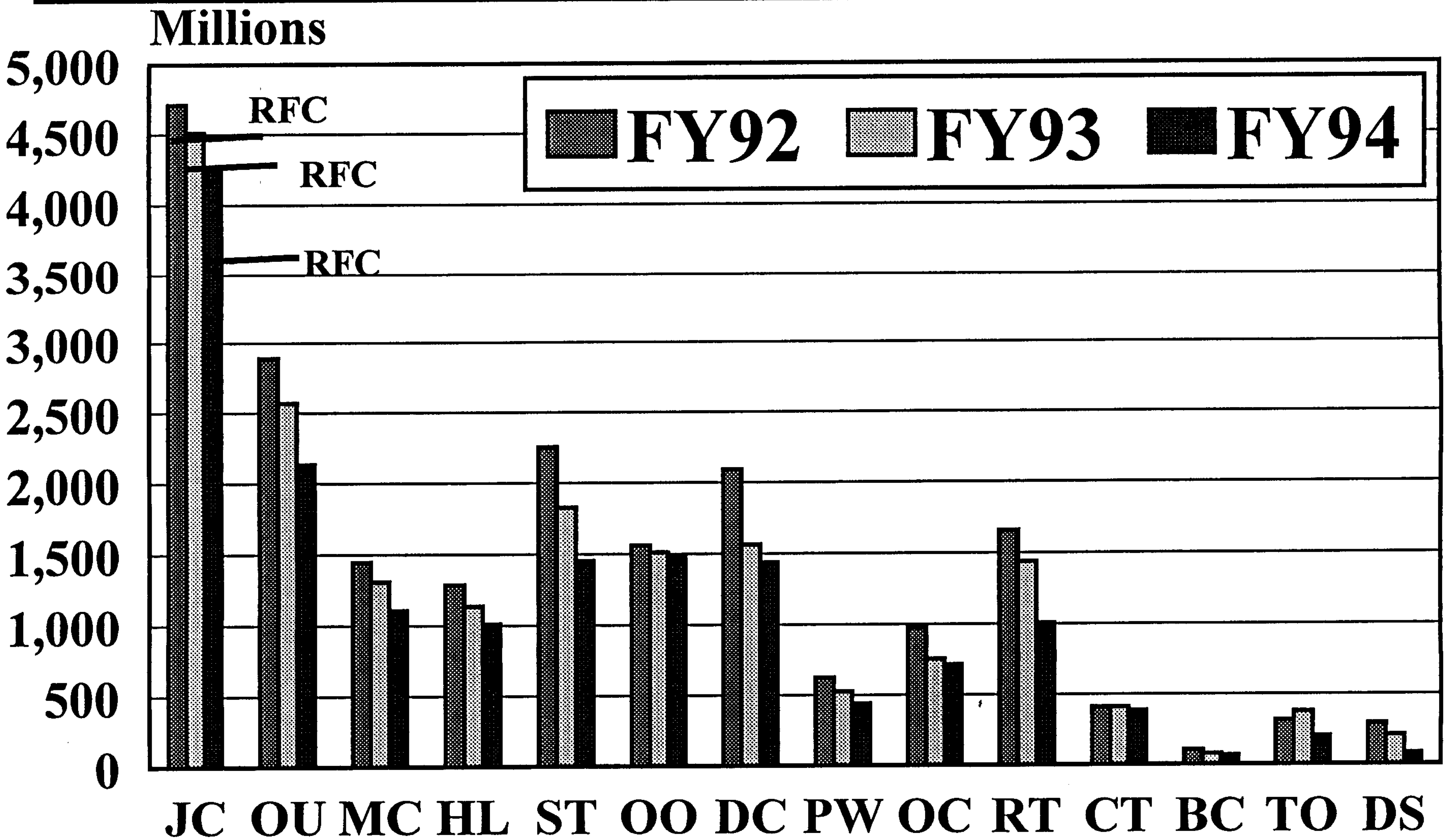
- **Lines decreased 1,668,667 in FY93 from FY92 or 10.8%**
- **Lines decreased 2,604,196 in FY94 from FY93 or 19%**
- **Lines decreased 4,272,863 in FY94 from FY92 or 27.7%**



DATA FROM R&A

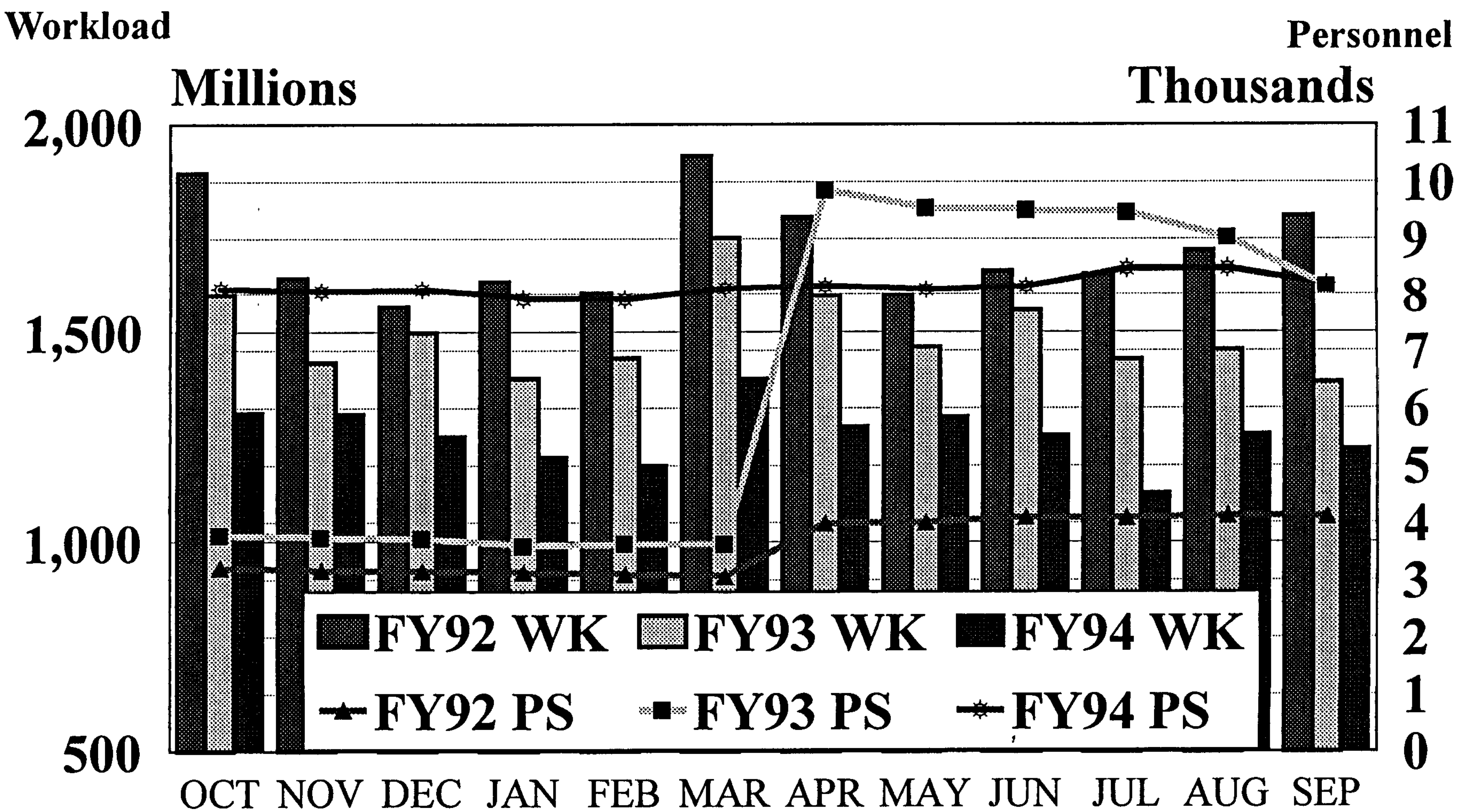
TOTAL LINES BY DEPOT

DATA OCT-SEP (DDJC: INCL RFC)



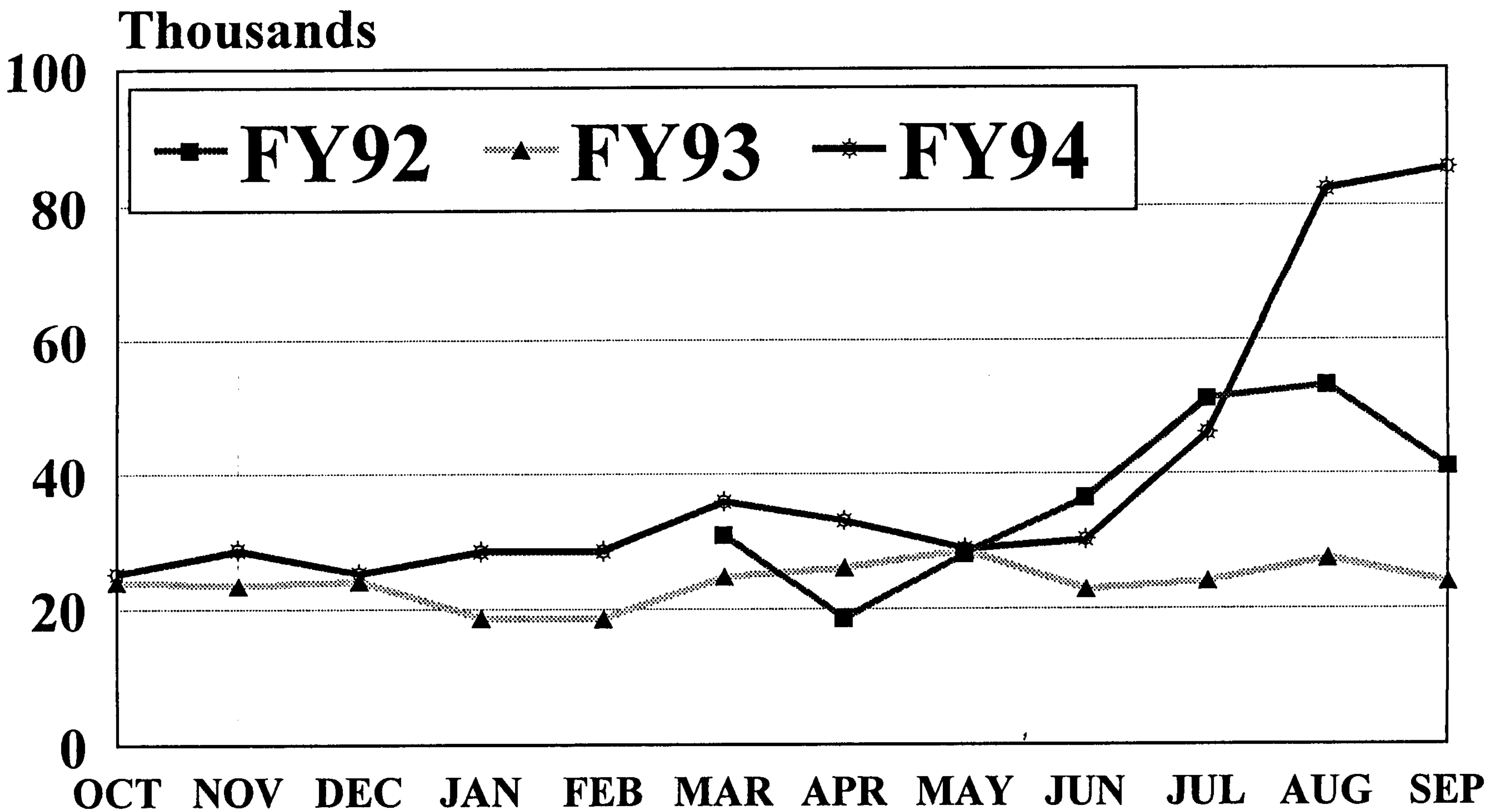
REGION TOTAL LINES

DISTRIBUTION PERSONNEL STRENGTH



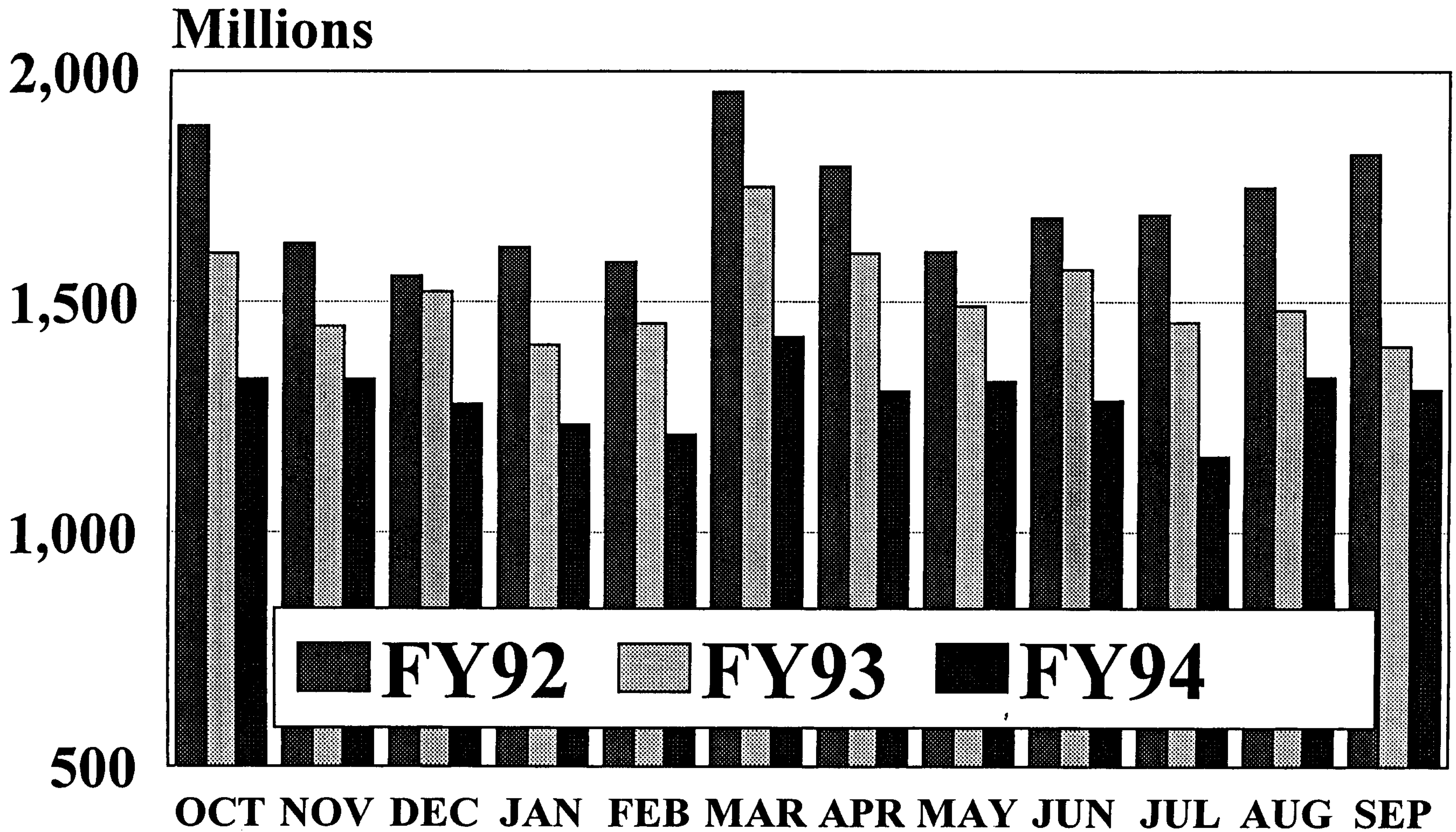
(FY92 PS:JC,MC,OC,DS;APR-MAY DC,PW,BC)(RFC N/A)

REGIONAL FREIGHT CONSOLIDATION

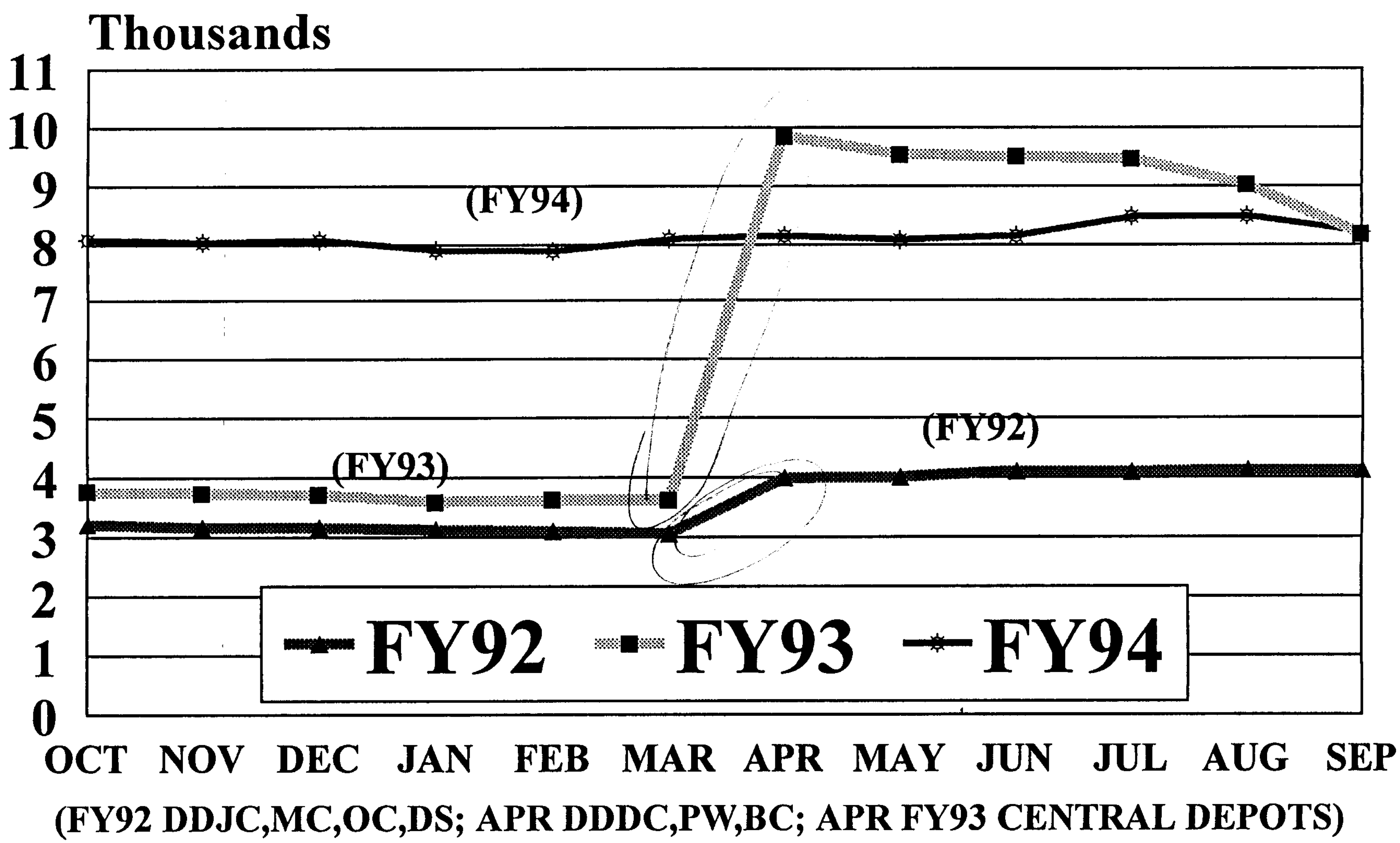


DATA FROM DDRW-R MIS (OCT-FEB FY92, N/A)

TOTAL LINES
INCLUDES RFC

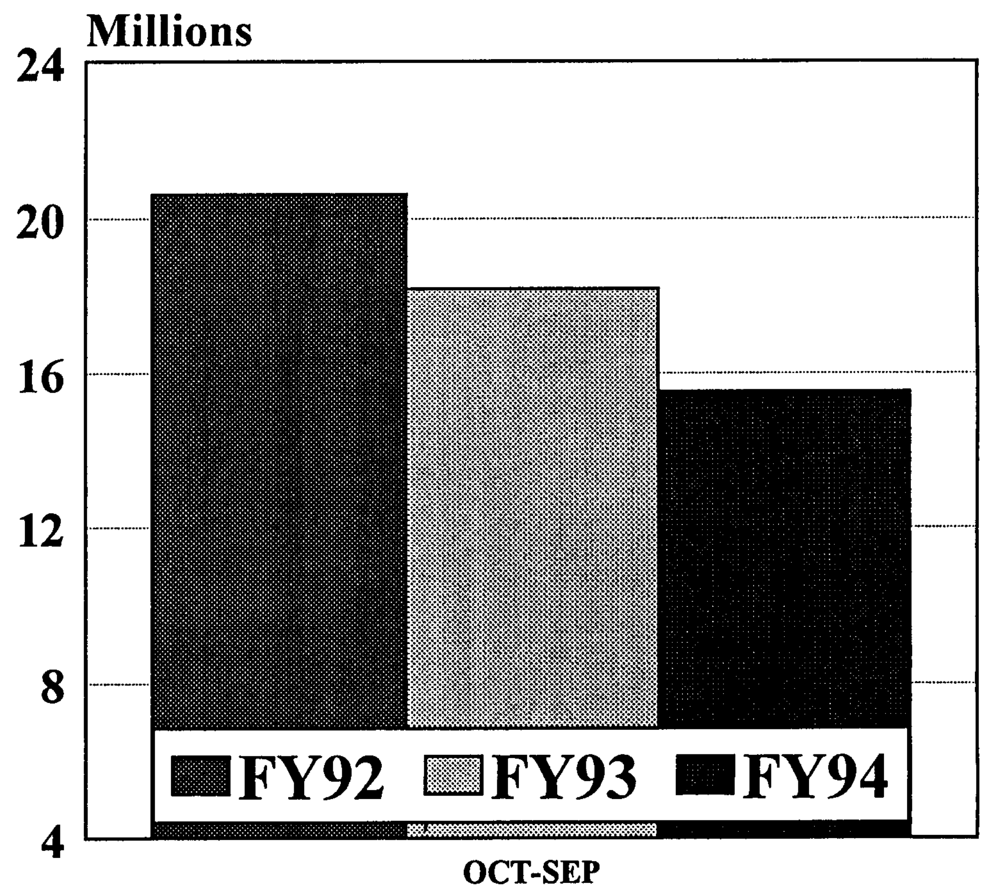


DIRECTORATE OF DISTRIBUTION PERSONNEL STRENGTH



TOTAL LINES ANALYSIS
FISCAL YEARS 92, 93 AND 94

- **Decrease of 2,403,650 in FY93 from FY92 or 11.7%**
- **Decrease of 2,672,929 in FY94 from FY93 or 14.7%**
- **Decrease of 5,076,579 in FY94 from FY92 or 24.6%**



DATA OCT-SEP (INCLUDES RFC LINES)

Document Separator