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USAF R&M ACTION PLAN DEVELOPMENT TEAM FINAL REPORT

VOLUME II

1 FEBRUARY 1985

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

AD-A153659

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED

1b. RESTRICTIVE MARKINGS:

2a. SECURITY CLASSIFICATION AUTHORITY:

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE:

3. DISTRIBUTION/AVAILABILITY OF REPORT: Unlimited Distribution

4. PERFORMING ORGANIZATION REPORT NUMBER(S):

5. MONITORING ORGANIZATION REPORT NUMBER(S):

6a. NAME OF PERFORMING ORGANIZATION: HQ USAF

6b. OFFICE SYMBOL *(If applicable)*: RD/LE

7a. NAME OF MONITORING ORGANIZATION:

6c. ADDRESS *(City, State and ZIP Code)*: WASHINGTON, DC 20330-5040

7b. ADDRESS *(City, State and ZIP Code)*:

8a. NAME OF FUNDING/SPONSORING ORGANIZATION:

8b. OFFICE SYMBOL *(If applicable)*:

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER:

8c. ADDRESS *(City, State and ZIP Code)*:

10. SOURCE OF FUNDING NOS.

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO	WORK N

11. TITLE *(Include Security Classification)*: USAF R&M Action Plan Development Team-Final Report

12. PERSONAL AUTHOR(S):

13a. TYPE OF REPORT: Final

13b. TIME COVERED: FROM ______ TO ______

14. DATE OF REPORT *(Yr., Mo., Day)*: 85 FEB 01

15. PAGE COUNT: Vol 1: 74/Vol

16. SUPPLEMENTARY NOTATION:

Weapon systems

17. COSATI CODES

FIELD	GROUP	SUB. GR.

18. SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*: Reliability, Maintainability, Weapon System Acquisition Guarantees, R&M 2000

19. ABSTRACT *(Continue on reverse if necessary and identify by block number)*

In September 1984, the Secretary and Chief of Staff of the Air Force directed establishment of a team to develop an Action Plan aimed at institutionalizing the Air Force commitment to improved reliability and maintainability. This report, published in two volumes documents the major activities of the R&M Action Plan Development Team with an emphasis the methodology, findings, and recommendations. Volume I outlines the team's tasking and approach and describes the findings, conclusions and recommendations that led to the development and approval of the Air Force R&M Action Plan, R&M 2000 (Appendix 2). Volume II is a compilation of key background documents that describe in more detail the establishment of the team and the development of its recommendations.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☒ DTIC USERS ☐

21. ABSTRACT SECURITY CLASSIFICATION: UNCLASSIFIED

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DD FORM 1473, 83 APR — EDITION OF 1 JAN 73 IS OBSOLETE.

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VOLUME II
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INTRODUCTION

The development of the Air Force R&M Action Plan, R&M 2000, was a result of an intensive effort of review and analysis by the Air Force Reliability and Maintainability (R&M) Working Group during the period of 24 October 1984 through 29 January 1985. This Working Group consisted of a General Officer Steering Group (GOSG) for guidance and direction and an Action Plan Development Team to conduct the analysis and develop the specific recommendations necessary to institutionalize R&M in the Air Force. Under the direction of the GOSG, the Action Plan Development Team reviewed, analyzed, and consolidated a considerable volume of data into a series of findings, conclusions, and recommendations ultimately leading to the development of R&M 2000. This two-volume report describes the process used to develop the R&M 2000 recommendations and contains key documents generated to support those recommendations. A summary of the contents of Volume I and an overview of this Volume II are outlined below.

A. Summary of Volume I. Volume I outlines the team's charter and approach to developing the Action Plan directed by the SECAF and CSAF memorandum dated 17 September 1984. In addition, it also describes the findings, conclusions, and recommendations that support the R&M Action Plan, R&M 2000.

Sections I through III of Volume I discuss the Action Plan Development Team's tasking, membership, research methodology, working group products, findings, and conclusions. The team divided the effort into three phases. In Phase I, two groups researched extensively the R&M literature and Department of Defense policy and procedures related to R&M. Two other groups interviewed officials throughout the Department of Defense as well as executives of a number of aerospace firms. In Phase II, the team distilled the findings from Phase I, identified major impediments to achieving accelerated improvement in weapon system R&M, and validated these findings in visits to selected program offices. Major R&M issues were also analyzed in-depth during Phase II. The team developed preliminary recommendations and briefed interim findings to the Air Force Council. The interim findings subsequently evolved into the major recommendations in R&M 2000.

Section IV of Volume I discusses the conclusions reached by the team and the rationale behind the final recommendations in the action plan. The team concluded that to satisfy the requirement to institutionalize the Air Force commitment to improved R&M, six key objectives must be met:

- Provide clear direction through visible R&M goals and policy to increase combat effectiveness.
- Establish organizational focus and expand training to build R&M technical expertise, advocacy, authority, and accountability.

- Improve R&M planning to consolidate efforts, tie R&M to operational goals, and coordinate across commands.

- Ensure effective accountability and feedback to measure progress in the R&M improvement program.

- Provide positive communication and motivation to sustain commitment to and support for R&M improvement.

- Obtain industry commitment to ensure that contractors have the motivation and capability to support R&M requirements.

Thirty-seven required actions support these six primary objectives. Details of each of these actions are contained in R&M 2000 included as Appendix 2 to Volume I.

B. Overview of Volume II. Volume II is a compilation of technical information and team products that collectively show the organization, methodology, and products of the team. Volume II is arranged as a series of annexes, each of which is described below. Volume II provides insight into the workings of the team as well as the background of the action plan development.

Annex A: R&M Working Group Charter - Established the purpose, membership, tasks, schedule, and support resources for the R&M working group.

Annex B: R&M Action Plan Development Team Roster - Lists the names, organizations, and phone numbers of the participating team members.

Annex C: R&M Action Plan Development Team Work Plan and Schedule - Provides a historical reference that documents the team's organization and approach to the problem of producing a comprehensive action plan within a relatively brief timeframe.

Annex D: SECAF and CSAF Letter to Industry, 3 December 1984 - Transmitted their 17 September 1984 memorandum to 42 key industry leaders and asked for increased focus on and support for the Air Force R&M initiative.

Annex E: Examples of Subteam Data Reports - Provides a representative sample of a data collection sheet and a report from the literature review subteam.

Annex F: Interim Briefing - Contains the briefing slides and script used to report results from the Phase I effort to the Air Force Council on 19 December 1984 and sets the stage for the final recommendations in the action plan.

Annex G: Final Briefing - Contains the final briefing slides used to present the six key objectives and 37 required supporting actions in Air Force R&M Action Plan, R&M 2000, to the Chief of Staff and the Secretary of the Air Force.

Annex H: Implementation Plans for Required Actions in R&M 2000 - Provides proposed methodologies for accomplishing the 37 required actions in R&M 2000. These documents are to be used as guides for initiating implementation of R&M 2000; they are not directive.

Annex I: Charter for Air Staff Special Assistant for R&M - Provides the charter developed by the team for the Office of the Special Assistant to AF/LE and AF/RD for Reliability and Maintainability.

Annex J: Bibliography - Summarizes the key literature sources used by the team for this effort.

Annex K: Final Report Distribution List

ANNEX A

R&M WORKING GROUP CHARTER

RELIABILITY AND MAINTAINABILITY (R&M)
WORKING GROUP

CHARTER

I. PURPOSE OF R&M WORKING GROUP. The Working Group is established to implement the SAF/OS, AF/CC memorandum to all Major Command and Separate Operating Agency Commanders dated 17 September 1984 (Atch 1). The primary purpose of the group is to institutionalize the Air Force commitment to reliability and maintainability. In implementing that direction, the group shall have the following specific objectives:

A. To clearly communicate at every opportunity the corporate Air Force commitment to reliability and maintainability as a system requirement coequal with program cost, schedule, and performance requirements;

B. To review the current state of the Air Force policy for introducing reliability and maintainability into the development of new Air Force systems and subsystems and modifications of existing systems; and

C. To develop an Air Force action plan including recommendations to institutionalize and enhance improved approaches to reliability and maintainability in current and future Air Force systems and subsystems with the ultimate objective of measurably improving operational suitability and effectiveness.

II. MEMBERSHIP. The Air Force Reliability and Maintainability (R&M) Working Group will consist of the following organizational levels:

A. General Officer Steering Group (GOSG). The GOSG will be cochaired by AF/RD and AF/LE. This group will consist of representatives from key Air Force organizations that have a direct impact on the requirement for or achievement of R&M in Air Force weapon systems. The GOSG will function as the corporate level Air Force body responsible for maintaining and communicating a continuing high level of Air Force commitment to R&M and focusing the efforts of the working group. The GOSG will meet at the discretion of the co-chairmen and function until the objective of an institutionalized Air Force commitment to R&M has been achieved.

B. R&M Action Plan Development Team. This team will consist of a core organization of individuals representing the Air Staff, Air Force Systems Command, Air Force Logistics Command and other key organizations in the R&M arena. The team will be responsible for the following:

1. Review Air Force R&M across functions, programs and commands;

2. Develop an Air Force R&M action plan including recommendations and initiatives resulting from the conduct of the R&M review; and

3. Respond to additional tasking as may be provided by the GOSG.

The team is envisioned to require full-time participation for a period of approximately 90 days to complete the tasking related to the second and third working group objectives.

C. Ad Hoc Groups. As the need is identified, ad hoc groups from specific functional areas will be utilized. These groups will support the working group by responding to taskings for review and information in specific areas requiring specialized expertise.

Proposed membership of each organizational level is identified in Attachment 2.

III. R&M WORKING GROUP TASKS. The achievement of the R&M Working Group objectives requires an ongoing process of communicating the corporate Air Force commitment to reliability and maintainability (R&M) in speeches, program reviews, and Air Force Council decisions. That process is envisioned to be a continuing one decreasing in intensity only when the GOSG is satisfied an optimum level of awareness of R&M in the Air Force has been achieved.

The R&M near-term review and the development of specific recommendations envisioned in the second and third objectives involves an immediate and intense level of activity by the R&M Action Plan Development Team over a limited period of time.

The following specific tasks will be accomplished in pursuit of the second and third objectives:

A. Literature Review. A data base of R&M material will be established by conducting a thorough review of literature including Congressional, GAO, OSD, and Air Force Inspector General reports as well as both internal and external Air Force studies and analyses.

B. Policies and Procedures. A review of existing Air Force R&M policies, procedures, and regulations, military standards, and other documents of a regulatory, directive or instructive nature will be conducted to establish the breadth and scope of the existing R&M policies and procedures. The impact of Air Force Doctrine will also be considered. The review will address all phases of the systems life cycle. R&M approaches taken by other Services, Government agencies and industry will be considered.

C. Air Force Organization for R&M. The Air Force organizations tasked with R&M responsibility will be examined including the Air Staff, Major Commands, AFSC Product Divisions, AFLC Air Logistic Centers, Laboratories, and other centers, as well as working groups, tiger teams and the like currently working to implement R&M initiatives. Their capabilities, responsibilities, and interrelationships will be examined. In addition, this task will establish a profile of the personnel resources conducting the Air Force R&M program. This profile will include determining the number, type, location, and training of these individuals, and their specific responsibilities.

D. Personnel Interviews. This task is designed to capture the knowledge and experience of leading R&M experts both inside and outside the Air Force. It will summarize their views and recommendations concerning reliability and maintainability.

E. Data Resources. This task will examine the type and extent of available data relating to the reliability and maintainability of Air Force weapon systems to determine its usefulness as a decision tool for Air Force management.

F. Weapon System Process. R&M requirements and actual performance data will be gathered and reviewed from a sample of systems presently under development and deployed to establish examples of both satisfactory and unsatisfactory R&M performance. Program Offices and industry will be contacted to discuss cost, incentives and impediments to attaining reliable and maintainable weapon systems.

G. Develop Recommendations. As a result of conducting tasks A through F, a series of recommendations will be developed into an Air Force action plan. These recommendations will address initiatives necessary to fully institutionalize reliability and maintainability in the Air Force.

IV. SCHEDULE. The approval of this charter by AF/RD and AF/LE is anticipated by 6 November 1984. In anticipation of that formal approval, the R&M Action Plan Development Team will be formed, a detailed work plan and schedule developed, and the effort initiated 29 Oct 84. AF/RD and AF/LE will receive weekly updates; AF/CV will be provided biweekly status reports. A formal mid-term review will be provided to AF/RD and AF/LE on 3 Dec 84, with a final action plan prepared for presentation to AF/CC by mid-January, 1985. Other briefings will be as requested by the GOSG. The R&M Action Plan Development Team effort is planned to be completed within 90 days (29 Oct 84 - 21 Jan 85).

V. SUPPORT. In support of the effort contemplated by this charter, various organizations throughout the Air Force will be requested to provide individuals either full-time or part-time to participate as working group or ad hoc group members. Administrative and clerical support will be provided by AF/RD and AF/LE. Dedicated office space for working group members will be provided to facilitate the concentrated near-term effort of collecting and analyzing a wide variety of data concerning the Air Force R&M program and ensuring the free flow of information between the many team members. Travel required to be accomplished as part of this tasking will be funded from within each assigned individual's organizational allocation.

LEO MARQUEZ
Lieutenant General, USAF
DCS/Logistics & Engineering
9 NOV 1984

ROBERT D. RUSS, Lt Gen, USAF
DCS/Research, Development
and Acquisition
9 NOV 1984

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

SEP 17 1984

MEMORANDUM FOR ALL MAJOR COMMANDS-SEPARATE OPERATING AGENCIES/CC

SUBJECT: Reliability and Maintainability of Air Force Weapon Systems - ACTION MEMORANDUM

For too long, the reliability and maintainability of our weapon systems have been secondary considerations in the acquisition process. It is time to change this practice and make reliability and maintainability primary considerations.

Reliable weapon systems reduce life-cycle costs, require fewer spares and less manpower, and result in higher sortie rates. Similarly, maintainable weapons require fewer people and lower skill levels, and reduce maintenance times. Equally important, good reliability and maintainability improve the mobility of our forces—fewer people and less support equipment to deploy. They reduce dependence on airlift and prepositioning, while increasing our ability to generate sorties.

We must emphasize reliability and maintainability throughout the acquisition process--from requirements definition, through concept development, design, production, and acceptance. Everyone must insure reliability and maintainability requirements are met through every step of the process. Reliability and maintainability must be coequal with cost, schedule, and performance as we bring a system into the Air Force inventory.

Our efforts, however, should not be confined to new or future programs. Many current systems will be with us into the next century. We need to make modifications which provide proven increases in reliability and address specific problems of maintainability.

To institutionalize the Air Force commitment, Lt Gen Bob Russ and Lt Gen Leo Marquez are forming a working group of logisticians, operators, and acquisition specialists to develop an Air Force-wide action plan with specific recommendations and suspenses. This will be reported to us in early December.

In the meantime, insure your people pay the utmost attention to reliability and maintainability needs as they prepare requirements, review specifications, and devise strategies. We need our best effort across the Air Force on this issue.

CHARLES A. GABRIEL, General, USAF
Chief of Staff

VERNE ORR
Secretary of the Air Force

Atch 1

RELIABILITY AND MAINTAINABILITY
R&M WORKING GROUP

MEMBERSHIP

A. General Officer Steering Group (GOSG)

AF/RD - Co-chairman

AF/LE - Co-chairman

Membership to be determined

B. Working Group

Team Chief - Colonel Kenneth Meyer

AF/LEY	AF/XOO	AFSC	SAF/ALG
AF/RDX	AF/SIT	AFLC	
AF/RDC	AF/PRP	AFOTEC	
AF/LEX	AF/ACM	AFALC	
AF/MPM	AF/SAG	AFIT	

C. Ad Hoc Group

As assigned by the Working Group.

Atch 2

ANNEX B

R&M ACTION PLAN DEVELOPMENT TEAM ROSTER

as of: 23 January 1985

RELIABILITY & MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

ORGANIZATION/NAME	OFFICE	OFFICE PHONE
A. AIR STAFF		
Col Kenneth Meyer	AF/RDC	697-7807
Col Thomas Hruskocy	AF/LEXY	695-6756
Lt Col Eric E. Nelson	AF/LEYE	697-9179
Lt Col Ronald Craigie	AF/RDPV	697-7715
Maj Laurence Trowel	AF/RDCS	697-6400
Maj John Hull	AF/RDXM	697-3040
Daniel G. King	AF/XOOM	695-9131
(2)Lt Col Richard Ruffing	AF/XOOTD	695-0651
Maj Gordon M. Hodgson	AF/SAGP	697-0862
(2)Maj Kenneth M. Hentges	AF/SAGP	697-0862
Capt Nadine E. Levine	AF/SITT	695-4907
(F)Capt Andrew Sherbo	AF/ACMC	697-0711
Maj Louis Medal	AF/MPME	694-0773
(F)Lt Col Waynard C. Devers	AF/PRPRC	694-2173
SSgt Scott F. Welsh	1947HSG	697-0205
Helen Chapman	1947HSG	695-3167
B. SECRETARIAT		
Lt Col Herbert Brown	SAF/ALG	695-7984
C. AFSC		
Lt Col N.H. Criscimagna	AFSC/ALK	981-4076
Lt Col David Strunk	AFSC/PG	981-6444
(1)Col Larry Jarman	ESD/AL	AV478-2904
(1)Lt Col Louis Bragaw	ESD/AL	AV478-2904
(1)Lee Pollock	ESD/AL	AV478-2904
(1)Dr John Halpin	ASD/EN	AV785-5874
(1)Col Guy Smith	ASD/AL	AV785-5185
(2)Chester Holloman	ASD/PMC	AV785-3959
(2)Michael Zsak	AFSC/ALK	981-4076
D. AFLC		
(F)John L. Max	AFLC/MMA	AV787-7119
Paul Barsotti	OCALC/MMIR	AV336-7996
William J. Hippenmeyer	AFLC/LOC	AV787-2151
E. AFALC		
(2)Col Howard Denman	AFALC/PT	AV785-2506
William C. Widenhouse	AFALC/PTR	AV785-4177
F. AFOTEC		
(F)Lt Col James R. Finch	AFOTEC/LG4	AV244-0346
(2)Capt Scott Smith	AFOTEC/LG3	AV246-5450
G. AFIT		
Lt Col Carlos M. Talbott	AFIT/LSM	AV785-5023
H. AFCOLR		
Col John Reynolds	AFCOLR	AV785-4758
Maj Gregory Padula	AFCOLR	AV785-4758
I. HQ AFISC/IG		
(2)Capt Michael Hunter	AFISC/IGYB	AV876-3833
J. RAND		
(F)Michael Rich	Rand Corp	(213)393-0411
(F)Giles Smith	Rand Corp	(213)393-0411

(1) Phase 1 Only (F) Focal Point
(2) Phase 2 Only

ANNEX C

R&M ACTION PLAN DEVELOPMENT TEAM
WORK PLAN AND SCHEDULE

PREPARED: OCT 84

PHASE II PLAN
AND TEAM ROSTER
REVISED NOV 84

UNITED STATES AIR FORCE

Reliability & Maintainability
Action Plan Development Team

Work Plan & Schedule

AIR FORCE

RELIABILITY & MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

WORK PLAN & SCHEDULE

INDEX

BACKGROUND

ACTION PLAN
DEVELOPMENT TEAM

PURPOSE

(SOURCE: SAF/OS, AF/CC Memo, 17 Sep 84)

- DEVELOP AN AIR FORCE-WIDE ACTION PLAN WITH SPECIFIC RECOMMENDATIONS
- MAKE R&M PRIMARY CONSIDERATIONS
  - COEQUAL WITH COST, SCHEDULE, AND PERFORMANCE
- INCREASE EMPHASIS ON R&M THROUGHOUT ACQUISITION CYCLE
  - FROM IR&D THROUGH MODS IN FIELDED SYSTEMS
- INSTITUTIONALIZE AIR FORCE COMMITMENT TO R&M

RELIABILITY & MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

ORGANIZATION/NAME	OFFICE	OFFICE PHONE
A. AIR STAFF		
Col Kenneth Meyer	AF/RDC	697-7807
Col Thomas Hruskocy	AF/LEXY	695-6756
Lt Col Eric E. Nelson	AF/LEYE	697-9179
Lt Col Ronald Craigie	AF/RDPV	697-7715
Maj Laurence Trowel	AF/RDCS	697-6400
Maj John Hull	AF/RDXM	697-3040
Daniel G. King	AF/XOOM	695-9131
(2)Lt Col Richard Ruffing	AF/XOOTD	695-0651
Maj Gordon M. Hodgson	AF/SAGP	697-0862
(2)Maj Kenneth M. Hentges	AF/SAGP	697-0862
Capt Nadine E. Levine	AF/SITT	695-4907
(F)Capt Andrew Sherbo	AF/ACMC	697-0711
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H. AFCOLR		
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Maj Gregory Padula	AFCOLR	AV785-4758
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J. RAND		
(F)Michael Rich	Rand Corp	(213)393-0411
(F)Giles Smith	Rand Corp	(213)393-0411

(1) Phase 1 Only (F) Focal Point
(2) Phase 2 Only

ACTION PLAN
DEVELOPMENT TEAM

WORK PLAN - OBJECTIVES

I. GIVE THE CHIEF AN AF-LEVEL ACTION PLAN THAT WILL ENHANCE AND INSTITUTIONALIZE R&M ACROSS THE AIR FORCE

II. DO ENOUGH BACKGROUND WORK TO ESTABLISH CREDIBILITY BUT DON'T GET "BOGGED DOWN" IN A STUDY EFFORT

III. LEAVE THE AIR FORCE IN A BETTER POSITION TO UNDERSTAND, FOCUS ON, AND ACHIEVE R&M IN OUR NEW AND EXISTING WEAPON SYSTEMS

ACTION PLAN
DEVELOPMENT TEAM

APPROACH

- THREE-PHASE EFFORT
  - PHASE I - R&M FUNCTIONAL REVIEW
  - PHASE II - PROGRAM REVIEWS/RECOMMENDATION DEVELOPMENT
  - PHASE III - REPORT/BRIEFING PREPARATION
- 90 DAYS
- PRODUCT ORIENTED
  - DATA COLLECTION SUMMARIES
  - PHASE REPORTS
  - FINAL REPORTS/BRIEFING
  - ACTION PLAN
  - IMPLEMENTATION PLAN

PHASE I WORK PLAN

PHASE I ORGANIZATION

TEAM CHIEF: MEYER (AF/RDC)

EXECUTIVE OFFICER: TROWEL (AF/RDCS)

	SUB-TEAM I LITERATURE	SUB-TEAM II POLICY/PROCEDURE	SUB-TEAM III DOD-WIDE ORGANIZATION	SUB-TEAM IV INDUSTRY
TEAM CHIEF:	HODGSON (AF/SA)	NELSON (AF/LE)	HRUSKOCY (AF/LE)	REYNOLDS (AFCOLR)
MEMBERS:	TALBOTT (AFIT)	CRISCIMAGNA (AFSC/AL)	KING (AF/XO)	PADULA (AFCOLR/XR)
	MEDAL (AF/MP)	HULL (AF/RD)	WIDENHOUSE (AFALC/PT)	JARMAN (ESD/AL)
	LEVINE (AF/SI)	BARSOTTI (OCALC/MM)	BROWN (SAF/AL)	BRAGAW (ESD/AL)
			STRUNK (AFSC/PG)	POLLOCK (ESD/AL)
			HIPPENMEYER (AFLC/LOC)	SMITH (ASD/AL)
				HALPIN (ASD/EN)

ACTION PLAN COORDINATOR:

CRAIGIE (AF/RDP)

ORGANIZATIONAL FOCAL POINTS:

DEVER (AF/PR)
SHERBO (AF/AC)
FINCH (AFOTEC/LG)
DENMAN (AFALC)
MAX (AFLC)
RICH (Rand)
SMITH (Rand)

TASK I

R&M LITERATURE REVIEW

Task Objective: To provide concise, summary-level data of significant R&M literature sufficient to draw general conclusions about R&M and to use as reference material for other tasks.

Work Plan:

A. Compile list of literature identified as directly relating to reliability and/or maintainability of weapon systems and subsystems to include the following sources:

1. Congress
2. DOD
3. Air Force
4. Other Services
5. Industry
6. Academia

B. Review most important and potentially useful literature and, based on the content, prepare a summary sheet (attached) indicating the following minimum information:

1. Purpose of the document
2. Major conclusions, incentives, and impediments to R&M identified
3. Recommendations
4. Elements identified as essential for a successful R&M program
5. R&M data relating to specific weapon system (including other services)
6. Stage in system acquisition cycle document discussed
7. Definitions of reliability and maintainability discussed

Product: This task will result in the following products:

A. A selected bibliography of R&M-related literature

B. A file of summary sheets on the most useful documents for analysis, cross referenced by team, process, applicable organization, and the questions of primary interest

C. An overall report summarizing the literature reviewed

Team:
Process:
Organization:
Question:

TASK I

LITERATURE REVIEW SUMMARY

Index #:

Title:

Author (Name & Organization):

Reviewer:

Date:

A. Purpose of document:

B. Major conclusions discussed:

C. Incentives and impediments to R&M discussed:

D. Recommendations/initiatives and their status:

E. Essential elements of successful R&M program:

F. R&M data relating to specific programs (including other services):

G. Stage of acquisition cycle document discusses:

H. Definition of R&M discussed:

TASK II

R&M POLICIES AND PROCEDURES

Task Objective: To provide concise, summary-level data necessary to overview and interrelate existing policies and procedures, determine any revisions required, and serve as reference material for other tasks.

Work Plan:

A. Compile a listing of all statutes, DOD and Air Force regulations, policies, procedures, specifications, standards, handbooks, and data items relating to reliability and maintainability. Include documents of other services as necessary.

B. Review each document focusing in particular on those documents that drive decisions. Prepare a summary sheet (attached) indicating the following minimum information as applicable:

1. Purpose of the document
2. Requirements established by the document
3. Elements identified as essential for a successful R&M program
4. Data/reports required by the document
5. Policy initiatives
6. Deficiencies, disconnects, conflicts with other policies, procedures, etc.
7. Stage in system acquisition life cycle document applies to
8. Definition of Reliability and Maintainability discussed

Product: This task will result in the following products:

A. A bibliography of all DOD and Air Force documents relating to R&M policies and procedures;

B. A file of summary sheets highlighting key requirements, etc. for each document for analysis and further reference; and

C. A report on the policies and procedures reviewed indicating the following:

1. An overall summary of the documents reviewed
2. Definitions of "reliability" and "maintainability" derived from policies and procedures reviewed
3. Major responsibilities for R&M
4. Building blocks of a successful R&M program
5. Policy initiatives identified
6. Key impediments, deficiencies, disconnects, conflicts
7. Your overall recommendations
8. A summary matrix depicting
   a. Policy/procedures versus the acquisition cycle
   b. Policy/procedures versus R&M definitions
   c. Policy/procedures versus R&M building blocks
9. A hierarchy of policy/procedures

TASK II

R&M POLICY/PROCEDURE REVIEW SUMMARY

Index #: Location of Document:

Number/Title:

Date of Publication:

OPR (Name/Organization/Phone):

Reviewer: Date Reviewed:

A. Purpose of document:

B. Policy summary (building blocks):

C. Responsibility summary:

D. Acquisition stage applicable:

E. Data/reports required (from/to):

F. Definition of R&M:

G. Impediments:

H. Incentives:

I. Initiatives:

J. Recommendations:

TASK III

R&M ORGANIZATIONS/PERSONNEL

Task Objectives:

A. To determine organizations with R&M relationships and charters and report data and organizational interrelationships.

B. To determine who are the leading Air Force, DOD, and other Services' experts on R&M and summarize their views and recommendations on institutionalizing R&M in the Air Force.

Work Plan:

A. Develop a critical path network for how R&M is corporately administered in the Air Force. Integrate the other units (organizations, working groups, tiger teams, special study groups, etc.) into a complete network illustrating the flow of R&M activity from pre-SON to retirement of a weapon system. Activity will include:

1. DOD (including FCRCs)
2. Air Force (including FCRCs)
3. Other Services (include only major organizations and those with direct interface and/or impact on Air Force activities.

B. For each organization, prepare a summary sheet (attached) indicating the following minimum information:

1. Organization (including placement within the larger organization)
2. Organizational responsibilities in R&M (goals, purpose, objectives)
3. Resources available (personnel, budgets, etc.)
4. Gather budgetary history, current TOA, and track record on obligation rates
5. How do they do their job?
6. How do they measure success?
7. Data they gather, generate, and/or use
8. Incentives/impediments to successful R&M identified
9. Initiatives
10. Data on specific programs
11. Your assessment/recommendations

C. Identify and interview the leading R&M experts within and outside the Air Force and those managers that directly influence the course of R&M within the Air Force. For each contact, complete an R&M Personnel Interview sheet that summarizes the following areas of interest:

1. R&M responsibilities
2. R&M experience and training
3. Level of authority, budgetary influence

4. Their definition of R&M
5. Essential elements of an R&M program
6. R&M successes and failures
7. Incentives and impediments to R&M
8. Initiatives planned or in process
9. Their recommendations for improving/institutionalizing R&M

Products: This task will result in the following products:

A. A file of summary sheets of all Air Force organizations involved in R&M at all levels; their roles, capabilities, and interrelationships; their assessment of the effectiveness of this overall structure; and a single report consisting of the following:

1. A summary of the R&M organizational review
2. Identification of incentives/impediments to achieving enhanced R&M
3. Levels of authority and budgetary influence on R&M
4. Identification of initiatives in process or planned
5. Summary of data relating to specific programs
6. Your recommendations

B. A file of summary sheets summarizing interviews with key R&M people and a single report containing the following information:

1. Overall summary of the interviews
2. Summary of the definitions of R&M
3. Summary of the essential elements of a successful R&M program
4. Summary of R&M successes and failures
5. Summary of incentives and impediments to R&M identified
6. Summary of initiatives planned or in process
7. Summary of their recommendations
8. Your overall recommendations

TASK III

R&M ORGANIZATIONS

Index #:

Organization Title:

Location:

Phone:

Key individuals contacted:

Reviewer: Date of Review:

A. Organization (including placement within larger organization):

B. R&M responsibilities (goals, purpose, objectives):

C. Resources available (for special study groups, committees, etc., identify membership by name and organization):

1. People (see attached personnel resource summary sheet):
2. Budgets:
3. Other:

D. Level of authority, ability to influence R&M events:

E. "How" do they do their job?

F. How do they measure their success?

G. Data they gather, generate and/or use:

H. Incentives and impediments to successful R&M identified:

I. R&M initiatives:

J. Data on specific programs provided:

K. Your assessment/recommendations:

TASK III

R&M PERSONNEL INTERVIEW

Index #:

Name: Title:

Organization:

Location:

Phone:

Interviewer: Date of Interview:

A. R&M responsibilities:

B. R&M experience/training:

C. Their definition of R&M:

D. Level of TOA control, ability to influence R&M events:

E. Essential elements of a successful R&M program:

F. R&M successes/failures:

G. Incentives and/or impediments to R&M:

H. Initiatives (planned or in process):

I. Their recommendations for improving/institutionalizing R&M:

TASK IV

INDUSTRY R&M PROGRAMS

Task Objective: To assess the role of industry in R&M of Air Force weapon systems, their organization to successfully incorporate R&M, and to suggest techniques the Air Force can use to incentivize industry to greater R&M.

Work Plan:

A. Identify major defense contractors with a significant level of Air Force work. If possible, include several with both government and commercial business. For each selected contractor, interview their key people and complete the attached summary sheet to identify the following:

1. Level of corporate commitment to R&M (corporate policy, etc.)
2. Corporate organization to achieve R&M in design and production
3. Level of corporate resources (people, budgets) dedicated to R&M
4. Their techniques and recommendations for measuring R&M and estimating the cost of R&M
5. Their definition of R&M
6. Their perceptions of how R&M is balanced with cost, schedule, and performance
7. Elements they identify as essential to a successful R&M program
8. Their experience with R&M in commercial ventures. Compare and contrast government vs. commercial R&M techniques and experience
9. Their impressions of the incentives/impediments to achieving enhanced R&M
10. Their initiatives to enhance R&M
11. Examples of program successes/failures
12. Their recommendations for institutionalizing R&M in the Air Force

B. Where resident contract administration exists (AFPRO, NAVPRO, DCASPRO) and time allows, include their assessment of the contractor's R&M program. Also include an assessment of the CAS R&M function.

Product: This task will result in the following products:

A. A file of summary sheets for each contractor reviewed; and

B. A report summarizing the following:

1. An overall summary of the industry review
2. Summary of industry recommendations concerning measurement of R&M
3. Summary of resources (dollars, people) industry identified as dedicated to R&M
4. Summary of the definitions of R&M discussed
5. Summary of elements identified as essential to a successful program
6. Summary of industry impressions of incentives/impediments to R&M
7. Summary of industry initiatives planned or in process
8. Summary of program successes/failures
9. Summary of industry recommendations for institutionalizing R&M
10. Your overall recommendations

TASK IV

INDUSTRY R&M PROGRAMS

Index #:

Contractor:

Person Interviewed:

Reviewer: Date Reviewed:

A. Level of corporate commitment to R&M:

B. Corporate organization to implement R&M:

C. Level of corporate commitment (people, budgets) dedicated to R&M :

D. Techniques and recommendations for measuring R&M and estimating its cost:

E. Their definition of R&M:

F. Their perceptions of the balancing of R&M, cost, schedule, performance:

G. Elements identified as essential to a successful R&M program:

H. Comparison of commercial vs government R&M techniques and experience:

I. Their impressions of incentives/impediments to enhancing R&M:

J. Their initiatives to enhance R&M:

K. Examples of program successes/failures:

L. Their recommendations for institutionalizing R&M in the Air Force:

PHASE II WORK PLAN

PHASE II ORGANIZATION

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EXECUTIVE OFFICER: MAJ TROWEL (AF/RDCS)

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PROGRAM REVIEWS

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MAJ HENTGES (AF/SAGP)
CAPT SMITH (AFOTEC/LG)
MR BARSOTTI (OC-ALC/MMIR)

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WEAPON SYSTEM PROCESS

*COL DENMAN (AFALC/PT)
COL REYNOLDS (AFCOLR)
MR WIDENHOUSE (AFALC/PTR)
MAJ PADULA (AFCOLR)
MR HIPPENMEYER (AFLC/LOC)

SUB-TEAM III
ISSUES

*COL HRUSKOCY (AF/LEXY)
LTC TALBOTT (AFIT/LSM)
MAJ BROWN (SAF/ALG)
LTC NELSON (AF/LEYE)
MR KING (AF/XOOM)
MAJ HULL (AF/RDXM)
MAJ MEDAL (AF/MPME)
LTC RUFFING (AF/XOOT)

SUB-TEAM IV
INDUSTRY INTERFACE

*MR ZSAK (AFSC/ALK)
MR HOLLOMAN (ASD/PMC)
LTC CRISCIMAGNA (AFSC/ALK)
CAPT HUNTER (AF/IG)

SUB-TEAM V
REPORTS

*LTC CRAIGIE (AF/RDPV)
MAJ HODGSON (AF/SAGP)
CAPT LEVINE (AF/SITT)

* TEAM CHIEF

TASK V

PROGRAMS

Task Objectives:

A. To determine program manager and system manager perspective of R&M.

B. To determine how R&M has been implemented within each program.

C. To sensitize the program managers and system managers to the current R&M efforts.

Work Plan:

A. Visit selected program offices and system program managers to gather data to meet the objective. The following questions will be addressed:

1. Building blocks: What are the essential elements of R&M?
2. Data base: How do you measure R&M?
3. People: Who is doing R&M?
4. Cost: How is R&M included in your budgeting and funding?
5. Impediments: What keeps you from doing R&M?
6. Initiatives: What are you trying to do in R&M?
7. Incentives: What helps you do R&M?
8. Recommendations: What should we be doing to improve R&M in the Air Force?

Products: This task will result in the following products:

A. List of program offices/system program managers interviewed.
B. Summary report of each interview conducted.
C. Individual sheet on each question.
D. Overall recommendations resulting from this task.

TASK V

PROGRAMS

Review Schedule

1.	Meet with PEMs	All Task V Team Members	27-30 Nov
2.	Visit ASD Programs AFWAL F-16 C-17 ATF Engine SPO	Team V(a)	3-7 Dec
3.	Visit SM-ALC F-111 A-10	Team V(b)	3-4 Dec
4.	Visit AD and AFATL AMRAAM Armament Lab	Team V(b)	5-7 Dec
5.	Visit Army/Navy H-60/T-700 F-18	All	TBD

TASK VI

CONTRACTING, WARRANTIES, AND INCENTIVES

Task Objective:

A. To develop recommendations for clearly communicating to industry the level of importance the Air Force places on reliability and maintainability (R&M).

1. Communications include all formal and informal means including contracts, symposia, RFPs, correspondence, and so forth.

2. Industry includes all contractors who are or may in the future conduct research and development, develop and produce new or modified systems, or operate and support systems for the Air Force.

3. The recommendation will key and focus on those actions that the CSAF can take to make sure Air Force contractors place the same high level of importance on R&M as is placed on those disciplines by the SECAF and CSAF.

Work Plan:

A. Inputs:

1. The data collected during the first phase of the action plan development effort will be used to establish a baseline.

2. The subteam will interview selected individuals from SAF, AF, AFSC, AFLC, and PPAC who are knowledgeable about warranties, incentives, contracting, acquisition strategy, and source selection.

3. The subteam will use information gathered by the Program Review Subteam from various program offices.

B. Task Breakout:

1. Analysis of inputs, synthesis, and recommendations will be done for each of the following categories:

a. Source Selection. The policy, procedures, impediments, responsibilities, and incentives for making R&M an important consideration when selecting a contractor.

b. Contracts. The policy, procedures, impediments, responsibilities, and incentives for developing contractual tools (e.g., RFP, SON, and CDRL) that require the contractor to design and produce a reliable, maintainable product and to provide the data needed to assess R&M, do logistics planning, and so forth.

c. Warranties and Incentives. The policy, procedures, impediments, responsibilities, and initiatives for motivating the contractor to design and produce a reliable, maintainable product through the use of warranties and incentives.

d. Acquisition Strategy. The policy, procedures, impediments, responsibilities, and incentives for developing an acquisition strategy wherein R&M is an essential element and then using this strategy as the basis for source selection, contracting, and warranties and incentives.

C. Schedule:

20-21 Nov	Initiate Phase II
26-27 Nov	Make assignments
	Review Phase I results
	Review Subteam Charter
28-30 Nov	Interviews at SAF, AF, AFSC
3-4 Dec	Interviews at AFLC, PPAC
7 Dec	Preliminary findings
12 Dec	Preliminary recommendations
14 Dec	End Phase II
17 Dec	Brief findings and recommendations to R&M Team

D. Participants:

Organization	Name
HQ AFSC/ALK	Mr Zsak
HQ AFSC/ALK	LTC Criscimagna
HQ ASD/PM	Mr Holloman
AFISC	Capt Hunter

Product: This task will result in the development of a subteam report that summarizes the team findings in each of the four key areas identified above and recommends actions ti address each of the findings. This subteam report should serve as the basis for the development of Action Plan recommendations in the area of industry motivation and commitment.

TASK VII

THE WEAPON SYSTEM R&M PROCESS

Task Objective: To define the weapon system process continuum from cradle to grave. Lay against that continuum building blocks, impediments, initiatives, key funding, and R&M decision/leverage points.

Work Plan:

A. Compile a listing of outputs from the Phase I task teams. Consolidate into seven major categories:

Building Blocks	Recommendations
Impediments	Funding
Incentives	Decision Points
Initiatives	

B. Prioritize the responses, within each of the seven categories, based on frequency/commonality of responses and relative importance of each item, including items identified by the four teams in Phase I.

C. Lay out prioritized list of items against acquisition cycle by phase and by event.

D. Down select from initial priority list based on input from issues sub-group. Group resultant priority listing of recommendations into 4 groups that correspond to the following breakout:

Management
Program Manager/System Manager
R&M Functionals
Industry

E. Based on inputs from Phase II program group, identify any additional impediments, recommendations, etc.

Product: This task will result in the following products:

A. Display of weapon system acquisition cycle across all phases to show visible relationship between total weapon system process and prioritized items from the seven categories identified in paragraph A above.

B. Summary report identifying key recommendations derived from Phase I and Phase II effort (input from Issues and Program Groups) identified against key leverage and decision points in the weapon system acquisition process continuum.

TASK VIII

ISSUES/RECOMMENDATIONS

Task Objective: To do an in-depth analysis of selected issues related to Air Force Reliability and Maintainability (R&M) that have the potential to become recommendations in the Action Plan and develop a proposed recommendation/ implementation outline.

Work Plan:

A. Select team member(s) and assign them to one of the following issue/ recommendation topics:

1. R&M Organization - size, location, charter, goals, interfaces.
2. Requirements Establishment - common parameters, statements of need, using command capability, measurability, tracking, enforceability.
3. Data Systems - systems in use today, requirements for future systems, commonality.
4. Training/Career Development - education/training available, demand for training, military/civilian mix, grades, career paths.
5. Budgets - funds curently identified for R&M, ability of current programs to absorb additional funding, ability to impact FY 87 POM, recommendations for establishment of additional funding lines.
6. Planning - goals of an Air Force R&M planning system, long-range and short-range planning, command, weapon system, and technology planning.

B. Identify factors impacting each issue, interface with other Phase II teams to cross-feed data that may impact the issue, thoroughly review all Phase I team reports for data applicable to the issue.

C. Develop a single recommendation for each issue with sufficient backup data to justify the proposed position. Backup data should include data gathered from other teams, results of additional interviews and data collection efforts, and proposed implementation plans.

Product: This task will result in the following product for each issue reviewed by the team:

A. A single proposed recommendation addressing the issue under consideration that supports the goal of institutionalizing R&M in the Air Force.

B. Backup data and rationale to support the proposed recommendation.

C. A plan for the proposed recommendation that clearly outlines the steps necessary to implement it to include OPRs, OCRs, and suspenses.

PHASE III WORK PLAN

TASK IX

CONCLUSIONS/RECOMMENDATIONS

Task Objective: To summarize the data gathered in Tasks I through VIII into a set of recommendations and initiatives designed to enhance and institutionalize the commitment to R&M across the Air Force.

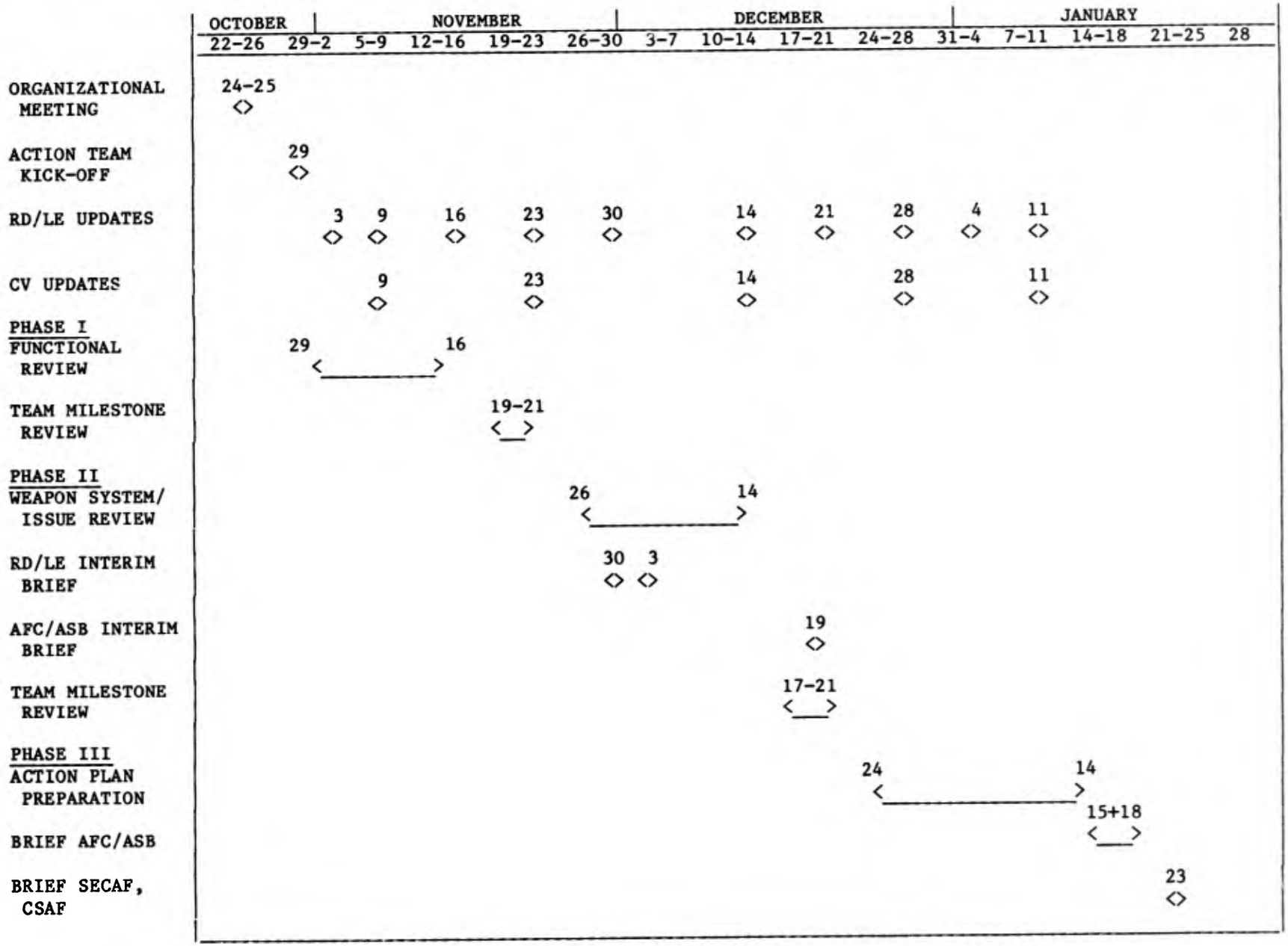
Product: This final task will result in the following products:

A. A final report documenting the team's findings and recommendations.

B. A briefing that summarizes the team's findings and recommendations.

C. An Air Force action plan that contains recommendations and suggested implementation plans for improving and institutionalizing R&M across the Air Force.

SCHEDULE


OCTOBER
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ORGANIZATIONAL MEETING
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ACTION TEAM KICK-OFF
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RD/LE UPDATES
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CV UPDATES
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14
RD/LE INTERIM BRIEF
30
3
AFC/ASB INTERIM BRIEF
19
TEAM MILESTONE REVIEW
17-21
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ACTION PLAN PREPARATION
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BRIEF AFC/ASB
15+18
BRIEF SECAF, CSAF
23

ANNEX D

SECAF AND CSAF LETTER TO INDUSTRY

3 DECEMBER 1984

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

20330-5040

DEC 3 1984

Mr. Jack L. Heckel
Chairman of the Board
and Chief Executive Officer
Aerojet-General Corporation
10300 N. Torrey Pines Road
La Jolla, California 92037

Dear Mr. Heckel

In the coming years, increased operational requirements coupled with airlift, manpower, and fiscal constraints will challenge the Air Force as never before. We firmly believe improving the reliability and maintainability of our new and deployed systems is key to reducing the logistics tail and manpower required to support our needed combat capability.

We recently sent the attached memorandum, clearly stating our objective of strengthening the logistics supportability of our systems, to our major commands. Along with this heightened Air Force commitment, we ask that you increase your company's focus on reliability and maintainability, particularly in the area of independent research and development. We also need and expect you to tell us when meeting our cost, schedule, and performance requirements conflicts with our supportability objectives.

Since your company is an important designer and producer of Air Force systems, we need and appreciate your full support in this effort.

Sincerely

CHARLES A. GABRIEL, General, USAF
Chief of Staff

VERNE ORR
Secretary of the Air Force

1 Atch
SECAF/CSAF Memo, 17 Sep 84

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

SEP 17 1984

MEMORANDUM FOR ALL MAJOR COMMANDS-SEPARATE OPERATING AGENCIES/CC

SUBJECT: Reliability and Maintainability of Air Force Weapon Systems - ACTION MEMORANDUM

For too long, the reliability and maintainability of our weapon systems have been secondary considerations in the acquisition process. It is time to change this practice and make reliability and maintainability primary considerations.

Reliable weapon systems reduce life-cycle costs, require fewer spares and less manpower, and result in higher sortie rates. Similarly, maintainable weapons require fewer people and lower skill levels, and reduce maintenance times. Equally important, good reliability and maintainability improve the mobility of our forces—fewer people and less support equipment to deploy. They reduce dependence on airlift and prepositioning, while increasing our ability to generate sorties.

We must emphasize reliability and maintainability throughout the acquisition process--from requirements definition, through concept development, design, production, and acceptance. Everyone must insure reliability and maintainability requirements are met through every step of the process. Reliability and maintainability must be coequal with cost, schedule, and performance as we bring a system into the Air Force inventory.

Our efforts, however, should not be confined to new or future programs. Many current systems will be with us into the next century. We need to make modifications which provide proven increases in reliability and address specific problems of maintainability.

To institutionalize the Air Force commitment, Lt Gen Bob Russ and Lt Gen Leo Marquez are forming a working group of logisticians, operators, and acquisition specialists to develop an Air Force-wide action plan with specific recommendations and suspenses. This will be reported to us in early December.

In the meantime, insure your people pay the utmost attention to reliability and maintainability needs as they prepare requirements, review specifications, and devise strategies. We need our best effort across the Air Force on this issue.

CHARLES A. GABRIEL, General, USAF
Chief of Staff

VERNE ORR
Secretary of the Air Force

DISTRIBUTION LIST FOR 3 DEC 84 INDUSTRY LETTER

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Chief Executive Officer
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Chairman of the Board
and Chief Executive Officer
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ANNEX E

EXAMPLES OF SUBTEAM DATA REPORTS

EXAMPLES OF SUBTEAM DATA REPORTS

The Action Plan Development Team collected extensive data during Phase I and Phase II. Five subteams responsible for reviewing literature, policy and procedures, organizations, industry, and programs were formed. They documented their work on data sheets and recorded their findings in subteam reports. Examples of a data sheet and a subteam report are attached to show the format the team used to collect this basic information (Part 1 and Part 2). The data sheets and reports from these subteams were provided as background information to the Office of the Special Assistant to AF/LE and AF/RD for Reliability and Maintainability (AF/LE-R).

During Phase II, to identify and consolidate key recommendations for institutionalizing the Air Force commitment to Reliability and Maintainability (R&M), several subteams were formed to analyze these reports and the hundreds of raw data sheets. The Acquisition Cycle subteam took the data and consolidated R&M building blocks, impediments, initiatives, and recommendations. The team plotted this information across the acquisition cycle timeline to identify where R&M could be most effectively influenced. The Industry subteam specifically analyzed industrys' interface with the Air Force and how this interface must be addressed to improve R&M. Finally, the Issues subteam examined specific areas such as Air Staff organizational structure, data systems, requirements process, planning, quality in manufacturing and design, training, personnel development, and budgets. Each of these Phase II subteams produced briefings and reports which formed the basis for R&M 2000. All the Phase II subteam reports were also provided to AF/LE-R as background information.

PART 1

RAW DATA SHEET FROM LITERATURE REVIEW

Team: Industry, Policy
Process: Design, Procurement
Organization:
Question:

TASK I

Literature Review Summary

Index #: A-01

Title: Innovative Contractual Approaches to Controlling Life Cycle Costs (Defense Mgt Journal, 2nd Qtr 83)

Author (Name & Organization): Emmelhainz, AFIT

Reviewer: Hodgson

Date of Literature: 2nd Qtr 1983

A. Purpose of Document: Describe innovative concepts used in the C-17 program.

B. Major Conclusions Discussed: Emphasis on design to LCC, system-level R&M measures, and warranties will lead to substantial savings in lifetime support costs.

C. Incentives and Impediments to R&M Discussed: Incentives: fixed price contract with incentives tied to Life Cycle support costs.

D. Recommendations & Initiatives: Initiatives: Emphasis of R&M goals at the system level and using LCC-oriented incentives.

E. Essential Elements of Successful R&M Program: Consideration of support requirements and costs in design tradeoffs, contract incentives, specifying R&M at the system level, continual assessment and evaluation of R&M data.

F. R&M Data Relating to Specific Programs (including other services): C-17.

G. Stage of Acquisition Cycle Discussed: Design

H. Definitions of R&M Discussed: none

PART 2

R&M LITERATURE REVIEW TEAM REPORT

NOVEMBER 1984

The R&M literature is both plentiful and diverse. Surveys of academic research have counted well over 1000 contributions during the past several decades. The Institute for Defense Analyses R&M Study lists over 850 documents from DOD, the Services, and civilian sources. This report focuses on military and industrial readings and is a synthesis of over 130 articles, papers, and studies deemed to be of importance. There are many more documents available, but time, judgment, and scope preclude their inclusion herein. Our synthesis is organized around the 10 key questions on R&M to be addressed in Phase I of this effort. As a result, there is much mingling of ideas in the synopsis below.

1. What is R&M? Reliability, maintainability, and availability constitute the overall notion of R&M. All have probabilistic root definitions, although in practice they are rarely measured as probability distributions. Rather, they are often described by at least three differing mindsets. The engineering mindset (perhaps most prevalant within the Air Force) tends to view R&M as a deterministic, measurable characteristic of design. The focus is on measures of central tendency such as Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR), without much interest in the underlying failure probability distribution. In juxtaposition, the statistical mindset considers R&M as a stochastic characteristic measuring the uncertainty of lifetime and described by a failure distribution. Much of the academic literature contains this view. Finally, the management mindset is not so much concerned with measuring R&M as it is with the consequences of R&M in the scheme of national defense.

2. What are the essential elements of R&M? There is near consensus that R&M, for the Air Force, begins with expression in Statements of Need (SONs). R&M specifications ought to be carefully analyzed in concert with mission requirements and clearly stated as coequal with performance requirements. Senior-level management is a key element in R&M, for without it R&M will tend to be traded away in the acquisition competition among cost, schedule, and performance. Personnel ought to be schooled in R&M concepts, since analytical skills are prerequisite to rational evaluation of requirements, tradeoffs, and test results. R&M contract requirements should be clear, so as to provide the basis for contract performance evaluation. Contract incentives (both positive and negative) can often motivate proper R&M interest. Notwithstanding schedule constraints, provisions for R&M growth are essential to allow for the identification and correction of unforeseen failures, problems, and changes. In addition to reliability growth, stringent reliability testing is required to confirm that R&M requirements are satisfied. To monitor R&M progress, there is some contention that a central data tracking system is required to provide appropriate failure, maintenance workload, and cost data.

3. How do we measure R&M? The number of R&M metrics is large; the IDA R&M Study, for example, discussed 34 different R&M parameters reflecting an array of choices depending on the decision setting. The 1971 Panel 34 Report (S-15) contains recommendations to implement a comprehensive, single-thread data reporting system. Many of these were incorporated into the Maintenance Data Collection (MDS) system. Concerns regarding the conditions for valid use of the formula for computing MTBF, although addressed in the Panel 34 Report, have

yet to be resolved. As for maintainability estimates, they are often confused with manpower measures. The manpower parameter, maintenance manhours per flying hour, is an indicator of workload and not maintainability.

4. Who is doing R&M? Organizations and people throughout the Air Force are involved in R&M. Air Logistics Centers focus on fielded systems, while the laboratories are dealing with future applications. Program offices integrate evolving technologies into new system acquisitions. Headquarters staffs at all levels deal with R&M issues at every stage in a weapon system's life cycle. The people doing R&M work vary widely in background and perspective. Manning authorizations and the people to fill them are rarely designated with the requisite skill identifiers. Moreover, R&M training deficiencies was a key comment in the IDA R&M Study.

5. How well are we doing R&M? The majority of literature is rather positive on R&M results, but this may be the result of the human tendency to advertise perceived successes as opposed to failures. The abundance of commentary and recommendation is indicative, however, of potential improvements. Among the R&M case studies, the F-18 is highly touted as the product of a good R&M effort. Initial field data indicates a maintenance manhour per flying hour (workload) rate on the same order of magnitude as that of the F-16. The Army's Firefinder radar system is held as an example of successful R&M. The F-16 radar (APG-66) is also very successful, demonstrating field reliability in excess of contract requirements.

6. What are we expending on R&M? There is not much information in the literature on the actual costs of R&M programs, except for case examples on R&M incentives or rewards paid on specific procurements. For example, improved reliability of the F-16's radar resulted in an estimated $250 million reduction in operations and support cost, with a 65-hour field MTBF (D-21). The F-18's radar demonstrated a 106-hour MTBF during MIL-STD 781B testing and has a field MTBF of 24 hours (D-20). R&M incentives included up to five percent of the full-scale development purchase order price.

7. What keeps us from doing R&M? There are a number of documents that address this topic. Data problems exist that relate to the suitability and sufficiency of the available data, as well as its accuracy. In general, lack of appropriate data or disagreement as to its nature and collection methods has caused difficulties in tracking universally understood metrics. The absence of timely and sufficient management emphasis is a primary impediment to high R&M achievement. The drive to reduce acquisition time is often cited as a cause for tradeoffs of R&M for cost, schedule, and performance improvements. Most affected by this problem are R&M testing and validation. Life Cycle Costing (LCC) analysis should provide information for such tradeoff decisions, but many LCC models fail to include R&M factors at all. The drive to increase competition can impact R&M as procurement is shifted from demonstrated, reliable vendors to other offerors. Weapon system testing, a valuable opportunity to detect R&M shortcomings, often lacks necessary realism. A related problem is the misuse of testing standards and statistical techniques. Various facts of life such as rapidly changing technology and small procurement quantities also hinder effective R&M programs.

8. What helps us do R&M? Both the Air Force and industry have incentives to achieve high R&M. To the Air Force, R&M can translate to increased combat capability and lower operating and support costs. Contractors may be motivated by profits and penalties. Profits relate to award fees granted the contractor for meeting or exceeding certain R&M parameters during testing or field performance. Conversely, warranties and negotiated monetary negative incentives may be used to ensure the Air Force experiences some minimum R&M performance.

9. What are we trying to do in R&M? There are many initiatives referenced in the literature. Programs noted as initiatives include Reliability-Centered Maintenance (RCM), Increased Reliability of Operational Systems/Logistics Investment Screening Technique (IROS/LIST), Combined Environmental Reliability Testing (CERT), Joint Logistics Commanders' Initiatives, a single-thread data system, and others. Technology initiatives include computer graphic techniques, Very High Speed Integrated Circuits (VHSIC), composites and other materials, fiber optics, and inspection technologies.

10. What should we be doing? Recommendations found in the literature were fairly unified. Requirements determination needs improvement to produce better R&M specifications. Specifications should be stated as requirements rather than goals, and should be integrated with the overall system support concept. Tradeoff decisions should be made with consideration to full cost impacts. Management should increase R&M emphasis to the level of that placed on cost, schedule, and performance. Improved education is necessary to enable people to analyze and understand the issues and procedures. A centralized organizational approach might improve this analysis process. Contracts should use incentives to motivate contractors to design and build in desirable R&M characteristics. Testing should be rigorous and realistic. Test schedules should not be sacrificed to gain cost, schedule, and performance improvements without careful consideration. R&M emphasis is critical during the design process. Computer technology may significantly enhance design and manufacturing of high-R&M systems. Improved built-in-test and automatic test equipment are needed to achieve substantial reduction in maintenance workload. Better data on failure modes, maintenance workload, and costs are needed for R&M analysis and decisions. Research and development are needed to integrate newly proven technologies and develop new ones.

#1 Definition: What is R&M?

1. There are three general terms in the literature that constitute the "official" definitions of R&M: Reliability, Maintainability, and Availability.

a. Reliability is the probability that an item will satisfactorily perform its intended function for a specified interval under stated conditions.

b. Maintainability is the probability of repair to a specified condition within a stated time if prescribed procedures and resources are used (DoD 3235.1-H). More commonly, the word "ability" is used in lieu of "probability" (DoD Dir 5000.40 & NAVSEA OD 29304B).

c. Availability is the probability that an item is in an operable state at a random point in time when used under stated conditions (NAVSEA OD 29304B). Often other words are used in lieu of "probability" (AFR 800-18 & DoD 3235.1-H).

2. Although these generic definitions each contain probabilistic notions, there are differing mindsets as to how to describe probability. Accordingly, the literature reflects three orientations as amplified below. Moreover, there are a variety of interpretations as to what constitutes satisfactory performance, repair measures, and operable states. As a consequence of a diverse set of perspectives, there are many differing measures of R&M. AFR 800-18, for instance, contains some 15 different measures of reliability.

3. The engineering mindset tends to view R&M as a deterministic, measurable characteristic of design. The focus is on measures of central tendency, such as MTBF and MTTR, without much interest in the underlying probability distribution. The idea is that one design may be preferred over another, and the preference criteria between designs ought to be single, simple metrics. By assuming a distributional form, simple computational formulas for MTBF and MTTR result. Most of the regulatory and descriptive literature has this orientation.

4. The statistical mindset, on the other hand, considers R&M as stochastic in nature, where an item's lifetime is uncertain and ought to be described by a failure distibution (or its converse, the survivor probability distribution). Although the appropriate probability distribution can be defined (in part or in whole) by measures of central tendency, knowledge of the distribution's form and scale is paramount. Such knowledge is attainable through life testing. Most of the theoretical literature focuses on this issue or employs this knowledge.

5. Finally, the management mindset is not so much concerned with measuring R&M as it is with the consequences of R&M. The consequences of low reliability and adverse maintainability are generally high costs and low combat capability. Faced with scarce and constrained resources, management advocates "good" R&M to enhance sortie production and logistics sustainability. Although the metrics of logistics support and combat capability are quantitative, acceptable levels are often determined subjectively.

#2 R&M Building Blocks: What Are The Essential Elements of R&M?

1. The R&M literature addresses a wide range of topics, but rarely does a single document cover more than a single aspect. We have consolidated and organized the more significant findings to provide a broad perspective of the various issues. The categories are requirements, management, contracting, design, data, and research & development.

2. The bulk of the literature supports early consideration of R&M in the preconcept phase. From an Air Force perspective, this emphasis begins with the preparation of Statements of Need (SON), which express the requirements of the new system. R&M specifications ought to be carefully analyzed in concert with mission requirements. Integrated Logistics Support (ILS) concepts depend on the R&M considerations. ILS and R&M concerns are integral to Life Cyle Costing, which should be used in tradeoff decisions.

3. Management is a key element in R&M. The organizational structure and philosophy will determine the emphasis placed on R&M. One proposal involves a central R&M analysis and tracking office as part of the program office to provide emphasis, continuity, and analytical capability in requirements determination, contracting, and testing. An overwhelming proportion of the literature indicates that an uncompromising policy of commitment to R&M by high-level management would ensure that R&M is properly considered in tradeoff decisions. This commitment should be communicated to all levels of the Air Force, as well as to contractors. Personnel ought to be schooled in R&M concepts since analytical skills are needed to evaluate requirements, tradeoffs, and test results.

4. Contract requirements should clearly state the R&M objectives of a new system in integrated, quantitative terms so as to provide the basis for evaluation of contract performance. Incentives can be an effective tool to establish which contract requirements will prevail when conflicts arise among priorities. Scheduled provisions for R&M growth ought to be sufficient to allow for the identification and correction of new failure modes, unforeseen problems, and design changes. Stringent testing is required to confirm that R&M requirements are satisfied; however, there is agreement in the literature that test methodology must be appropriate to the situation.

5. There is also agreement in the literature that the design process provides the highest leverage for effective R&M integration. Substantial attention is given to the screening of parts, both in the original system and for spares support. Design review should include R&M as a primary consideration in order to ensure R&M achievement.

6. Numerous problems exist with data collection and use. Data bases have proliferated, each with a different emphasis. Where the contractor needs inherent failure data, the logistician would like all failures addressed, and the test process requires yet another orientation. There is some contention that a central tracking system is required to provide appropriate failure, maintenance workload, and cost data.

7. Research and development provide the basic building blocks for present and future R&M. Current, proven technologies must be integrated to take best advantage of R&M, with concurrent efforts to develop theory and new technology.

#3 Database: How do we measure R&M?

1. There are a large number of metrics used to assess R&M. For example, the IDA R&M study (D-27) documents the strengths and weaknesses of 8 readiness, 17 reliability, 7 maintainability, and 2 manpower parameters commonly used within DoD to measure R&M. The choice of parameters is often a function of the decision setting and the ease of data collection. Data collection difficulties are discussed in detail in the Panel 34 report (ref. S-15) and often are resolved with factor proxies. As an illustration, flying hours can be adjusted with a "K factor" so as to more correctly estimate operating time when computing MTBF. Invariably, we estimate MTBF with the formula that divides operating time (or total time on test) by the number of failures. As suggested in DoD 3235.1-H and elsewhere, better estimators of MTBF may be available for items with increasing or decreasing failure rates.

2. There are several data bases that provide useful reliability estimates for items with a constant failure rate (modeled with an exponential lifetime distribution). Specifically, MIL-STD 217 documents the failure rates of numerous electronic piece parts. The Maintenance Data Collection (MDC) system tracks field MTBF down to the work unit code level. RADC's Reliability Corporate Memory concept (ref. S-07) provides automated data retrieval capability, and AFSC's System Effectiveness Data System (SEDS) contains failure detail useful in design assessment.

3. Maintainability estimates are often confused with manpower measures. According to the IDA R&M study, "...the two dominant maintainability parameters are the time required to perform on-equipment repair and the frequency of no-defect (or false alarms) experienced during on-equipment diagnostics." The manpower parameter, maintenance manhours per flying hour, is an indicator of workload, not maintainability. An item can be very maintainable and yet very unreliable, so as to drive a high workload notwithstanding its good maintainability.

4. Data collection supports a variety of decision-making processes. Not only do design engineers need R&M data to evaluate their designs and measure reliability growth, but the government uses this data to confirm that contractual requirements have been satisfied. Also with this data, the government can address spares decisions, level-of-repair issues, and preventive maintenance questions. In addition to these decision-making examples, there is the matter of monitoring R&M to detect deterioration of R&M due to changes in operating environment, mission, management emphasis, or reporting discipline. Item modification may be required as a result of such deterioration, and hence R&M data support modification decisions.

#4 People: Who Is Doing R&M?

1. There are a great number and variety of people working on R&M-related subjects. We summarized those found in the readings into the categories of organizations and types of people.

2. Organizations throughout the Air Force are involved. Air Logistics Centers deal constantly with spare parts R&M problems of fielded systems, while the laboratories are dealing with future, improved applications. Program offices integrate evolving technologies into new systems. Headquarters staffs at all levels deal with R&M issues at every stage in a weapon system's life cycle. Additionally, numerous special organizations have been established throughout the Air Force to focus on particular concerns, such as logistics research, contracting methodologies, testing, and scientific research. The academic community often provides statistical and management theory, as well as technological research. Our sister services and the Office of the Secretary of Defense are involved in similar efforts. Finally, industry provides much of the initial research and development, design, and manufacturing methods to translate needs into actual weapon systems.

3. The people that deal with R&M vary widely in background and perspective. They bring a variety of skills, education, and training to bear on R&M issues, but their skills do not always match the problems at hand. Manning authorizations and the people identified to fill them are rarely designated with the requisite R&M skill identifiers. R&M training deficiencies was one of the key observations from the IDA R&M Study.

#5 Program Data: How well are we doing R&M?

1. The vast majority of the literature dealing with programs speaks about the positive aspects of their R&M management and achievement. It is human nature to avoid publicizing failure (perhaps for fear of bad press), and thus the literature may provide a biased view on this question. We do find, however, that there is no dearth of ideas for R&M improvement. This abundance of commentary and recommendation clearly indicates we could do R&M better than we are. From the many case studies available in the literature, we have selected four to illustrate our point.

2. The F-18 is touted as the product of a highly successful R&M program. This image is based on initial operating experience and is as yet unconfirmed by fleet data, since the F-18 was not scheduled to deploy at sea until Jan 1985. However, Navy 3M data for the initial training squadron at NAS Lemoore and the initial operational squadron at MCAS El Toro indicate consumption of approximately 21 direct maintenance manhours per flying hour (ref. M-09c). Although direct comparisons may be misleading, the reported F-16 data has been, on average, below 20 MMH/FH (adjusted for travel and delays) since 1980.

3. The IDA R&M study suggests that the Army's Firefinder radar system is an example of successful R&M. A division complement for the Firefinder radar includes 2 TPQ-36 sets and 3 TPQ-36 sets. The TPQ-36 had a 100 hour MTBF contractual requirement with a 400 hour goal. During acceptance testing, the 100 hour criterion was relaxed to 75 hours and now the field MTBF is 70 hours. The TPQ-37 orginally had no formal reliability requirement until a reliability improvement program was adopted with monetary incentives for a 90 hour MTBF requirement and a 180 hour goal. The contractor was awarded $508K for demonstrating 115 hour MTBF. The initial TPQ-37 field reliability turned out to be approximately 50 hours.

4. The F-16 radar (APG-66), which comprises about 50% of the F-16 avionics, is reported in the IDA R&M study to have field reliability of 65 hours MTBF (compared to 10-20 hours for other fighter radar) versus a 60 hour MTBF FSD requirement. Moreover, there is a 98% FMC rate for this radar, with 89% of F-16 flights having no radar faults (ref. D-21). Notwithstanding these accomplishments, in 1984 the AF began an effort to further mature R&M of the APG-66 as well as the APG-63 on the F-15 (see Rand's WD-2341-AF).

#6 Costs: What are we expending on R&M?

1. We did not find published information on the actual costs of R&M programs. There were costs quoted in the sense of R&M incentives or rewards paid on specific weapon system contracts. Examples include the F-16 radar, the T-700 engine, the F-18 radar, and the Army's doppler navigation and Firefinder radars.

2. The IDA R&M study (D-21) suggests that the improved reliability of the F-16's APG-66 radar results in a $250M reduction in operations and support cost (going from 20 hour MTBF to 65 hour MTBF). While there was an award fee for early completion of FSD reliability qualification testing (RQT) and production RQT, these awards were not achieved. There was a formal RIW provision with a firm fixed price contract (with cost sharing). The RIW contract price ranges from 2% to 6% per year of LRU costs.

3. The Army's T-700 Black Hawk helicopter engine, first introduced in 1979, has accumulated over 300,000 flight hours and has a reputation for R&M. There were no monetary incentives in the T-700 contract for meeting R&M contractual requirements. The development contract was a cost plus incentive fee type with a special incentive for a guaranteed fuel consumption target and a penalty for late preliminary flight rating testing. There was a warranty incentive agreement for the initial three years of the production contract, which hastened reliability growth.

4. The F-18's APG-65 radar demonstrated a 106 hour MTBF during MIL-STD 781B testing and from Sep 82 thru Feb 83 had a 24 hour MTBF for the fleet (ref. D-20). R&M incentives included up to 5% of FSD purchase order price for MIL-STD 781B laboratory demonstration of MTBF guarantee and flight demo of MFHBF, MMH/FH, and MFHBMA.

5. The Army's doppler navigation radar program included a four-year RIW (renewable) and a 1000 hour MTBF requirement. Field MTBF (warranty data) is 1162.1 hours. The contract was a design-to-unit-production-cost without monetary R&M incentives. Similarly, the Firefinder radar was a fixed price production contract plus dollar R&M incentives. The contractor earned $508K in incentives on the TPQ-37.

#7 Impediments: What Keeps Us From Doing R&M?

1. There were a number of documents that addressed individual or collective impediments to successful R&M achievement. These ideas have been aggregated into the general areas of data, management, acquisition policy, tradeoffs, testing and standards, and facts of life.

2. Data problems relate to the suitability and sufficiency of the available data, as well as its accuracy. In general, lack of appropriate data or disagreement as to its nature and collection methods has caused difficulties in tracking universally understood metrics through specifications, test results, and field experience.

3. One of the most common concerns of the literature is the absence of timely and sufficient management emphasis on R&M. Additionally, several documents, including the IDA R&M Study, have pointed out the lack of adequate education and training of people involved in key decisions and analysis regarding R&M aspects of a program.

4. Acquisition policies were blamed by some documents for impeding achievement of high R&M. One cited cause was the drive to reduce acquisition time. One article [A-17] pointed out a fourfold difference between military and civilian airline acquisition time for a new aircraft. Attempts to reduce acquisition time cause adverse impacts on R&M testing and validation. Another problem referenced in the literature is the increased emphasis on competition, which could cause the Air Force to seek new and untried sources of components, notwithstanding the availability of demonstrated component reliability from an existing contractor.

5. Tradeoffs result from pressures to meet cost, schedule, and performance objectives. A large portion of the literature indicates that these decisions are made to the detriment of R&M, by reducing either test times or R&M funds. Life Cycle Costs (LCC), greatly affected by R&M, are not always used in tradeoff analyses and decisions. In fact, some LCC models do not consider R&M factors at all, despite R&M influences on support costs.

6. Weapon system testing provides a valuable opportunity to obtain R&M data as well as identify problem areas. Lack of realistic testing in an operational environment is often cited as a cause for failure to correct R&M deficiencies before fielding a system. Maintainability tests in particular have been singled out as misleading due to an artificial environment. The misunderstanding or misuse of standards is also of concern. The suitability of a particular standard is an issue that relates to understanding of its underlying assumptions. In some cases, an unscrupulous or unknowing contractor could significantly bias test results by misapplication of existing standards (ref. T-12). Additional statistical techniques are needed to address questions of the suitability of current standards.

7. Various facts of life may preclude effective R&M programs. One such influence is fast-changing technology. New applications require time to mature, but the pace of technological advance may not allow sufficient time for a comprehensive analysis. Design engineers may be working with little ability to predict the R&M of recently developed technologies. Another fact of life is the size of military procurements relative to the scope of research and development effort. Small procurements lead to high unit costs, creating additional emphasis on reducing program costs, often impacting R&M.

#8 Incentives: What helps us do R&M?

1. Both the Air Force and industry may have incentives to achieve high R&M. The Air Force is motivated by readiness and budgetary issues, while contractors are generally motivated by profit.

2. The Air Force's incentive to achieve good R&M stems from two main benefits. First, improvements in R&M lead to improved mission reliability and system availability. These factors relate directly to combat effectiveness. Second, R&M has a great influence on the cost of spares, other support infrastructure, and manpower requirements - major areas of high-level concern.

3. Various documents provided examples of ways in which a contractor may be motivated, primarily through the contract. Profit may be used as an incentive by including awards based on projected system Life Cycle Costs or demonstrated R&M parameters. Conversely, a contract may include provisions for penalties to the contractor for not meeting objectives. One form of penalty is a warranty in which the contractor bears the expense for corrective actions and additional spares requirements. Another form is a direct monetary penalty as determined during contract negotiations.

#9 Initiatives: What Are We Trying to Do In R&M?

1. Numerous initiatives, in the categories of programs and technologies, were noted in the literature.

2. Reliability-Centered Maintenance (RCM) - an application of preventive maintenance techniques to determine scheduled maintenance timetables (fly to failure) (H-02).

3. Increased Reliability of Operational Systems/Logistics Investment Screening Technique (IROS/LIST) - an AFLC program to identify candidates for reliability improvement investments (T-06).

4. Combined Environmental Reliability Testing (CERT) - testing of components in representative environmental conditions (M-05c).

5. Joint Logistics Commanders' Initiatives - one particular initiative involves the development of test methodologies appropriate for mechanical systems (M-04c).

6. Single-Thread Data System - a recommendation of the Panel 34 Report to implement a single-source data system for development, test, and operational monitoring activities (S-15).

7. F-16 Retest Okay Analysis and Corrective Action Team - an ad hoc group to analyze F-16 electronic component repair issues.

8. Tiger Teams - a series of ad hoc groups looking at various R&M-related issues.

9. Computer Graphic Techniques - use of computer-generated graphics to visually inspect relationships among data (T-02, T-10).

10. Very High Speed Integrated Circuits (VHSIC) - a new generation of electronic circuitry (IDA D-42).

11. Composites and Other Materials - newly developed materials of improved strength, weight, or other desired characteristics.

12. Fiber Optics - transmission of data through optical light-carrying materials (IDA D-33).

13. Inspection Techniques - nondestructive inspection technologies for condition monitoring (IDA D-37).

(Note: Numerous emerging technologies are discussed in portions of the IDA R&M Study.)

#10 Recommendations: What Should We Be Doing?

1. We have extracted a large number of recommendations from the literature for potential improvement of R&M. Many of them are repeated several times. We again consolidated them into categories, and they are summarized here.

2. R&M requirements determination needs improvement. Statements of need should be developed with better reliability, maintainability, and availability specifications. These specifications should be stated as requirements rather than goals and should take the system view. That is, R&M relates to the weapon system and support structure in some way, which should be analyzed to determine the best achievable mix of requirements consistent with operational needs. Support needs should be devoted to obtain full consideration of the cost impacts of tradeoff decisions.

3. Management should increase R&M emphasis. R&M should be made equal to cost, schedule, and performance criteria. Improved training and education is needed for personnel dealing with R&M concepts to ensure correct analysis is available in decision making. Better technical orders are required to assist maintenance personnel in maintaining systems and test equipment of growing complexity. Enhanced R&M analysis abilities might be achieved through the establishment of an R&M-oriented organization to serve as a centralized R&M policy and analysis office.

4. The use of rewards and incentives in contracts may encourage contractors to strive for R&M if these incentives are significant in relation to other contract demands and incentives. Testing is a significant area that offers the opportunity for identifying R&M problems early enough to take cost-effective corrective action. Well-designed and realistic demonstration tests should be accomplished to validate R&M parameters. Environmental stress screening and parts burn-in are valuable techniques that need to be applied to spare parts as well as original system components. R&M should be integrated into the contractual terms to require specific achievements (not goals) and provide for demonstration testing at specified points in the development process. Sufficient time should be scheduled for adequate testing.

5. R&M should receive early and continued emphasis in the design process. Computer-aided design and manufacturing techniques should be applied and programmed to ensure reasonable consideration of R&M characteristics of the design. Poor diagnostics are frequently referenced as the source of maintenance workload. Estimates on the F-15 and F-16 cannot-duplicate and bench-check okay occurrences indicated that 25 to 50 percent of this workload could be substantially reduced by more accurate built-in test and diagnostic equipment.

6. Better data on failure modes, maintenance workload, and costs are needed for R&M analysis and decision making as well as contract performance validation. The Panel 34 report emphasized the need for single-thread data collection to ensure that all users of R&M data are using valid information from a common base.

7. Finally, research and development is required on a continuing basis to integrate proven technologies into new weapon systems, while exploring new theory and technologies.

ANNEX F

INTERIM BRIEFING

19 DECEMBER 1984

PART 1

BRIEFING TO AIR FORCE COUNCIL WITH SCRIPT

19 DECEMBER 1984

SLIDE 1: TITLE

THE PURPOSE OF THIS BRIEFING IS TO PROVIDE THE COUNCIL AN ORIENTATION TO THE RELIABILITY AND MAINTAINABILITY (R&M) ACTION PLAN AND A STATUS OF THE EFFORTS TO DEVELOP THAT PLAN.

RELIABILITY AND MAINTAINABILITY ACTION PLAN DEVELOPMENT TEAM

BRIEFING
PRESENTED BY
COL KENNETH MEYER
TEAM CHIEF

F-5

3312 7

SLIDE 2: AIR FORCE COMMITMENT

THIS EFFORT IS BASED ON THE SAF/OS, AF/CC MEMO DATED 17 SEPTEMBER 84. THE INTENT OF THIS MEMO IS TO MAKE R&M EQUAL TO COST, SCHEDULE, AND PERFORMANCE AND TO ENSURE R&M IS EMPHASIZED THROUGHOUT OUR WEAPON SYSTEMS FROM NEW TECHNOLOGY DEVELOPMENT PROGRAMS LIKE THE ATF TO FIELDED SYSTEMS LIKE THE A-10.

THE AIR FORCE HAS MADE THIS DECLARATION BEFORE, BUT THIS TIME THERE ARE TWO KEY DIFFERENCES. THE FIRST IS THAT THIS TIME THE NEED FOR R&M IS TIED DIRECTLY TO OPERATIONAL NECESSITY, I.E., MOBILITY, SORTIE GENERATION, AND MANPOWER LIMITATIONS - NOT JUST EFFICIENCY (LIFE CYCLE COSTS). IT IS IMPROVED R&M THAT PROVIDES THE LEVERAGE TO DO THESE THINGS. SECOND IS A CLEAR RECOGNITION THAT WE MUST INSTITUTIONALIZE, I.E., BRING ABOUT A CULTURAL CHANGE IN THE WAY THE AIR FORCE THINKS ABOUT R&M, IF WE ARE TO ACHIEVE THESE OBJECTIVES.

ACTION PLAN DEVELOPMENT TEAM

AIR FORCE COMMITMENT

(SOURCE: SAF & CC MEMO, 17 SEPTEMBER 1984)

- TO INCREASE SORTIE RATES, IMPROVE MOBILITY, REDUCE MANPOWER NEEDS, AND LOWER LIFE-CYCLE COSTS
  - —MAKE R&M PRIMARY CONSIDERATIONS
    - COEQUAL WITH COST, SCHEDULE, AND PERFORMANCE
  - —EMPHASIZE R&M THROUGHOUT THE ACQUISITION PROCESS
    - FROM TECHNOLOGY BASE TO FIELDED SYSTEMS
  - —INSTITUTIONALIZE AIR FORCE COMMITMENT TO R&M
    - DEVELOP AN AIR FORCE-WIDE ACTION PLAN

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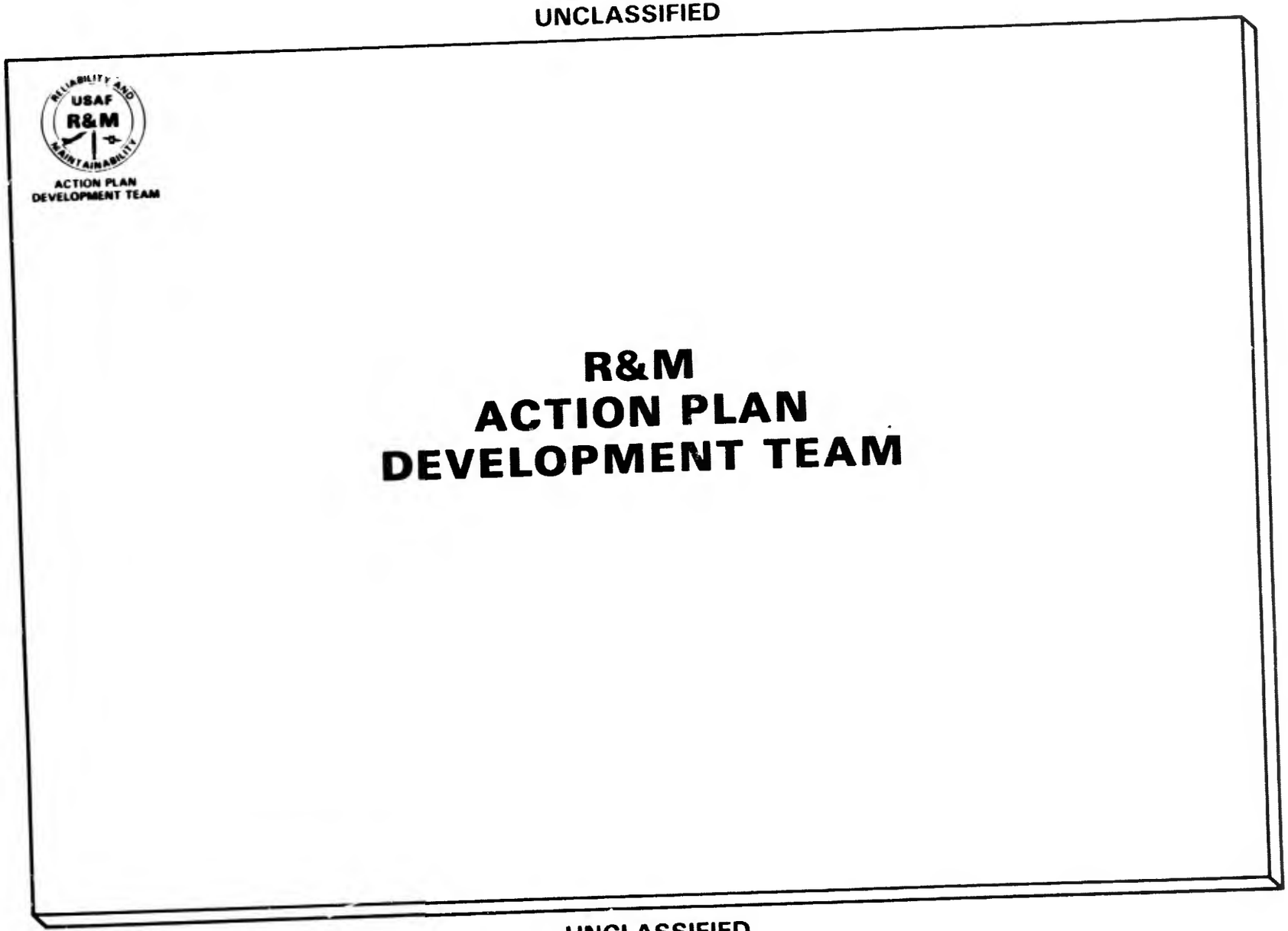
SLIDE 3: R&M ACTION PLAN DEVELOPMENT TEAM

WE WILL TAKE A QUICK LOOK AT THE COMPOSITION AND PHILOSOPHY OF THE TEAM THAT WAS FORMED BY AF/RD AND AF/LE TO RESPOND TO THE INSTITUTIONALIZATION TASKING CONTAINED IN THE SAF/OS, AF/CC MEMO.


RELIABILITY AND
USAF
R&M
MAINTAINABILITY
ACTION PLAN
DEVELOPMENT TEAM
R&M
ACTION PLAN
DEVELOPMENT TEAM

SLIDE 4: TEAM OBJECTIVES

THE TEAM WAS ORGANIZED WITH TWO KEY OBJECTIVES IN MIND. THE FIRST WAS TO WRITE SPECIFIC ACTIONS THAT WOULD, IN FACT, INSTITUTIONALIZE R&M ACROSS THE AIR FORCE.

THE SECOND WAS TO TOUCH BASE WITH AS MANY AIR FORCE AND CONTRACTOR ORGANIZATIONS AS POSSIBLE IN THE SHORT TIME AVAILABLE TO SOLICIT THEIR IDEAS, SENSITIZE THEM TO THE SERIOUSNESS OF THIS EFFORT, AND PREPARE THEM FOR THE UPCOMING CHANGES IN R&M FOCUS AND PRIORITY.

ACTION PLAN
DEVELOPMENT TEAM

TEAM OBJECTIVES

- PREPARE SPECIFIC RECOMMENDATIONS THAT WILL INSTITUTIONALIZE AIR FORCE COMMITMENT
- CONTACT AIR FORCE AND CONTRACTOR ORGANIZATIONS TO SOLICIT THEIR IDEAS AND SENSITIZE THEM TO THE INCREASED EMPHASIS

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SLIDE 5: TEAM COMPOSITION

THE TEAM WAS DRAWN FROM ACROSS THE AIR FORCE. SOME WERE NOT FULL-TIME AND SOME PROVIDED FOCAL POINTS ONLY. (BACKUP SLIDES GIVE NAMES OF TEAM PARTICIPANTS AND SHOW HOW THEY WERE ORGANIZED FOR PHASE II.)

ACTION PLAN
DEVELOPMENT TEAM

TEAM COMPOSITION

AIR STAFF

AF/RD
AF/LE
AF/XO
AF/IG
AF/MP
AF/SA
AF/SI
AF/AC*
AF/PR*

SECRETARIAT

SAF/AL

LOGISTICS COMMAND

AFLC/MM
AFLC/LOC
OC-ALC

SYSTEMS COMMAND

AFSC/AL
AFSC/PG
ESD
ASD

OTHERS

AFOTEC
AFALC
AFIT
AFCOLR

*FOCAL POINT

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SLIDE 6: TEAM PLAN

THE TEAM EFFORT WAS DIVIDED INTO THREE SHORT PHASES.

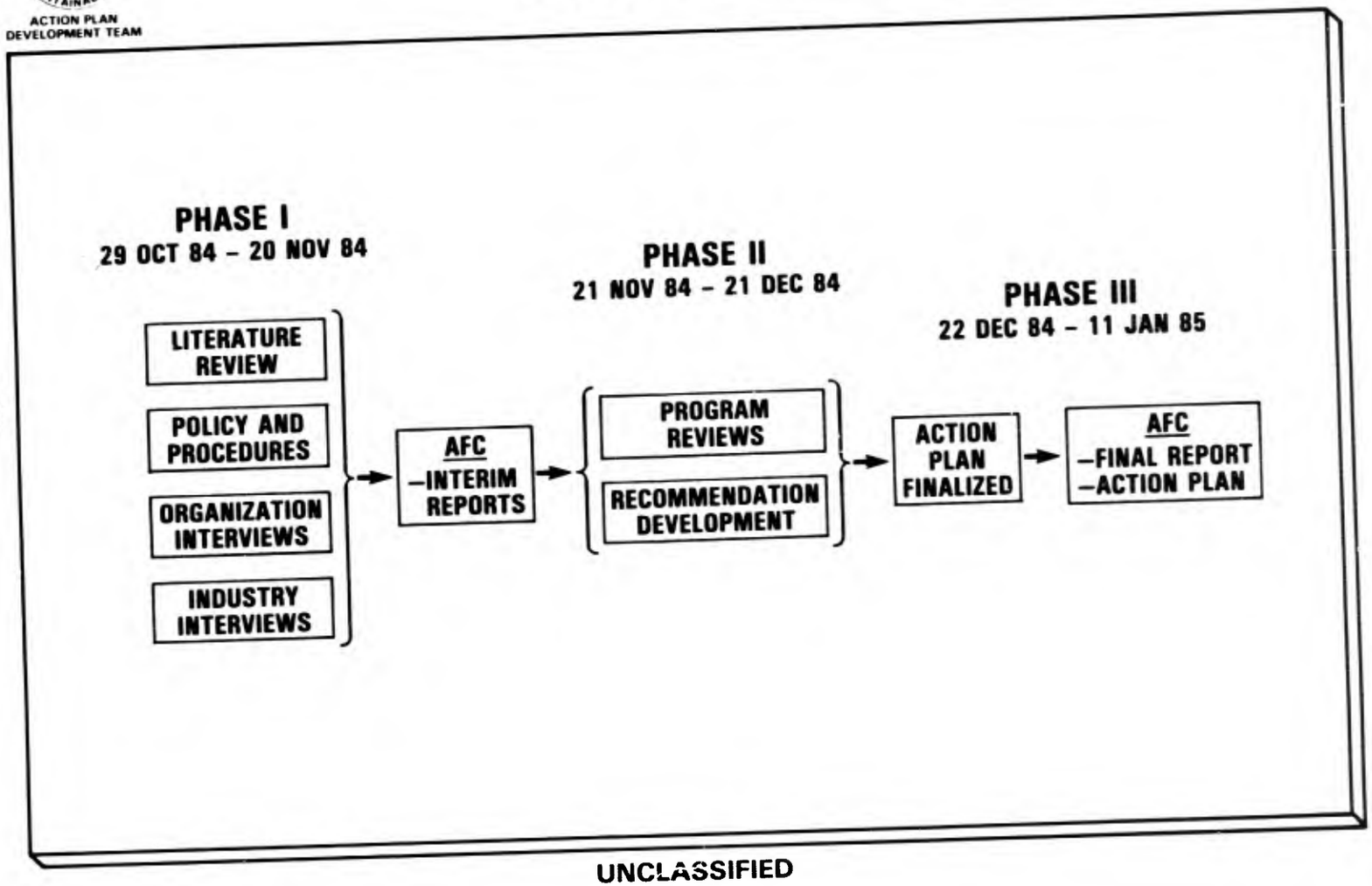
IN PHASE I, WE ANALYZED FOUR DATA BASES (LITERATURE, POLICY, ORGANIZATIONS, AND INDUSTRY) FOR SOURCES OF INFORMATION ON R&M. THIS INFORMATION PROVIDES THE BASIS FOR MUCH OF THIS BRIEFING.

IN PHASE II, OUR PURPOSE WAS TO LOOK AT A FIFTH DATA SOURCE, PROGRAMS. PROGRAMS VISITED INCLUDE AMRAAM, AFWAL, ATF, A-10, C-17, ENGINE SPO, F-16, F-18, F-111, and GPS. IN ADDITION, WE CONTINUED ANALYSIS OF PHASE I FINDINGS AND BEGAN TO DEVELOP SPECIFIC ACTIONS FOR THE FINAL ACTION PLAN. (THIS PHASE II EFFORT HAS NOW BEEN COMPLETED. IT SUBSTANTIATED AND REINFORCED OUR PHASE I FINDINGS. THE MAJORITY OF THE TEAM HAS BEEN DISMISSED AND ARE NOW ON-CALL.)

IN PHASE III, WE WILL FINALIZE THE AIR FORCE LEVEL ACTION PLAN, BACK IT UP WITH MORE DETAILED ACTION METHODOLOGIES, AND INITIATE THE COORDINATION PROCESS LEADING TO A MID-JANUARY BRIEFING TO AFC, SAF/OS, AND AF/CC.

USAF R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

TEAM PLAN



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SLIDE 7: LITERATURE REVIEW

WE WILL BEGIN BY REVIEWING OUR PHASE I FINDINGS. (BACKUP SLIDE ON KEY QUESTIONS SHOWS THE KINDS OF DATA WE PURSUED IN EACH OF OUR FOUR SOURCE AREAS.)

THERE IS A SUBSTANTIAL AMOUNT OF LITERATURE ON R&M. (BACKUP SLIDE ON KEY DOCUMENTS LISTS SOME EXAMPLES.) FOR EXAMPLE, THE INSTITUTE FOR DEFENSE ANALYSES (IDA) STUDY, WHICH WAS COMPLETED IN 1983, WAS THE RESULT OF A TWO-YEAR EFFORT CONTRACTED FOR BY DOD. IT CONTAINS 28 VOLUMES OF DATA AND IS THE DEFINITIVE STATEMENT ON R&M. IT INCLUDES MANY AIR FORCE WEAPON SYSTEM AND TECHNOLOGY CASE STUDIES. ANOTHER EXAMPLE IS THE 1982 SAMI CONDUCTED BY THE AF/IG. IT DOCUMENTED MANY OF THE KEY FINDINGS WE STILL SEE TODAY. THE AIR FORCE STAFFS TOOK TWO YEARS TO CONVINCE THE IG THESE EXCELLENT FINDINGS SHOULD BE CLOSED, BUT THEY ULTIMATELY RESULTED IN VERY LITTLE FUNDAMENTAL CHANGE.

WHILE THE VOLUME IS SUBSTANTIAL, THE FINDINGS AND CONCLUSIONS IN THE LITERATURE ARE CONSISTENT, AND THERE IS VERY LITTLE NEW TO BE FOUND OR DOCUMENTED.

BY FAR THE MOST IMPORTANT CONCLUSION IS THE ABSOLUTE NECESSITY FOR TOP MANAGEMENT COMMITMENT IF R&M IS TO SUCCEED. THIS WAS EVIDENT IN EVERY IMPORTANT CASE STUDY WE REVIEWED. THERE WERE TWO OTHER CONSISTENT THEMES. FIRST WAS THE NECESSITY TO PUT R&M INTO THE DESIGN, AND DO IT AS SOON AS POSSIBLE. THE OTHER WAS THE CONTINUOUS NEED FOR A GOOD TRACKING SYSTEM, WHICH SO OFTEN WAS NOT AVAILABLE.

ACTION PLAN
DEVELOPMENT TEAM

LITERATURE REVIEW

- **SCOPE**
  - —IDENTIFIED OVER 1,000 DOCUMENTS
  - —REVIEWED 130 KEY ARTICLES, PAPERS, AND STUDIES
- **FINDINGS**
  - —COVERAGE IS EXTENSIVE AND HIGH CALIBER
  - —CONSISTENT RECOMMENDATIONS
    - MANAGEMENT COMMITMENT ESSENTIAL
    - INCORPORATION EARLY INTO THE DESIGN
    - DATA TRACKING SYSTEM INADEQUATE

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SLIDE 8: POLICY AND PROCEDURES REVIEW

AGAIN, THERE IS EXTENSIVE POLICY COVERAGE OF R&M. THE BASIC AIR FORCE POLICY IS COVERED IN AFR 800-18 (AF/LEYE IS OPR). DOD R&M POLICY IS SPELLED OUT IN DODD 5000.40. HOWEVER, R&M PERMEATES THE PROCEDURES OF MANY FUNCTIONS. WE REVIEWED DOCUMENTS FROM ACQUISITION, FINANCE, PROCUREMENT, MAINTENANCE, ETC. (BACKUP SLIDE ON R&M REGULATORY OVERVIEW SHOWS SOME EXAMPLES OF THIS COVERAGE.)

IN GENERAL, WE FOUND THERE WAS MORE THAN ADEQUATE COVERAGE FOR R&M. WE DO NOT LACK WRITTEN DIRECTION. WE NOTED SOME MINOR DISCONNECTS OR AREAS REQUIRING EMPHASIS, BUT THEY WERE NOT CURTAILING US FROM ACHIEVING BETTER R&M. FOR EXAMPLE, DODD 5000.40 MENTIONS FIVE KEY R&M OBJECTIVES (OPERATIONAL EFFECTIVENESS, OWNERSHIP COST REDUCTION, LIMITING MANPOWER NEEDS, MANAGEMENT INFORMATION, AND EFFICIENCY) THAT WERE NOT REITERATED IN THE AIR FORCE LEVEL POLICY. ANOTHER EXAMPLE IS AFR 800-22, WHICH DOES NOT INCLUDE R&M AS A TRADEOFF FACTOR IN THE CFE VS GFE DECISION PROCESS. (OTHER EXAMPLES ARE LISTED ON BACKUP SLIDES TITLED "POLICY CHANGES NEEDED.")

THE IMPORTANT FACT IS THAT MORE POLICY IS NOT THE ANSWER. RATHER, WE MUST CONSOLIDATE AND FOCUS THE R&M EMPHASIS WE HAVE SO IT IS CLEAR TO THE FIELD WHAT IS REQUIRED AND THE PRIORITY IT MUST HAVE. WE MUST FIND A WAY TO PUT MORE DISCIPLINE INTO OUR IMPLEMENTATION OF CURRENT POLICY. (EXAMPLE: PROGRAM AND STAFF OFFICES CONTINUALLY ASKED US "WHICH OF THE MANY REQUIREMENTS DO YOU REALLY WANT US TO DO?" PROGRAM R&M PLANS ARE A REQUIREMENT OF AFR 800-18, BUT MANY PROGRAMS DID NOT KNOW THAT, AND IN ONE CASE, A PROGRAM EVEN HAD AN EXCELLENT PLAN NOT KNOWING HE WAS SUPPOSED TO HAVE IT).

ACTION PLAN DEVELOPMENT TEAM

POLICY AND PROCEDURES REVIEW

- SCOPE
  - —REVIEWED 170 DOD/SERVICE DOCUMENTS
  - —COVERED ALL FUNCTIONAL AREAS
- FINDINGS
  - —PLENTY OF POLICY AND PROCEDURES
    - SOME DISCONNECTS EXIST
    - SOME REEMPHASIS IS REQUIRED
  - —MORE POLICY IS NOT THE ANSWER
    - POLICY CONSOLIDATION AND FOCUS
    - IMPLEMENTATION DISCIPLINE

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SLIDE 9: R&M ORGANIZATION REVIEW

WE VISITED OFFICES INVOLVED IN R&M ACTIVITIES ACROSS DOD. (BACKUP SLIDES SHOW SOME OF THE ORGANIZATIONS VISITED. THESE WERE EXPANDED SOMEWHAT IN PHASE II.)

THE FACT THAT IS MOST EVIDENT ACROSS THE AIR FORCE IS THE AMOUNT OF FRAGMENTATION IN THE R&M FUNCTION. R&M TENDS TO BE A SPLIT OR SHARED RESPONSIBILITY WITH A RATHER LOW PRIORITY. AS A RESULT, IT IS ACCOMPLISHED ON A PART-TIME BASIS BY PEOPLE WHOSE MOTIVATION AND PERSONAL DEVELOPMENT WERE SUFFERING AS A DIRECT REFLECTION OF THIS LACK OF EMPHASIS. THE AUTHORITY AND INFLUENCE OF R&M PERSONNEL ON KEY AIR FORCE PROGRAMMATIC DECISIONS WERE MINIMAL IN MANY INSTANCES.

THIS FRAGMENTATION WAS APPARENT AT ALL LEVELS. FOR EXAMPLE, AT THE AIR STAFF LEVEL, R&M IS CARRIED OUT AT THE ACTION OFFICER LEVEL AMONG MANY DIRECTORATES (RDCS, LEXY, RDXM, XOOM, LEYE, ETC). ATTEMPTS HAVE BEEN MADE TO BRING THIS TOGETHER THROUGH WORKING GROUPS SUCH AS THE LOG R&D WORKING GROUP HEADED BY AF/RDX OR THE AF WEAPON SYSTEM IMPROVEMENT GROUP HEADED BY AF/LE. HOWEVER, THE SCOPE AND EFFECTIVENESS OF THESE AD HOC EFFORTS ARE LIMITED. OUR MAJCOMS REFLECT SIMILAR DISPERSION. FOR EXAMPLE, THE AFLC R&M FOCAL POINT IS A PART-TIME GS-14. AFSC HAS ONLY A SMALL GROUP (2 ACTION OFFICERS) WHO WORK R&M POLICY IN AFSC/AL WHILE PROGRAM REVIEW IS MAINTAINED IN AFSC/SD. SIMILARILY, THE ROLE OF THE HQ AFSC SPECIAL ASSISTANT TO THE COMMANDER FOR PRODUCT ASSURANCE HAS NOT BEEN FULLY DEVELOPED TO DATE.

IN SUMMARY, THERE IS NO CLEAR ORGANIZATIONAL ADVOCATE OR FOCUS ON R&M IN THE AIR FORCE.

ACTION PLAN DEVELOPMENT TEAM

R&M ORGANIZATION REVIEW

- SCOPE
  - —VISITED OVER 50 AF OFFICES + ARMY, NAVY, OSD
  - —INTERVIEWED OVER 100 KEY PEOPLE
- FINDINGS
  - —FUNCTIONS ARE FRAGMENTED AND DISPERSED
  - —NO RECOGNIZED AIR FORCE FOCAL POINT
  - —LOW PRIORITY AND FREQUENTLY A PART–TIME EFFORT
  - —PEOPLE REQUIRE MOTIVATION AND DEVELOPMENT

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SLIDE 10: ORGANIZATIONAL COMPARISON

THIS SLIDE SHOWS THE WAY OUR COUNTERPARTS HAVE CHOSEN TO FOCUS ON R&M. BOTH THE ARMY AND NAVY STAFFS PLAY MINOR ROLES IN THE R&M ARENA AND RELY ON THEIR SINGLE MATERIAL COMMANDS TO MANAGE R&M IN ALL PROGRAMS, WOMB TO TOMB.

IN THE ARMY, ARMY MATERIAL COMMAND (THE FORMER DARCOM) HAS AN SES HEADING A DIRECTORATE OF PRODUCT ASSURANCE AND TEST. THIS OFFICE HAS ABOUT 60 PEOPLE AND IS THE TECHNICAL FOCUS FOR QUALITY, RELIABILITY, AND TEST. EQUALLY IMPORTANT, AT THE BUYING DIVISION LEVEL [AVIATION SUPPLY COMMAND/ST LOUIS (AVSCOM), TANK COMMAND/DETROIT, MISSILE COMMAND/HUNTSVILLE, ETC], THIS ORGANIZATION IS DIRECTLY REFLECTED IN OFFICES CONTAINING 200-300 PEOPLE. THERE IS CLEAR ORGANIZATIONAL FOCUS ON TECHNICAL ISSUES INCLUDING RELIABILITY.

THE NAVY DEPUTY CHIEF FOR R&M AND QA, MR. WILL WILLOUGHBY, HAS A NATIONAL REPUTATION AS A RELIABILITY EXPERT. THE F-18 IS HIS PROTEGE. HIS OFFICE IS SMALL (12-15), AND WHILE IT IS PERSONALITY-DRIVEN, IT HAS BEEN VERY EFFECTIVE DUE TO ITS DIRECT AUTHORITY FROM NAVMAT TO INFLUENCE THE TECHNICAL SIDE OF NAVY PROGRAMS.

THE AIR FORCE IS FACED WITH A MORE DIFFICULT PROBLEM. WE HAVE SPLIT THE RESPONSIBILITY FOR OUR WEAPON SYSTEMS BETWEEN TWO COMMANDS. WHILE THIS GIVES US ADVANTAGES, LIKE BEING ABLE TO CONCENTRATE OUR ATTENTION MORE CLOSELY ON TECHNOLOGY ON ONE END AND DEPOT SUPPORT ON THE OTHER, IT HAS ALSO REQUIRED US TO PURSUE ISSUES SUCH AS R&M ACROSS COMMANDS.

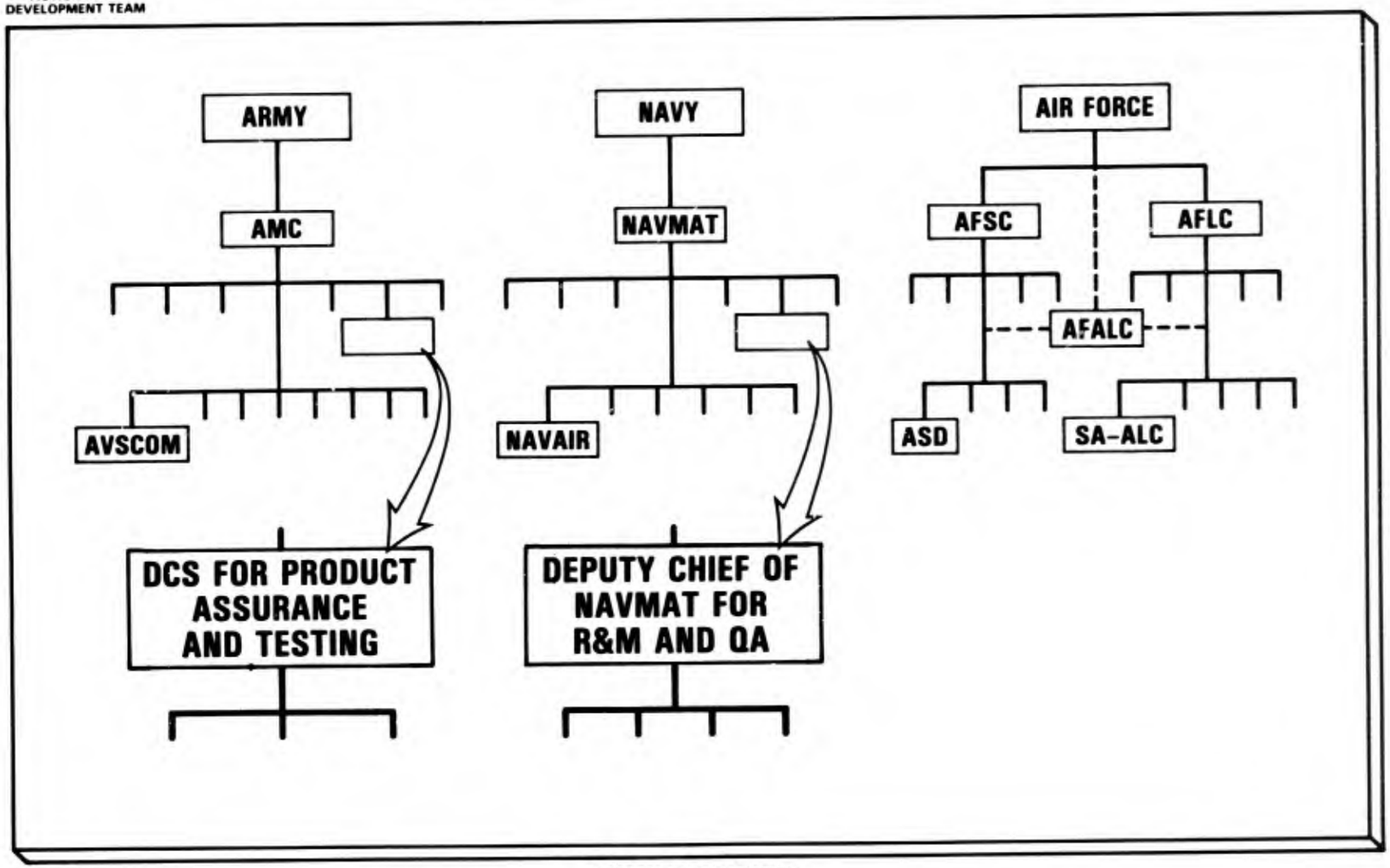
IT HAS OFTEN CAST THE AIR STAFF INTO AN ARBITRATION ROLE AND HAS BROUGHT ABOUT ORGANIZATIONAL "SOLUTIONS" SUCH AS AFALC, DPMLs, AND INTERCOMMAND MOAs.

AFLC AND AFSC DO NOT HAVE EQUIVALENT OFFICES WITH THE INFLUENCE WE SAW IN AMC AND NAVMAT. ALSO, AT THE BUYING DIVISION LEVEL IN AFSC, ALL THE DIVISIONS APPROACH THE R&M TASK DIFFERENTLY. NO TWO HAVE THE SAME ORGANIZATION APPROACH.

ONE FINAL - NOTE BOTH THE ARMY AND NAVY ARE ALSO CURRENTLY WORKING KEY R&M INITIATIVES. IN THE ARMY, THE VICE CHIEF HAS SENT A LETTER TO AMC TASKING THEM TO REDUCE RAM-D (RELIABILITY, AVAILABILITY, MAINTAINABILITY, AND DURABILITY) COSTS BY 50% BY 1991. IN THE NAVY, MR. WILLOUGHBY IS ATTEMPTING TO INSTITUTIONALIZE HIS PHILOSOPHY AT THE BUYING DIVISION LEVEL (NAVAIR, NAVSEA, NAVELEX). HE HAS HIRED NEW SESs AND HAS THEM WORKING ON INSTITUTIONALIZATION PLANS WITH INDUSTRY.

ACTION PLAN DEVELOPMENT TEAM

ORGANIZATIONAL COMPARISON



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SLIDE 11: INDUSTRY REVIEW

THE FOURTH AREA WE REVIEWED WAS INDUSTRY. ASIDE FROM THE MANY CASE STUDIES AVAILABLE, WE INTERVIEWED MOST OF OUR KEY AEROSPACE PRIMES SUCH AS BOEING, MACDAC, GD, AND GE. (BACKUP SLIDE ON INDUSTRY INTERVIEWS PROVIDES A LISTING OF COMPANIES.)

AGAIN, THE FINDINGS WERE VERY CONSISTENT. WE FOUND THAT INDUSTRY KNOWS HOW TO DO R&M IF CHALLENGED AND GIVEN THE OPPORTUNITY. MANY PROGRAMS ARE CITED AS DEMONSTRATION OF THAT FACT, INCLUDING THE F-18, T700 ENGINE, F-20, SPACE PROGRAMS, AND THE MINUTEMAN MISSILE.

INDUSTRY IS WAITING AND ASSESSING HOW REAL THE AIR FORCE COMMITMENT REALLY IS. THE AFE GOT THEIR ATTENTION, AND THE CURRENT FLURRY OF R&M INTEREST IS MAINTAINING IT. HOWEVER, IT WILL BE THE KEY SOURCE SELECTIONS COMING IN EARLY 1985, SUCH AS THE SMALL MISSILE AND THE ATF, THAT WILL VERIFY AND ENFORCE IT.

FINALLY, CONTRACTORS ARE SEARCHING THOSE KEY DOCUMENTS SUCH AS THE RFPs, STATEMENTS OF WORK (SOWs), DATA REQUIREMENTS, AND INCENTIVES TO SEE IF WE ARE, IN FACT, REALLY COMMITTED.

ACTION PLAN DEVELOPMENT TEAM

INDUSTRY REVIEW

- SCOPE
  - —CONTACTED OVER 25 AEROSPACE FIRMS
  - —PRIMES, MAJOR SUBS, AND ASSOCIATIONS
- FINDINGS
  - —KNOW HOW TO DO R&M
  - —WAITING TO SEE IF R&M COMMITMENT IS REAL
  - —LOOKING FOR EMPHASIS IN RFP AND CONTRACT

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SLIDE 12: CRITICAL R&M CONSIDERATIONS

THERE ARE MANY WAYS TO LOOK AT THE DATA WE HAVE COLLECTED. WE BELIEVE THESE THREE VIEWPOINTS ARE ESPECIALLY RELEVANT TO OUR EFFORT.

ACTION PLAN
DEVELOPMENT TEAM

CRITICAL R&M CONSIDERATIONS

- ESSENTIAL R&M BUILDING BLOCKS
- IMPEDIMENTS TO R&M
- INITIATIVES IN R&M

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SLIDE 13: ESSENTIAL R&M BUILDING BLOCKS - MANAGEMENT

WHAT ARE THE ESSENTIAL ELEMENTS OF A GOOD MANAGEMENT R&M PROGRAM? FIRST AND FOREMOST IS THE COMMITMENT FROM THE TOP. WITHOUT THAT COMMITMENT, R&M IS TOUGH - MAYBE IMPOSSIBLE TO DO WELL. WITHOUT SUPPORT FROM THE TOP, RESOURCES WON'T BE AVAILABLE FOR THE TASKS, AND THE TOUGH TRADEOFF DECISIONS WILL NOT BE MADE. IN MOST CASES, THEY WON'T EVEN BE MADE VISIBLE AT THE HIGHER MANAGEMENT LEVELS.

AGAIN AND AGAIN WE WERE TOLD BY THE FIELD, "JUST HAVE THE CHIEF TELL US WHAT HE WANTS AND WE WILL GIVE IT TO HIM." THE FIELD, STAFFS, AND PROGRAMS ARE CONFRONTED WITH MANY CONFLICTING DEMANDS ON TIME AND RESOURCES. WITHOUT A CLEAR DEFINITION OF OUR OBJECTIVES, THEY WILL PROVIDE US WITH WHAT THEY PERCEIVE WE WANT - TO DATE IT HAS NOT BEEN R&M.

INTEREST IN R&M IS NOT ENOUGH. IT MUST BE BACKED BY TECHNICAL EXPERTISE AT ALL LEVELS. EXPERTISE IN R&M IS SCARCE AND SCATTERED IN THE AIR FORCE. THIS IS EVIDENT FROM THE VARIABILITY WE NOTE IN PROGRAMS AND THE INEFFECTIVENESS OF REVIEWS AT VARIOUS STAFF LEVELS. NOTHING CAN MAKE UP FOR IGNORANCE.

CLEAR AUTHORITY AND ACCOUNTABILITY ARE ALSO ESSENTIAL. WITHOUT PUTTING SOME PUNCH INTO THE PROGRAM, R&M WILL REMAIN ONLY A CONSIDERATION.

FINALLY, R&M IS TOUGH TO MAKE VISIBLE, SO WE MUST PLAN IT AND TRACK IT WITH A STRONG REVIEW PROCESS OR IT WILL SLIP AWAY AS PROGRAMS GO THROUGH THEIR EXTENSIVE LIFE CYCLES, BOUNCE UP AND DOWN THE MANAGERIAL HIERARCHIES, AND FACE THE COMPETING PRESSURES OF COST, SCHEDULE, AND PERFORMANCE.

ACTION PLAN
DEVELOPMENT TEAM

ESSENTIAL R&M BUILDING BLOCKS— MANAGEMENT

- COMMITMENT AT THE TOP
- CLEAR COMMUNICATION OF OBJECTIVES
- TECHNICAL COMPETENCE
- CLEAR AUTHORITY AND ACCOUNTABILITY
- EFFECTIVE PLANNING
- STRONG REVIEW PROCESS

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SLIDE 14: ESSENTIAL R&M BUILDING BLOCKS - PROGRAMS

AT THE PROGRAM LEVEL, CLEAR REQUIREMENTS ARE THE MOST ESSENTIAL ELEMENT AND ARE THE TOUGHEST TO ESTABLISH. WE HAVE BEEN WORKING ON THE ATF SON FOR YEARS WITH A MYRIAD OF ORGANIZATIONS INVOLVED INCLUDING RAND AND ANSER, ALL STRIVING TO CLEARLY DEFINE OUR REQUIRMENTS. THE BOTTOM LINE IS THAT WITHOUT ENFORCEABLE REQUIREMENTS, THERE IS NO REQUIREMENT.

ONCE WE KNOW WHAT WE WANT, WE MUST TRANSLATE THAT DEMAND INTO EFFECTIVE CONTRACTUAL LANGUAGE, SPECIFYING NOT ONLY THE REQUIREMENT, BUT OF EQUAL IMPORTANCE, ITS PRIORITY.

FINALLY, R&M IS PUT INTO OUR SYSTEMS IN DESIGN AND MUST BE MAINTAINED DURING MANUFACTURING. THESE "HOW TO" TASKS ARE A FEW OF THE MOST ESSENTIAL TECHNIQUES THAT LEAD TO IMPROVED R&M. THEY REQUIRE TIME, ATTENTION, TALENT, AND DOLLARS TO BE ACCOMPLISHED.

WE KNOW HOW TO DO THESE THINGS AND HAVE SHOWN IT IN AREAS SUCH AS AIRCRAFT STRUCTURES AND ENGINES. WE HAVE INSTITUTIONALIZED GOOD DESIGNS AND MANUFACTURING PROCEDURES ON THESE SYSTEMS BECAUSE OF THE SAFETY IMPLICATIONS. WE HAVE NOT TAKEN THIS SAME APPROACH ON AVIONICS OR ON MUCH OF THE PERIPHERAL EQUIPMENT. HERE WE MAINTAIN THE "FIX IT WHEN WE GET HOME" MODE OF OPERATION.

ONE ASIDE-INDUSTRY TOLD US THAT FROM THEIR EXPERIENCE WE CAN ACHIEVE A 30-35% R&M IMPROVEMENT WITH BUSINESS AS USUAL. THIS IS BECAUSE LEARNING AND TECHNOLOGY WILL HELP US IMPROVE THAT MUCH. ANOTHER 25% IMPROVEMENT COMES IF YOU PLACE MANAGEMENT ATTENTION ON R&M. HOWEVER, TO GET THE LAST 40-45% YOU MUST INSIST ON DESIGN AND MANUFACTURING TECHNIQUES SUCH AS THOSE LISTED HERE.

ACTION PLAN
DEVELOPMENT TEAM

ESSENTIAL R&M BUILDING BLOCKS— PROGRAMS

- CLEAR REQUIREMENTS
  - —MEASURABLE, VERIFIABLE, AND ENFORCEABLE
- EFFECTIVE CONTRACTUAL PROCESS
  - —REFLECTS REQUIREMENTS
  - —CONTAINS R&M INCENTIVES/WARRANTIES
- EMPHASIS DURING DESIGN/MANUFACTURE
  - —ITERATIVE DESIGN PROCESS
  - —EFFECTIVE TECHNIQUES (DERATING, PARTS SCREENING)
  - —IN-DEPTH TECHNICAL REVIEWS
  - —REALISTIC TESTING

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SLIDE 15: R&M PROCESS

THE R&M PROCESS IS SIMPLE IN CONCEPT. TWO KEY FACTORS ARE UNDERSTANDING AND AND CONVEYING THE NEED THROUGHOUT THE PROCESS, AND SECONDLY, MAINTAINING AN EFFECTIVE FEEDBACK SYSTEM. THESE ALSO HAPPEN TO BE THE TWO BIGGEST GENERIC R&M PROBLEMS.

TECHNOLOGY GIVES YOU THE CAPABILITY TO IMPROVE R&M. ATTENTION MUST BE PAID TO NEW TECHNOLOGIES TO ENSURE THE R&M IS IN THEM WHEN WE BEGIN TO APPLY THEM [FOR EXAMPLE: BUILT-IN-TEST (BIT), COMPOSITES, AND VHSIC]. IN ADDITION, WE MUST ENSURE OUR LABS ARE WORKING THE USER'S SUPPORTABILITY PROBLEMS, NOT JUST HIS CAPABILITY NEEDS.

DESIGN IS WHERE R&M GOES INTO THE SYSTEM. AT SOME POINT, AN ENGINEER HAS TO PUT "PEN TO PAD" AND LAY OUT THE CIRCUIT OR CHANGE THE STRUCTURE. HE CAN DO IT DURING DEVELOPMENT (THE MOST EFFICIENT WAY IF YOU CAN AFFORD THE TIME), OR HE MAY HAVE TO REDO IT DURING PRODUCTION (VERY DISRUPTIVE), OR HE MAY HAVE TO DO IT AS A MODIFICATION (VERY EXPENSIVE), BUT HE MUST DO IT.

THEREFORE, THE MORE WE ALLOW ITERATION DURING DEVELOPMENT, THE MORE MATURE THE SYSTEM THAT GOES TO THE FIELD. UNFORTUNATELY, THE ENGINEER CAN'T DO IT RIGHT THE FIRST TIME - HE TOO MUST LEARN FROM HIS MISTAKES. THESE MISTAKES BECOME KNOWN DURING THE TESTING PROCESS. (CAD/CAM IS HELPING US ITERATE THE DESIGN FASTER AND CHEAPER.) THE POINT IS IF WE CAN'T ACHIEVE THE GROWTH DURING DEVELOPMENT, WE HAVE TWO CHOICES. EITHER WE PLAN ON FIXING IT LATER (COSTLY BUT NECESSARY) OR LEARN TO TOLERATE IT, I.E., PAY THE COSTS OF REPAIRS, FAILURES, TEST EQUIPMENT, MAINTENANCE MANPOWER, ETC. WE HAVE DONE SOME OF BOTH IN THE AIR FORCE.

IN MANUFACTURING, YOU CANNOT PUT R&M IN, BUT YOU CAN SURE LOSE RELIABILITY. OUR RECENT QUALITY PROBLEMS WERE EXAMPLES OF POTENTIALLY DEGRADING THE RELIABILITY WE HAD IN THE SYSTEM THROUGH POOR MANUFACTURING DISCIPLINE.

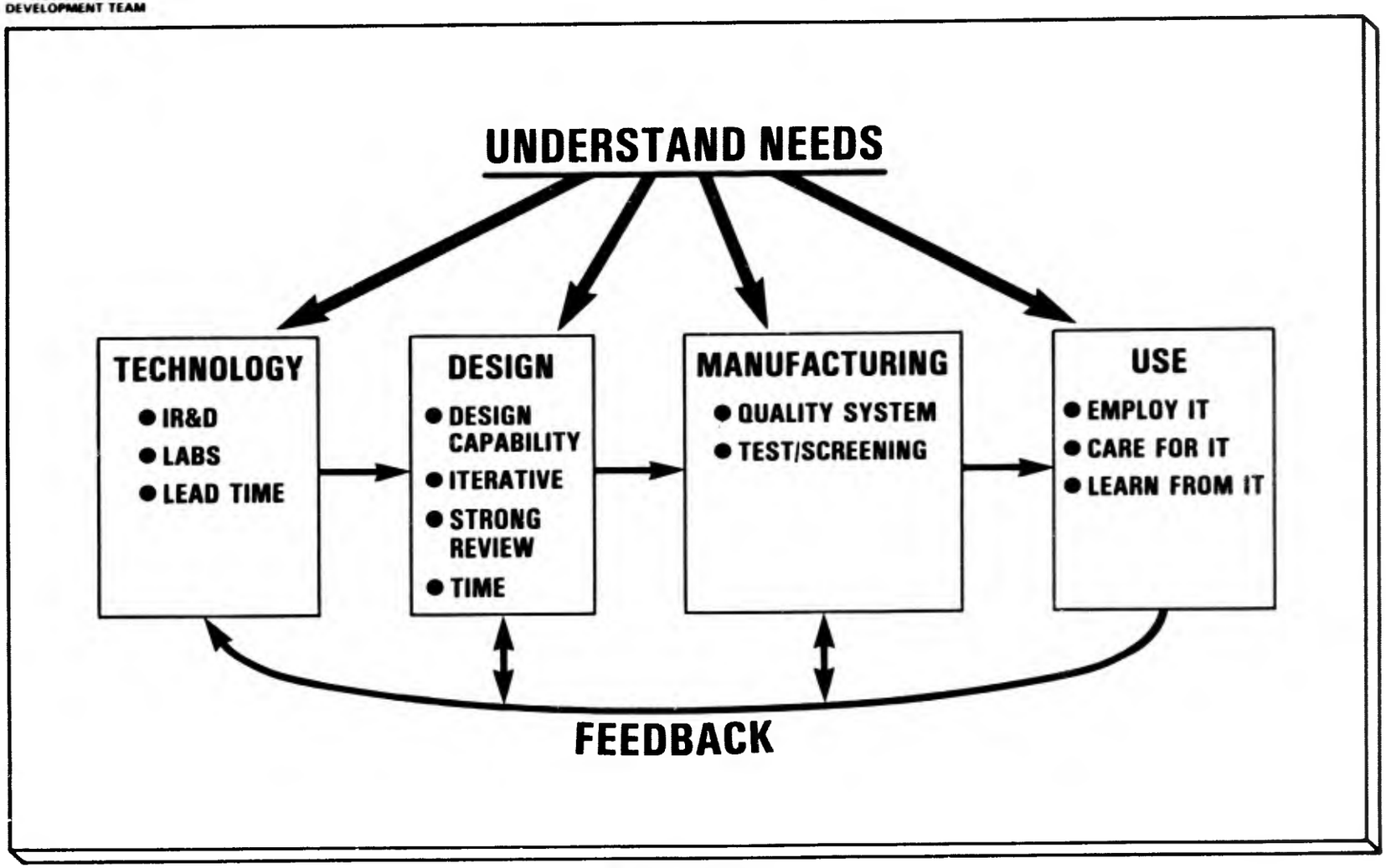
IT ONLY COSTS A DOLLAR TO DISCARD A PIECE PART AT A CONTRACTOR'S RECEIVING INSPECTION BENCH BUT THOUSANDS IF WE HAVE TO SEND AN LRU/SRU BACK TO THE STATES FROM KOREA TO HAVE THE DEPOT REMOVE THAT PART. SYSTEMS DON'T FAIL - PIECE PARTS DO. SO, SCREENING AND TEST MUST FIND THE FAILURES IN THE PLANT, NOT ON THE FLIGHT LINE. PARTS FAIL DUE TO STRESS. SO, WE MUST ENSURE THEY ARE STRESSED IN THE FACTORY, NOT IN THE AIRCRAFT.

WHEN THE SYSTEM GETS TO THE USER IN THE FIELD, HE CAN'T DIRECTLY ENHANCE R&M, BUT HE CAN DEGRADE IT. MAINTAINANCE PRACTICES, TRAINING, AND OPERATIONS ALL DIRECTLY EFFECT HOW MUCH "R" WE GET OUT OF OUR SYSTEMS. IN ADDITION TO CARING FOR IT, WE MUST LEARN FROM IT AND FEED THAT INFORMATION BACK THROUGH THE SYSTEM TO THE TECHNOLOGISTS AND DESIGNERS.

FINALLY, WE MUST RECOGNIZE THAT WE ALL LEARN AS TIME PROGRESSES. NEW TECHNOLOGY CAN GREATLY ENHANCE OUR FIELDED SYSTEMS. WE MUST IDENTIFY THESE NEEDS AND OPPORTUNITIES AND TRANSLATE THEM INTO EFFECTIVE R&M MODIFICATION ENHANCEMENTS TO OUR CURRENT FORCE. WE SHOULD EXPECT TO DO THIS AND PLAN ON IT.

USAF R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

R&M PROCESS



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SLIDE 16: IMPEDIMENTS TO R&M

WHAT KEEPS US FROM IMPROVING OUR R&M?

FIRST ARE THE INTENSE PROGRAMMATIC PRESSURES R&M MUST COMPETE WITH: COST WITH ITS ANNUAL BUDGETS, PRESSURE ON FRONT-END DOLLARS, AND BASELINES; SCHEDULES WITH IOC PRESSURES AND OPTIMISTIC DEVELOPMENT PLANS; AND PERFORMANCE WITH CHANGING REQUIREMENTS IN THE FACE OF A GROWING SOPHISTICATED THREAT.

IN ADDITION TO THESE, R&M IS, BY ITSELF, VERY DIFFICULT TO DO. ITS IMPACT CANNOT BE SEEN OR FELT FOR MANY YEARS. LIFE CYCLE COST ESTIMATES CONTAIN SO MANY VARIABLES THAT THE AIR FORCE HAS HAD DIFFICULTY IN ACCEPTING THE RESULTS FROM THESE ANALYSES. OPTIMISM ALWAYS SEEMS TO INTERVENE AND DISCOUNT THE POTENTIAL IMPACTS. ASIDE FROM DIFFICULTY IN TRACKING AND MEASURING R&M, IT SIMPLY HAS NOT BEEN TREATED LIKE THE OTHER LEGS OF THE STOOL. THERE IS NO R&M ORGANIZATION HELD ACCOUNTABLE FOR TRACKING IT (AS AF/AC DOES WITH COSTS OR AFSC DOES WITH BASELINES). THERE ARE NO VISIBLE ADVOCATES, LITTLE FEAR OF FAILURE, AND ACCOUNTABILITY IS NOT PREVALENT IN R&M AS IT IS IN THE OTHER LEGS OF THE STOOL.

FINALLY, OUR PAST ACTIONS HAVE NOT LIVED UP TO OUR INTENTIONS. THE AIR FORCE IS PERCIEVED, RIGHTLY OR WRONGLY, AS WANTING PERFORMANCE AND LOW ACQUISITION COSTS. CONTRACTORS BELIEVE THAT IS WHAT WINS BIG CONTRACTS. THE AIR FORCE WILL SPEND TO GO FAST, BUT TO SPEND ON R&M IS A REAL BURDEN. AND, AS ONE CONTRACTOR CLEARLY STATED, "WE GIVE THE AIR FORCE WHAT PUTS A TWINKLE IN THEIR EYES - AND THAT AIN'T R&M."

ONE ASIDE-THE OPPOSITE OF IMPEDIMENTS IS INCENTIVES. IMPEDIMENTS ARE MANY, BUT WE WERE NOT ABLE TO ASSEMBLE A LENGTHY LIST OF THINGS THAT COULD HELP US. IN SHORT, FOR CONTRACTORS IT IS DOLLARS AND IMAGE THAT DRIVES THEIR DECISIONS. FOR OUR MANAGERS, IT IS THEIR REPORT CARDS AND THEIR PERCEPTION OF WHAT BRINGS THEM SUCCESS.

ACTION PLAN DEVELOPMENT TEAM

IMPEDIMENTS TO R&M

- PROGRAMMATIC PRESSURES—COST, SCHEDULE AND PERFORMANCE
- INABILITY TO DEFINE, TRACK, MEASURE, OR COST R&M
- ACCOUNTABILITY AND AUTHORITY LACKING
- R&M PERCEIVED AS LOW PRIORITY
- LACK OF ORGANIZATION FOCUS
- ACTIONS HAVE NOT LIVED UP TO WORDS

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SLIDE 17: INITIATIVES

WORKING AS WE HAVE, WE SEARCHED FOR THINGS THAT WERE WRONG SO WE CAN ADDRESS OUR EFFORTS TOWARD IMPROVING THEM. IT IS NOT OUR INTENT TO PAINT A BLEAK PICTURE. AIR FORCE R&M IS NOT A HORROR STORY.

AIR FORCE R&M HAS IMPROVED STEADILY, AND IN SOME CASES, DRAMATICALLY. WE CERTAINLY ARE DOING WORK COMPARABLE TO OUR SISTER SERVICES AND, IN MANY CASES, ARE IN FRONT OF THE PACK.

THIS GROWTH IS COMING FROM TECHNOLOGY AND FROM THE HARD WORK OF AIR FORCE PEOPLE. WE FOUND MANY, MANY POSITIVE INITIATIVES. SOME EXAMPLES INCLUDE THE EMPHASIS WE HAVE PLACED ON R&M IN OUR CONTRACTORS' IR&D PROGRAM. (IN 1984 OVER $3 BILLION WAS SPENT ON IR&D.) WE SAW POSITIVE INDICATIONS THAT THIS EFFORT WAS PAYING OFF. TWO OF THE PRIMES WE VISITED HAD REJECTED THEIR DIVISION IR&D PROGRAMS BECAUSE THEY DID NOT CONTAIN ENOUGH R&M EFFORT.

THE F-16 APG-66 RADAR IS AN EXAMPLE OF SIGNIFICANT HARDWARE IMPROVEMENT. THE AVIP IS A MANAGEMENT INITIATIVE AIMED AT INSTITUTIONALIZING A DISCIPLINED R&M APPROACH ACROSS OUR AVIONICS DEVELOPMENT PROGRAMS. RADC IS AN EXAMPLE OF AN OUTSTANDING R&M ORGANIZATION KNOWN WORLDWIDE FOR THINGS LIKE ELECTRONIC PIECE PART RELIABILITY.

UNFORTUNATELY, NOT ALL OUR EFFORTS ARE SO SUCCESSFUL. OUR ATTEMPT TO TURN PPAC INTO A CENTER OF EXPERTISE FOR R&M INCENTIVES HAS HAD DIFFICULTY REACHING ITS POTENTIAL DUE TO FUNDING AND ORGANIZATIONAL PROBLEMS. BUILT-IN TEST (BIT) IS AN EXAMPLE OF A TECHNOLOGY THAT PROMISED RELIEF FROM HEAVY MAINTENANCE BURDENS FOR OUR USERS, BUT HAS NOT LIVED UP TO THAT PROMISE. FALSE-ALARM RATES AND ITS OWN SUPPORT PROBLEMS HAVE PLAGUED IT.

BUT THE BOTTOM LINE IS THAT THE AIR FORCE CAN ACCELERATE OUR R&M IMPROVEMENT (ABOVE THE 30-35% VIA TECHNOLOGY). SOME CAN COME WITHOUT ADDING RESOURCES THROUGH MANAGEMENT COMMITMENT (THE 25%). THE REST (40-45%) WILL REQUIRE ADJUSTMENT IN THE BALANCE WITH OTHER PARAMETERS (COST, SCHEDULE, AND PERFORMANCE). ADVANCING TECHNOLOGY HAS GIVEN US THE OPPORTUNITY TO MAKE THOSE TRADES, AND WE MUST TAKE ADVANTAGE.

ACTION PLAN DEVELOPMENT TEAM

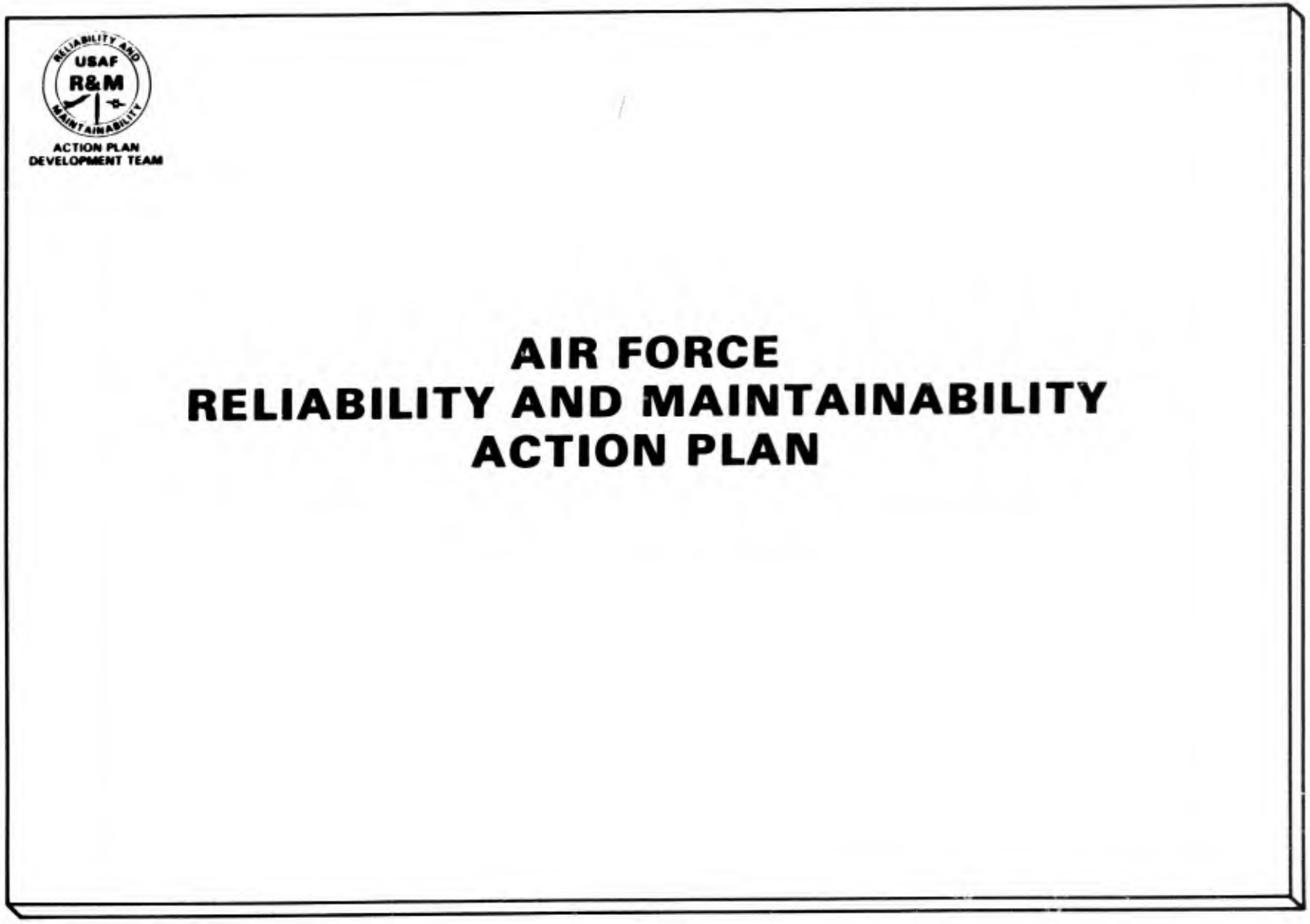
INITIATIVES IN R&M

- MANY INITIATIVES
- SOME STRONG EFFORTS
  - —INDEPENDENT RESEARCH AND DEVELOPMENT (IR&D)
  - —APG-66 RADAR
  - —AVIONICS INTEGRITY PROGRAM (AVIP)
  - —ROME AIR DEVELOPMENT CENTER (RADC)
- SOME MIXED RESULTS
  - —PRODUCT PERFORMANCE AGREEMENT CENTER (PPAC)
  - —BUILT-IN TEST (BIT)

SLIDE 18: AF R&M ACTION PLAN

WE ARE FACED WITH TWO PROBLEMS. ONE IS TO SOLVE THE TRADITIONAL GENERIC R&M PROBLEMS THAT REVOLVE AROUND REQUIREMENTS, DATA MEASUREMENT, ETC. THE OTHER IS TO CHANGE THE BASIC WAY THE AIR FORCE THINKS ABOUT, PLANS FOR, AND MANAGES R&M. WE BELIEVE THIS SECOND PROBLEM MUST BE RESOLVED IF WE ARE TO BE SUCCESSFUL ON THE FIRST. (TO DATE, WE HAVE TRIED TO DO IT THE OTHER WAY AROUND USING AD HOC TEAMS TO SOLVE DATA OR REQUIREMENTS PROBLEMS, AND WE HAVE HAD LITTLE SUCCESS.)

WITH THIS BACKGROUND, LET'S LOOK AT THE PHILOSOPHY AND GENERAL CONTENT OF THE R&M ACTION PLAN.


USAF
R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN
DEVELOPMENT TEAM
AIR FORCE
RELIABILITY AND MAINTAINABILITY
ACTION PLAN
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SLIDE 19: WHAT THE ACTION PLAN MUST DO TO INSTITUTIONALIZE R&M

IT IS CLEAR THAT TO BE SUCCESSFUL IN OUR EFFORT, THE AIR FORCE MUST DO THESE FOUR THINGS.

ACTION PLAN
DEVELOPMENT TEAM

WHAT THE ACTION PLAN MUST DO TO INSTITUTIONALIZE R&M

- MAINTAIN TOP MANAGEMENT COMMITMENT
- FOCUS AF RESOURCES ON R&M
- CONVINCE AIR FORCE AND CONTRACTOR ORGANIZATIONS THAT WE ARE SERIOUS
- DIRECT ACTIONS THAT INFLUENCE KEY COMMUNICATION CHANNELS

3312 29

SLIDE 20: AIR FORCE/CONTRACTOR INSTITUTIONALIZATION PROCESS

TO CHANGE THE WAY WE MANAGE R&M, WE MUST INFLUENCE THESE TWO PYRAMIDS. WE SIT AT THE BOARD OF DIRECTORS LEVEL OF THE AIR FORCE HIERARCHY AND MUST INFLUENCE THE MANAGEMENT STRUCTURE (AIR STAFF AND COMMAND-LEVEL STAFFS) WHERE THE RESOURCES ARE CONTROLLED, THE PMs/SPMs WHO STRUCTURE AND DIRECT OUR PROGRAMS (WHERE R&M IS PUT IN OR LEFT OUT), AND THE FUNCTIONAL BASE, WHICH INCLUDES ALL OUR PEOPLE CAPABLE OF INFLUENCING R&M, FROM THE FLIGHT LINE MECHANIC TO THE LABORATORY TECHNICIAN.

THE CONTRACTOR'S HIERARCHY MUST ALSO CHANGE. IT WILL DO SO PARTLY AS A RESULT OF OUR CHANGES, BUT CAN DO SO INDEPENDENTLY AS SHOWN BY NORTHROP IN THE F-20 PROGRAM.

THE LEVERAGE POINTS FOR THIS CHANGE ARE THE POLICY, GOALS, BUDGETS, REVIEWS, AND REWARD SYSTEMS THAT ARE AN INTEGRAL PART OF THE AIR FORCE DAY-TO-DAY MANAGEMENT. ON THE CONTRACTORS' SIDE, IT IS THE CONTRACTS AND THE FORMAL/INFORMAL COMMUNICATIONS THAT TAKE PLACE UP AND DOWN THE CHAIN, FROM THE CHIEF'S LETTER TO INDUSTRY TO THE ENGINEERS DRAWING REVIEW.

THE KEY TO CHANGING THE WAY BOTH PYRAMIDS THINK IS TO BACKUP OUR WORDS WITH VISIBLE, TANGIBLE ACTIONS.

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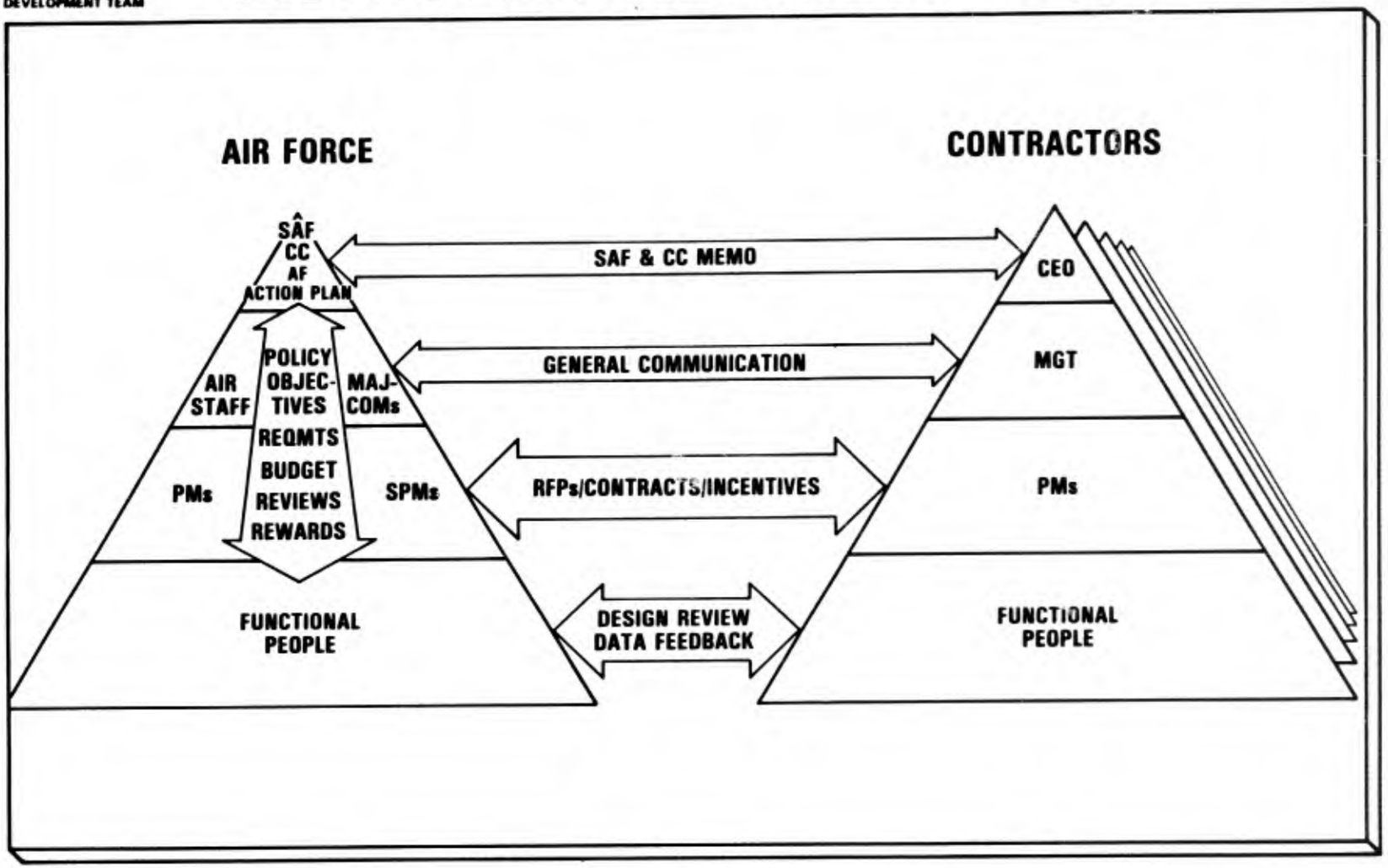
ACTION PLAN DEVELOPMENT TEAM

AIR FORCE/CONTRACTOR INSTITUTIONALIZATION PROCESS



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SLIDE 21: AREAS FOR POTENTIAL RECOMMENDATIONS

TO EFFECT THE CULTURAL CHANGE, WE HAVE GROUPED SPECIFIC ACTIONS AROUND SIX KEY OBJECTIVES. MEETING THESE OBJECTIVES SUCCESSFULLY WILL INSTITUTIONALIZE R&M MANAGEMENT IN THE AIR FORCE.

FIRST IS CLEARLY SETTING THE DIRECTION FOR THE AIR FORCE. THERE CAN BE NO DOUBT THAT R&M IS ESSENTIAL TO OUR OPERATIONAL VIABILITY. R&M IMPROVEMENT MUST CLEARLY RELATE TO OPERATIONAL NECESSITY. OUR COMMANDS AND WEAPON SYSTEMS MUST PLAN AND MARK THEIR SUCCESS IN RELATION TO THESE GOALS, AND WE MUST TEACH THE AIR FORCE THE NECESSITY AND LANGUAGE OF R&M THROUGH VISIBLE MANAGEMENT INDICATORS. WE WILL LEARN R&M AS WE LEARNED COST WITH ITS ASSOCIATED BASELINES AND C/SCSC CHARTS. FINALLY, WE WILL REVISE OUR DOCTRINE AND POLICY TO REFLECT THIS NEW EMPHASIS AND OPERATIONAL PRIORITY.

SECONDLY, WE MUST INSTITUTE SOME ORGANIZATIONAL FOCUS SO IT IS CLEAR BOTH INSIDE AND OUTSIDE THE AIR FORCE THAT WE ADVOCATE IMPROVED R&M AND STAND BEHIND IT WITH THE EXPERTISE TO BACK OUR COMMITMENT. AN ORGANIZATION THAT CAN MANAGE THIS IMPROVEMENT PROGRAM, CONVEY OUR COMMITMENT, SCRUB OUR PROGRAMS, AND FORCE MEANINGFUL TRADEOFFS IS ESSENTIAL TO OUR LONG-TERM SUCCESS.

ACTION PLAN DEVELOPMENT TEAM

AREAS FOR POTENTIAL RECOMMENDATIONS

- ESTABLISH VISIBLE AIR FORCE OBJECTIVES
  - —AF-LEVEL RESOURCE OBJECTIVES/GOALS
  - —COMMAND/PROGRAM R&M REQUIREMENTS
  - —MANAGEMENT INDICATORS
  - —R&M DOCTRINE
- DEVELOP ORGANIZATIONAL FOCUS AND ACCOUNTABILITY
  - —R&M ADVOCATE
  - —TECHNICAL EXPERTISE AND AUTHORITY
  - —R&M PROGRAM COORDINATION

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SLIDE 22: AREAS FOR POTENTIAL RECOMMENDATIONS

GIVEN THE DIRECTION AND AN ORGANIZATION TO KEEP US FOCUSED, WE NEED THE PLANNING TO SET THE PRIORITIES, INITIATE THE COORDINATION, AND LAY OUT THE ROADMAPS TO GET US THERE. THIS WILL INVOLVE R&M PLANNING AT THE COMMAND LEVEL AND ON ALL OUR WEAPON SYSTEMS (FROM THE NEW SYSTEMS, LIKE ATF, TO THE FIELDED SYSTEMS, LIKE FB-111).

ADDITIONALLY, WE MUST ENSURE R&M IS INCLUDED IN OUR TECHNOLOGY ROADMAPS. OTHER POTENTIAL AREAS INCLUDE TARGETING SPECIFIC PROGRAMS FOR R&M SUCCESS AND IMPROVING OUR PERSONNEL TRAINING AND DEVELOPMENT PROGRAMS.

COMMUNICATION AND MOTIVATION PROGRAMS ARE VITAL TO OUR SUCCESS. THEY MUST ENSURE THE COMMITMENT IS MAINTAINED UNTIL WE HAVE INTERNALIZED R&M AS A BASIC AIR FORCE VALUE.

ACTION PLAN
DEVELOPMENT TEAM

AREAS FOR POTENTIAL RECOMMENDATIONS—Continued

- CREATE R&M PLANNING SYSTEM
  - —COMMAND LEVEL
  - —WEAPON SYSTEM
  - —TECHNOLOGY ROADMAPS
  - —TARGET PROGRAMS (DEVELOPMENT, PRODUCTION, MODS)
  - —PERSONNEL PLANNING
- INSTITUTE CORPORATE R&M PUBLIC RELATIONS EFFORT
  - —CORPORATE AF INVOLVEMENT
  - —MEDIA EXPOSURE
  - —INDUSTRY INTERFACE
  - —EDUCATIONAL SUPPORT

3312 30A

SLIDE 23: AREAS FOR POTENTIAL RECOMMENDATIONS

THE AIR STAFF HAS PLAYED A MINOR ROLE IN R&M IN THE PAST, BUT OUR EFFORT WILL HAVE TO INCREASE, AND MAINTAINING ACCOUNTABILITY IS A VITAL PART OF THIS ROLE. TO ENSURE OUR OPERATIONAL SUPPORT OBJECTIVES ARE MET, WE MUST DEMONSTRATE OUR COMMITMENT.

THE INCREASED SCRUTINY OF R&M PROGRAMS RECEIVED HERE AT THE COUNCIL HAS ALREADY HAD A MAJOR IMPACT. WE MUST MAKE R&M IN NEW SYSTEMS MORE VISIBLE AND POOR R&M IN FIELDED SYSTEMS LESS TOLERABLE. INCREASING STAFF AND IG EMPHASIS WILL HELP ALONG WITH SOME INDEPENDENT REVIEWS (NOT DISSIMILAR FROM THE INDEPENDENT COST ANALYSIS WE PERFORM ON THE COST LEG OF THE STOOL). FINALLY, WE MUST TRACK R&M FROM CRADLE TO GRAVE; BY MAKING IT VISIBLE, WE CAN BETTER ENSURE THE CORRECT TRADES ARE MADE AND BALANCE ACHIEVED.

THE FIRST FIVE AREAS CONCENTRATED ON THE AIR FORCE PYRAMID. CHANGING IT WILL CERTAINLY INFLUENCE OUR CONTRACTORS, BUT THE SIXTH OBJECTIVE IS AIMED AT INFLUENCING THEM DIRECTLY. THEY MUST BELIEVE US, AND OUR SOURCE SELECTIONS, CONTRACT INCENTIVES, AND REVIEWS MUST CONVINCE THEM WE ARE SERIOUS.

WE ARE WORKING THE SPECIFIC ACTIONS TO IMPLEMENT THESE SIX OBJECTIVES NOW AND WILL BE COMPLETED MID-JANUARY.

ACTION PLAN DEVELOPMENT TEAM

AREAS FOR POTENTIAL RECOMMENDATIONS—Continued

- ESTABLISH CORPORATE OVERSIGHT
  - —INTENSIFIED PROGRAM REVIEW
  - —HEADQUARTERS R&M STAFF/IG EMPHASIS
  - —INDEPENDENT R&M REVIEW TEAM
  - —TRACK REQUIREMENTS FROM CRADLE TO GRAVE

- STRENGTHEN CONTRACTOR INTERFACE
  - —SOURCE SELECTION MANDATORY
  - —INCREASE DEVELOPMENT INCENTIVES
  - —PRODUCTION WARRANTIES
  - —IN-DEPTH DESIGN REVIEWS

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SLIDE 24: SUMMARY

IN SUMMARY, WE MUST DO THESE THREE THINGS - AND IF OUR DAY-TO-DAY ACTIONS REFLECT THESE, WE WILL BE SUCCESSFUL. WE BELIEVE THIS ACTION PLAN WILL SET THE ENVIRONMENT FOR REAL CHANGE IN THE AIR FORCE AND WILL ALLOW US TO NURTURE AND ACCELERATE R&M IMPROVEMENTS.

I LOOK FORWARD TO BRINGING YOU THE COMPLETED ACTION PLAN AFTER THE HOLIDAYS.

ACTION PLAN
DEVELOPMENT TEAM

SUMMARY

- DEMAND IT — SUPPORT IT — REWARD IT
  - —ACROSS ALL WEAPON SYSTEMS (NEW AND FIELDED)
  - —ACROSS ALL ORGANIZATIONS (LABS TO MAINTENANCE SQUADRONS)
  - —ACROSS ALL LEVELS (AIR FORCE COUNCIL TO DESIGN ENGINEER)

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PART 2

BACKUP SLIDES TO INTERIM BRIEFING

19 DECEMBER 1984

RELIABILITY AND MAINTAINABILITY ACTION PLAN DEVELOPMENT TEAM

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ACTION PLAN DEVELOPMENT TEAM

PHASE I TEAM COMPOSITION

AIR STAFF

COL MEYER	AF/RDC
LT COL CRAIGIE	AF/RDPV
MAJ TROWEL	AF/RDCS
MAJ HULL	AF/RDXM
COL HRUSKOCY	AF/LEXY
LT COL NELSON	AF/LEYE
MR. KING	AF/XOOM
LT COL RUFFING	AF/XOOM
CAPT HUNTER	AF/IG
MAJ HODGSON	AF/SAGP
MAJ MEDAL	AF/MPME
CAPT LEVINE	AF/SITT
*CAPT SHERBO	AF/ACMC
*LT COL DEVERS	AF/PRPRC
SSGT WELSH	1947HSG
MS. CHAPMAN	1947HSG

SECRETARIAT

LT COL BROWN	SAF/ALG

LOGISTICS COMMAND

MR. HIPPENMEYER	AFLC/LOC
MR. BARSOTTI	OCALC/MMIR

SYSTEMS COMMAND

LT COL CRISCIMAGNA	AFSC/ALK
LT COL STRUNK	AFSC/PG
COL JARMAN	ESD/AL
LT COL BRAGAW	ESD/AL
DR. POLLOCK	ESD/AL
DR. HALPIN	ASD/EN
COL SMITH	ASD/AL

OTHERS

*LT COL FINCH	AFOTEC/LG4
MR. WIDENHOUSE	AFALC/PTR
LT COL TALBOTT	AFIT/LSM
COL REYNOLDS	AFCOLR
MAJ PADULA	AFCOLR

*FOCAL POINT

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PHASE II ORGANIZATION

TEAM CHIEF: COL MEYER (AF/RDC)
EXECUTIVE OFFICER: MAJ TROWEL (AF/RDCS)

ACTION PLAN DEVELOPMENT TEAM

SUBTEAM I
PROGRAM REVIEWS

*L/C STRUNK (AFSC/PMAG)
MAJ HENTGES (AF/SAGP)
CAPT SMITH (AFOTEC/LG)
MR. BARSOTTI (OC-ALC/MMIR)
ASD (TBD)

SUBTEAM II
WEAPON SYSTEM PROCESS

*COL DENMAN (AFALC/PT)
COL REYNOLDS (AFCOLR)
MR. WIDENHOUSE (AFALC/PTR)
MAJ PADULA (AFCOLR)
MR. HIPPENMEYER (AFLC/LOC)

SUBTEAM III
ISSUES

*COL HRUSKOCY (AF/LEXY)
LTC TALBOTT (AFIT/LSM)
LTC BROWN (SAF/ALG)
LTC NELSON (AF/LEYE)
MR. KING (AF/XOOM)
MAJ HULL (AF/RDXM)
MAJ MEDAL (AF/MPME)

SUBTEAM IV
INDUSTRY INTERFACE

*MR. ZSAK (AFSC/ALK)
MR. HOLLOMAN (ASD/PMC)
LTC CRISCIMAGNA (AFSC/ALK)
MR. MAX (AFLC/MMA AND PPAC)
CAPT HUNTER (AF/IG)

SUBTEAM V
REPORTS

*LTC CRAIGIE (AF/RDPV)
MAJ HODGSON (AF/SAGP)
CAPT LEVINE (AF/SITT)

*TEAM CHIEF

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ACTION PLAN
DEVELOPMENT TEAM

WHAT IS R&M?

RELIABILITY: THE PROBABILITY THAT AN ITEM WILL PERFORM ITS INTENDED FUNCTION FOR A SPECIFIED INTERVAL UNDER STATED CONDITIONS (AFR 800-18)

MAINTAINABILITY: THE ABILITY OF AN ITEM TO BE RETAINED IN OR RESTORED TO SPECIFIED CONDITION WHEN MAINTENANCE IS PERFORMED BY PERSONNEL HAVING SPECIFIED SKILL LEVELS, USING PRESCRIBED PROCEDURES AND RESOURCES (DOD 5000.40)

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ACTION PLAN
DEVELOPMENT TEAM

R&M DEFINITIONS

ENGINEER: DETERMINISTIC, MEASURABLE CHARACTERISTIC—A POINT ESTIMATE (MTBF, MTTR)

STATISTICIAN: PROBABILISTIC, OBSERVABLE CHARACTERISTIC—A PROBABILITY DISTRIBUTION (EXPONENTIAL DISTRIBUTION)

MANAGER: READINESS AND SUSTAINABILITY—OPERATIONAL READY RATES, SPARES, AND MANPOWER BUDGETS ($)

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ACTION PLAN
DEVELOPMENT TEAM

KEY QUESTIONS

- DEFINITION: WHAT IS R&M?
- BUILDING BLOCKS: WHAT ARE ESSENTIAL ELEMENTS OF R&M?
- DATA BASE: HOW DO WE MEASURE R&M?
- PEOPLE: WHO IS DOING R&M?
- PROGRAM DATA: HOW WELL ARE WE DOING R&M?
- COSTS: WHAT ARE WE EXPENDING ON R&M?
- IMPEDIMENTS: WHAT KEEPS US FROM DOING R&M?
- INCENTIVES: WHAT HELPS US DO R&M?
- INITIATIVES: WHAT ARE WE TRYING TO DO IN R&M?
- RECOMMENDATIONS: WHAT SHOULD WE BE DOING?

ACTION PLAN
DEVELOPMENT TEAM

KEY DOCUMENTS

- IDA R&M STUDY (NOVEMBER 1983)
- AF/IG SAMI OF R&M (MAY 1982)
- PANEL 34 REPORT (1971 AF-WIDE DATA STUDY)
- QUALITY HORIZONS REPORT (NOVEMBER 1979)
- LOGISTICS LONG-RANGE PLANNING GUIDE (SEPTEMBER 1984)
- RAND REPORTS
- DEFENSE SCIENCE BOARD REPORTS
- GAO AUDITS
- PROCEEDINGS OF ANNUAL R&M SYMPOSIUM

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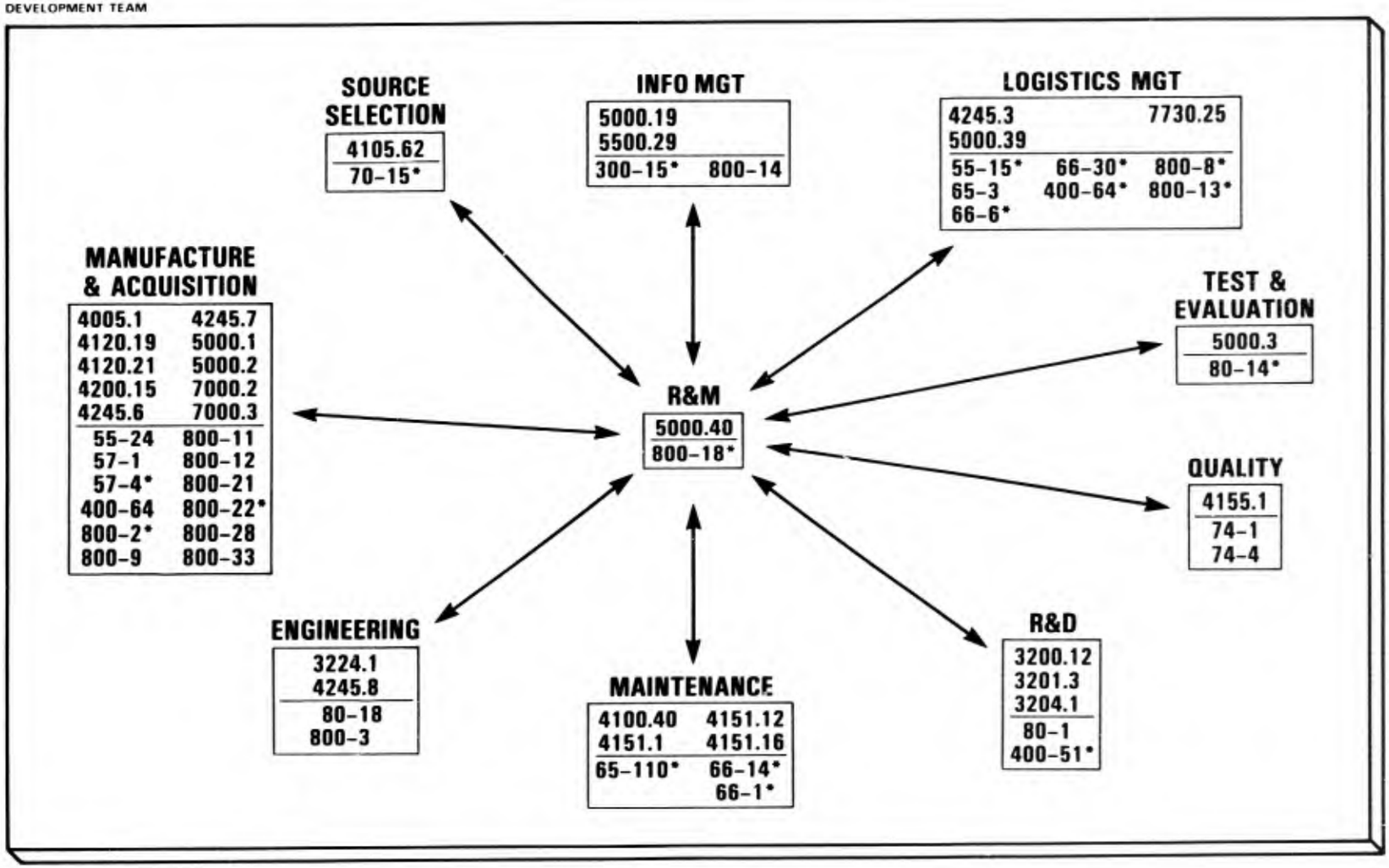
ACTION PLAN
DEVELOPMENT TEAM

R&M REGULATORY OVERVIEW



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ACTION PLAN
DEVELOPMENT TEAM

POLICY CHANGES NEEDED

- AFR 55-15: UNIT COMBAT READINESS REPORTING
  - —REFINE READINESS CRITERIA BASED ON R&M
- AFR 57-4: MODIFICATION PROGRAM APPROVAL AND MANAGEMENT
  - —DEVELOP A MODIFICATION PRIORITIZATION PROCESS BASED ON R&M CONTRIBUTION TO MISSION CAPABILITY
- AFR 65-110: AEROSPACE VEHICLE AND EQUIPMENT INVENTORY, STATUS, AND UTILIZATION REPORTING SYSTEM (AVISURS)
  - —INCORPORATE THE DATA REQUIRED BY THIS REGULATION INTO THE R&M MANAGEMENT INFORMATION SYSTEM (MIS) SOON TO BE DESCRIBED IN AFR 800-18
- AFR 66-1: MAINTENANCE MANAGEMENT POLICY
  - —IMPLEMENT RELIABILITY-CENTERED MAINTENANCE POLICY
- AFR 66-6: APPLICATION AND USE OF ELAPSED TIME INDICATORS AND EVENT COUNTERS
  - —INCORPORATE THE DATA REQUIRED BY THIS REGULATION INTO THE R&M MANAGEMENT INFORMATION SYSTEM (MIS) SOON TO BE DESCRIBED IN AFR 800-18

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ACTION PLAN DEVELOPMENT TEAM

POLICY CHANGES NEEDED—Continued

- AFR 66-14: EQUIPMENT MAINTENANCE POLICIES, OBJECTIVES, AND RESPONSIBILITIES
  - —IMPLEMENT RELIABILITY-CENTERED MAINTENANCE POLICY
- AFR 66-30: PRODUCT IMPROVEMENT POLICY (PIP) FOR OPERATIONAL EQUIPMENT
  - —INCORPORATE THE DATA REQUIRED BY THIS REGULATION INTO THE R&M MANAGEMENT INFORMATION SYSTEM (MIS) SOON TO BE DESCRIBED IN AFR 800-18
- AFR 70-15: SOURCE SELECTION POLICY AND PROCEDURES
  - —MAKE R&M COEQUAL WITH COST, SCHEDULE, AND PERFORMANCE IN SOURCE SELECTION
- AFR 80-14: TEST AND EVALUATION
  - —EMPHASIZE R&M TESTING THROUGHOUT THE WEAPON SYSTEM LIFE CYCLE
- AFR 300-15: AUTOMATED DATA SYSTEM PROJECT MANAGEMENT
  - —INCLUDE R&M CONSIDERATIONS IN COMPUTER HARDWARE/SOFTWARE ACQUISITION AND MANAGEMENT
- AFR 400-51: OPERATIONS OF THE LOGISTICS RESEARCH PROGRAM
  - —INCLUDE R&M AS AN OBJECTIVE IN LOGISTICS RESEARCH

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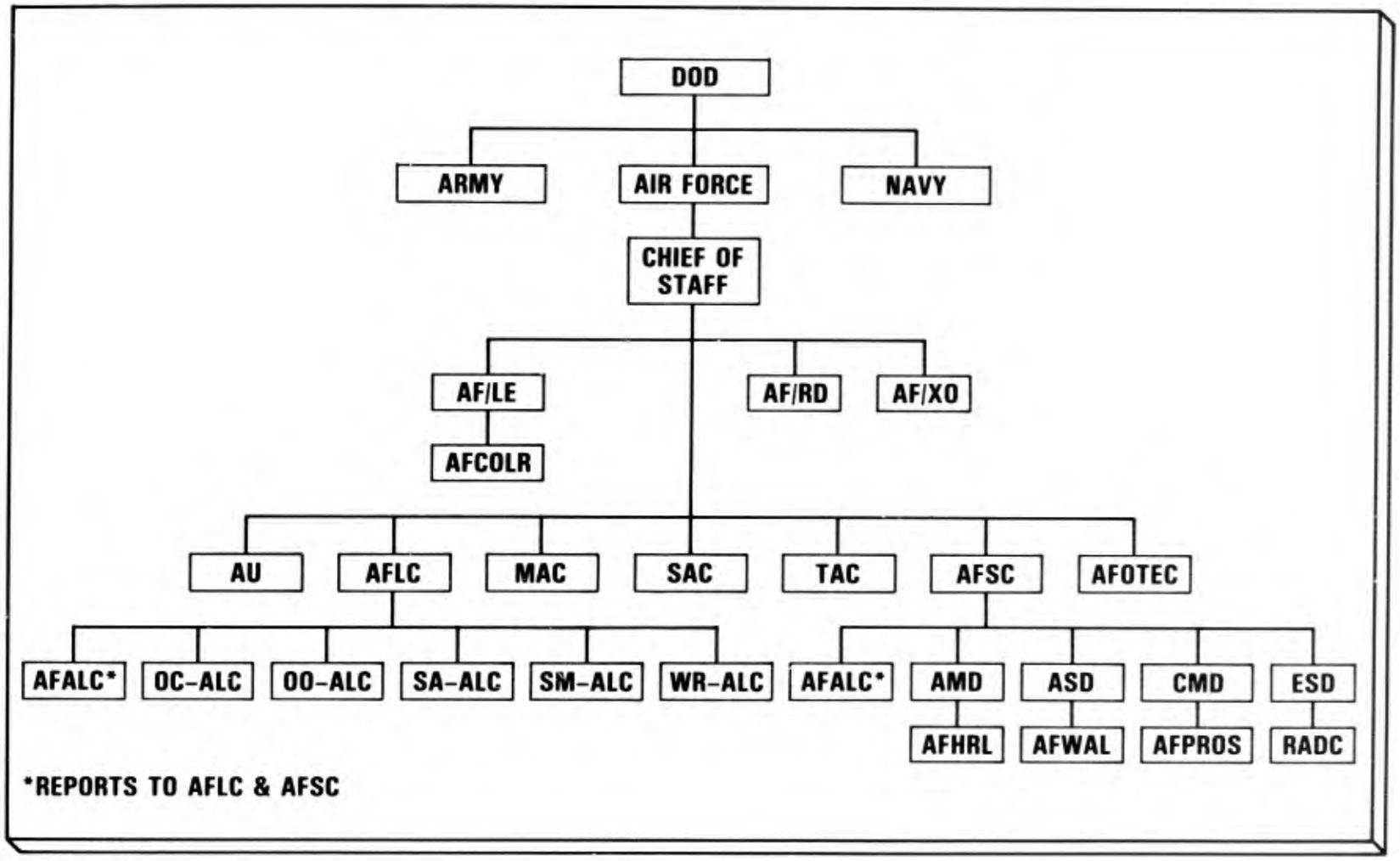
ACTION PLAN
DEVELOPMENT TEAM

POLICY CHANGES NEEDED—Continued

- AFR 400-64: LOGISTICS SUPPORT PLANS FOR GROUND C-E SYSTEMS AND EQUIPMENT
  - —INCLUDE R&M IN GROUND C-E LOGISTICS SUPPORT PLAN
- AFR 800-2: ACQUISITION PROGRAM MANAGEMENT
  - —MAKE R&M COEQUAL WITH COST, SCHEDULE, AND PERFORMANCE IN ACQUISITION MANAGEMENT
- AFR 800-8: INTEGRATED LOGISTICS SUPPORT PROGRAM
  - —UPDATE WITH EMPHASIS ON R&M
- AFR 800-13: AIR FORCE FEEDBACK POLICY
  - —INCORPORATE THE DATA REQUIRED BY THIS REGULATION INTO THE R&M MANAGEMENT INFORMATION SYSTEM (MIS) SOON TO BE DESCRIBED IN AFR 800-18
- AFR 800-18: AIR FORCE RELIABILITY AND MAINTAINABILITY PROGRAM
  - —REWRITE TO IMPLEMENT DODD 5000.40
- AFR 800-22: CFE VERSUS GFE SELECTION PROCESS
  - —INCLUDE R&M AS A CONSIDERATION IN CFE/GFE TRADEOFF DECISIONS

R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

ORGANIZATIONS VISITED



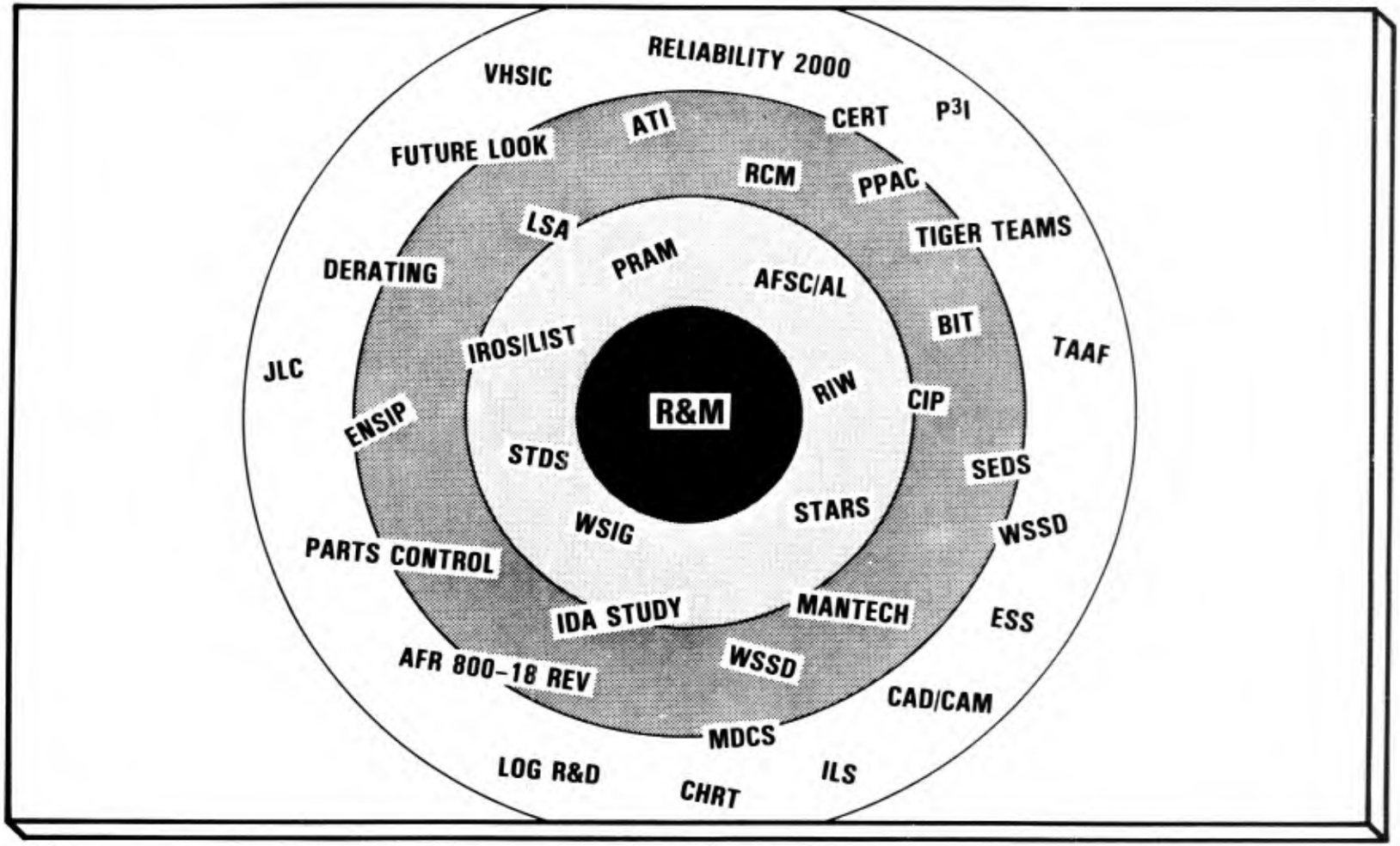
R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

INDUSTRY INTERVIEWS

- PRIMES
  - BOEING AIRCRAFT
  - GENERAL DYNAMICS
  - GENERAL ELECTRIC
  - GRUMMAN
  - HUGHES
  - LOCKHEED
  - MARTIN MARIETTA
  - McDONNELL DOUGLAS
  - NORTHROP
  - ROCKWELL INTERNATIONAL
- ASSOCIATIONS
  - AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA (AIAA)
  - AMERICAN DEFENSE PREPAREDNESS ASSOCIATION (ADPA)
  - ELECTRONIC INDUSTRIES ASSOCIATION (EIA)
  - NATIONAL SECURITY INDUSTRIAL ASSOCIATION (NSIA)
- MAJOR SUBS
  - EATON CORP, AIL
  - GARRETT TURBINE
  - HEWLETT PACKARD
  - IBM
  - LTV
  - PRATT & WHITNEY
  - RAYTHEON
  - SPERRY
  - TEXAS INSTRUMENTS
  - WESTINGHOUSE
- CONSULTANTS
  - ANSER
  - MITRE
  - RAND

R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

R&M INITIATIVES



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ACTION PLAN
DEVELOPMENT TEAM

INITIATIVES

ATI	AUTOMATION OF TECHNICAL INFORMATION
BIT	BUILT-IN TEST
CAD/CAM	COMPUTER-AIDED DESIGN/COMPUTER-AIDED MANUFACTURING
CERT	COMBINED ENVIRONMENTAL RELIABILITY TESTING
CHRT	COORDINATED HUMAN RESOURCES TECHNOLOGY
CIP	COMPONENT IMPROVEMENT PROGRAM
ENSIP	ENGINE STRUCTURAL INTEGRITY PROGRAM
ESS	ENVIRONMENTAL STRESS SCREENING
ILS	INTEGRATED LOGISTICS SUPPORT
IROS/LIST	INCREASED RELIABILITY OF OPERATIONAL SYSTEMS/LOGISTICS INVESTMENT SCREENING TECHNIQUES
JLC	JOINT LOGISTICS COMMANDERS
LOG R&D	LOGISTICS RESEARCH AND DEVELOPMENT
LSA	LOGISTICS SUPPORT ANALYSIS

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ACTION PLAN DEVELOPMENT TEAM

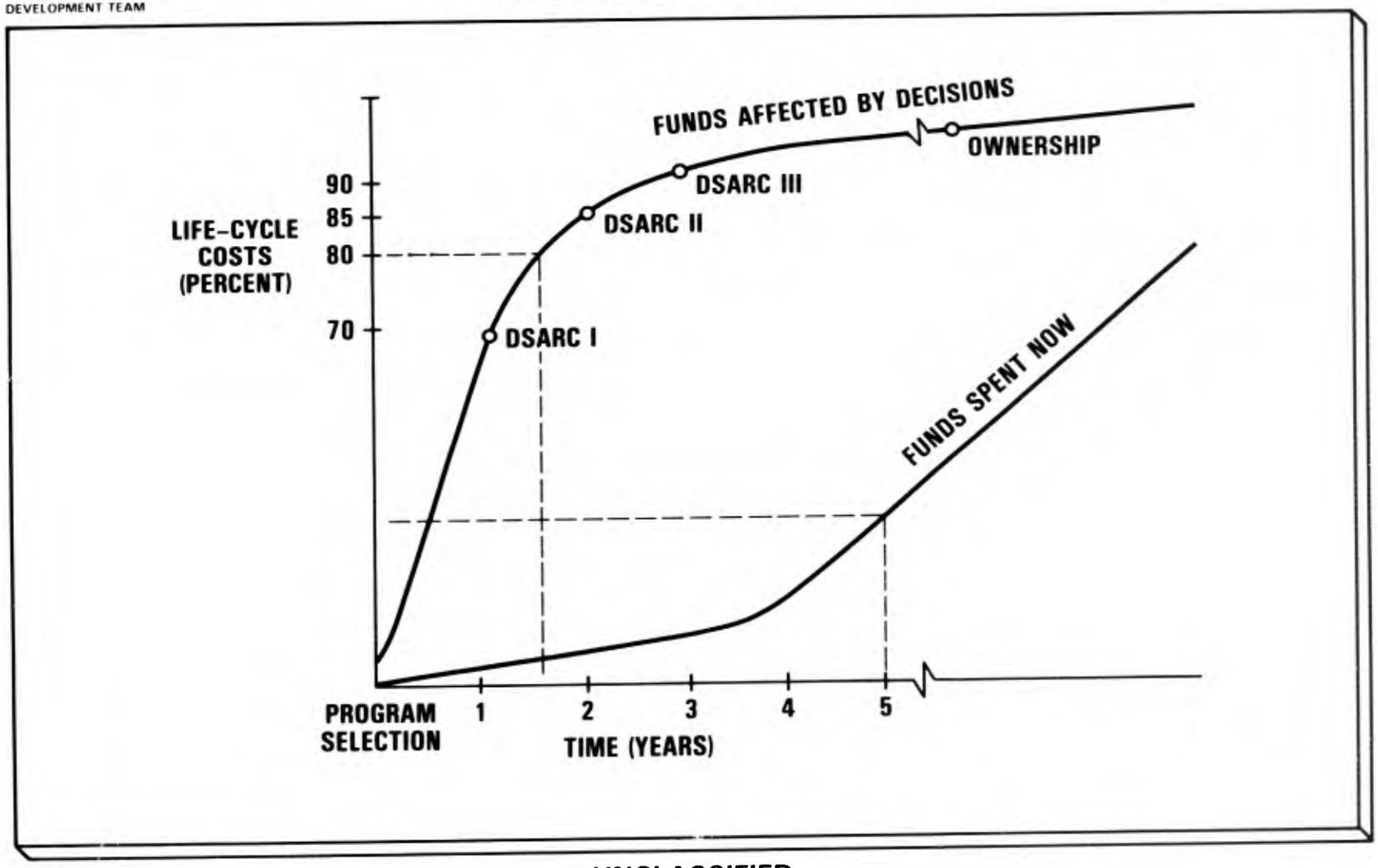
INITIATIVES—Continued

MANTECH	MANUFACTURING TECHNOLOGY
MDCS	MAINTENANCE DATA COLLECTION SYSTEM
P3I	PREPLANNED PRODUCT PERFORMANCE IMPROVEMENT
PPAC	PRODUCT PERFORMANCE AGREEMENT CENTER
PRAM	PRODUCTIVITY, RELIABILITY, AVAILABILITY, AND MAINTAINABILITY
RCM	RELIABILITY–CENTERED MAINTENANCE
RISE	RELIABILITY IMPROVEMENT OF SELECTED EQUIPMENT
RIW	RELIABILITY IMPROVEMENT WARRANTIES
R&M	RELIABILITY AND MAINTAINABILITY
SEDS	SYSTEMS EFFECTIVENESS DATA SYSTEM
STARS	SOFTWARE TECHNOLOGY FOR ADAPTABLE, RELIABLE SOFTWARE
STDS	SINGLE THREAD DATA SYSTEM
TAAF	TEST, ANALYZE, AND FIX
VHSIC	VERY–HIGH–SPEED INTEGRATED CIRCUITS
WSIG	WEAPON SYSTEM IMPROVEMENT GROUP
WSSD	WEAPON SYSTEM SUPPORT DEVELOPMENT PE64609

3312 38

R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

DSARC MILESTONES AND RELATED COMMITMENTS



3312 6

ACTION PLAN DEVELOPMENT TEAM

SYSTEM EFFECTIVENESS AND COST EFFECTIVENESS

SYSTEM EFFECTIVENESS = CAPABILITY × AVAILABILITY × DEPENDABILITY

THE EXTENT TO WHICH A SYSTEM ACHIEVES ITS MISSION WITHIN ITS OPERATIONAL ENVIRONMENT	=	ABILITY TO ACHIEVE ITS MISSION OBJECTIVES IN THE OPERATIONAL ENVIRONMENT –FUNCTIONAL PERFORMANCE –OPERATOR PERFORMANCE –THREAT ENVIRONMENT	×	PROBABILITY THAT SYSTEM IS OPERABLE AND READY TO BEGIN A MISSION –MAINTENANCE MANPOWER –SPARES –SUPPORT EQUIPMENT –R&M	×	PERFORMANCE DURING THE MISSION –RELIABILITY –IN-MISSION REPAIR –SUSTAINABILITY

COST EFFECTIVENESS = LIFE CYCLE COST PER UNIT OF SYSTEM EFFECTIVENESS

3312 56

ANNEX G

FINAL BRIEFING

23 JANUARY 1985

PART 1

FINAL BRIEFING TO SECAF AND CSAF

23 JANUARY 1985

RELIABILITY AND MAINTAINABILITY ACTION PLAN DEVELOPMENT TEAM

RELIABILITY AND MAINTAINABILITY
USAF
R&M

BRIEFING
PRESENTED BY
COL KENNETH MEYER
TEAM CHIEF

3312 7

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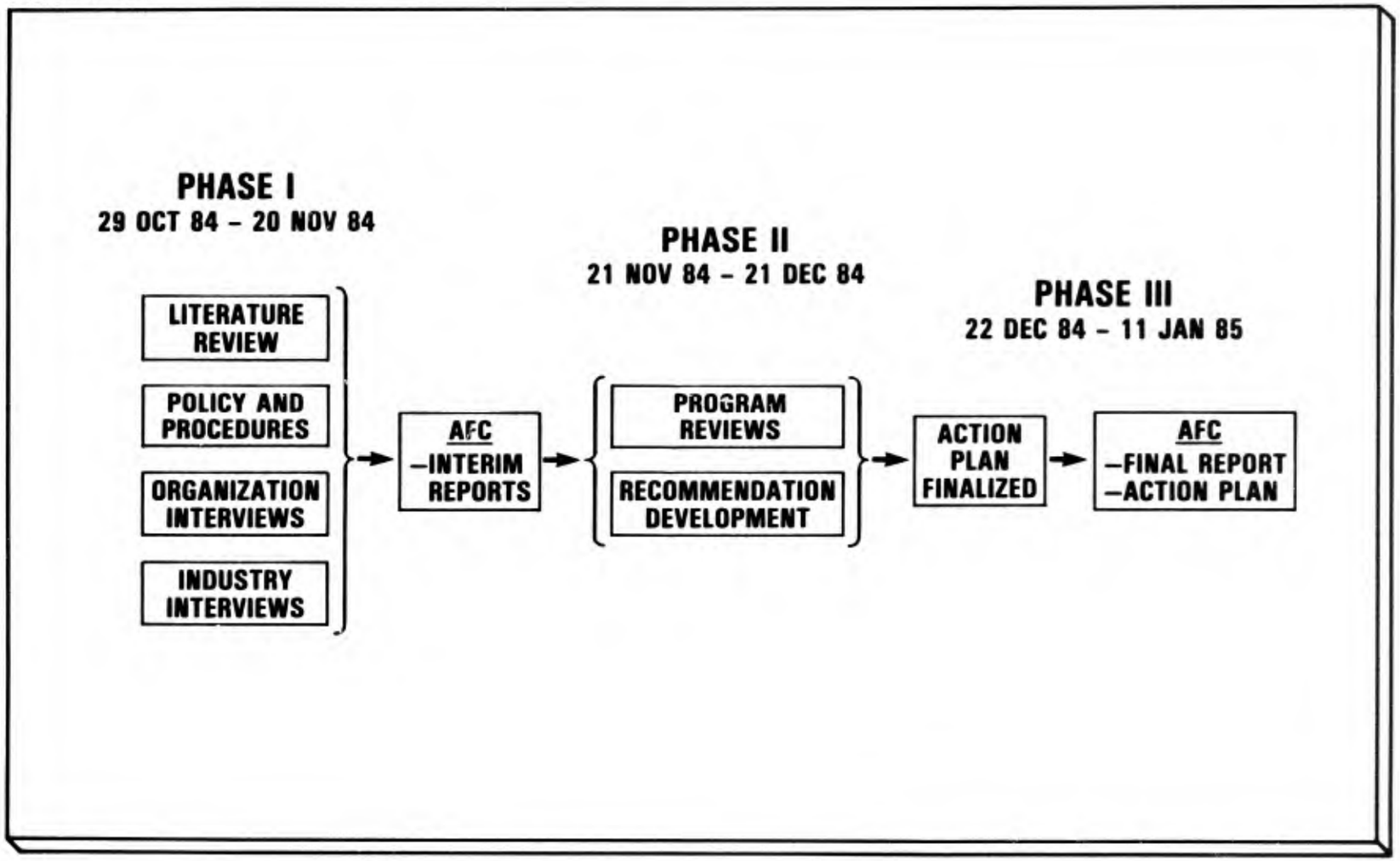
TEAM PLAN

ACTION PLAN DEVELOPMENT TEAM



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3312 2A

ACTION PLAN
DEVELOPMENT TEAM

WHAT THE ACTION PLAN MUST DO TO INSTITUTIONALIZE R&M

- MAINTAIN TOP MANAGEMENT COMMITMENT
- FOCUS AF RESOURCES ON EFFECTIVE R&M
- CONVINCE AIR FORCE AND CONTRACTOR ORGANIZATIONS THAT WE ARE SERIOUS

3312 29

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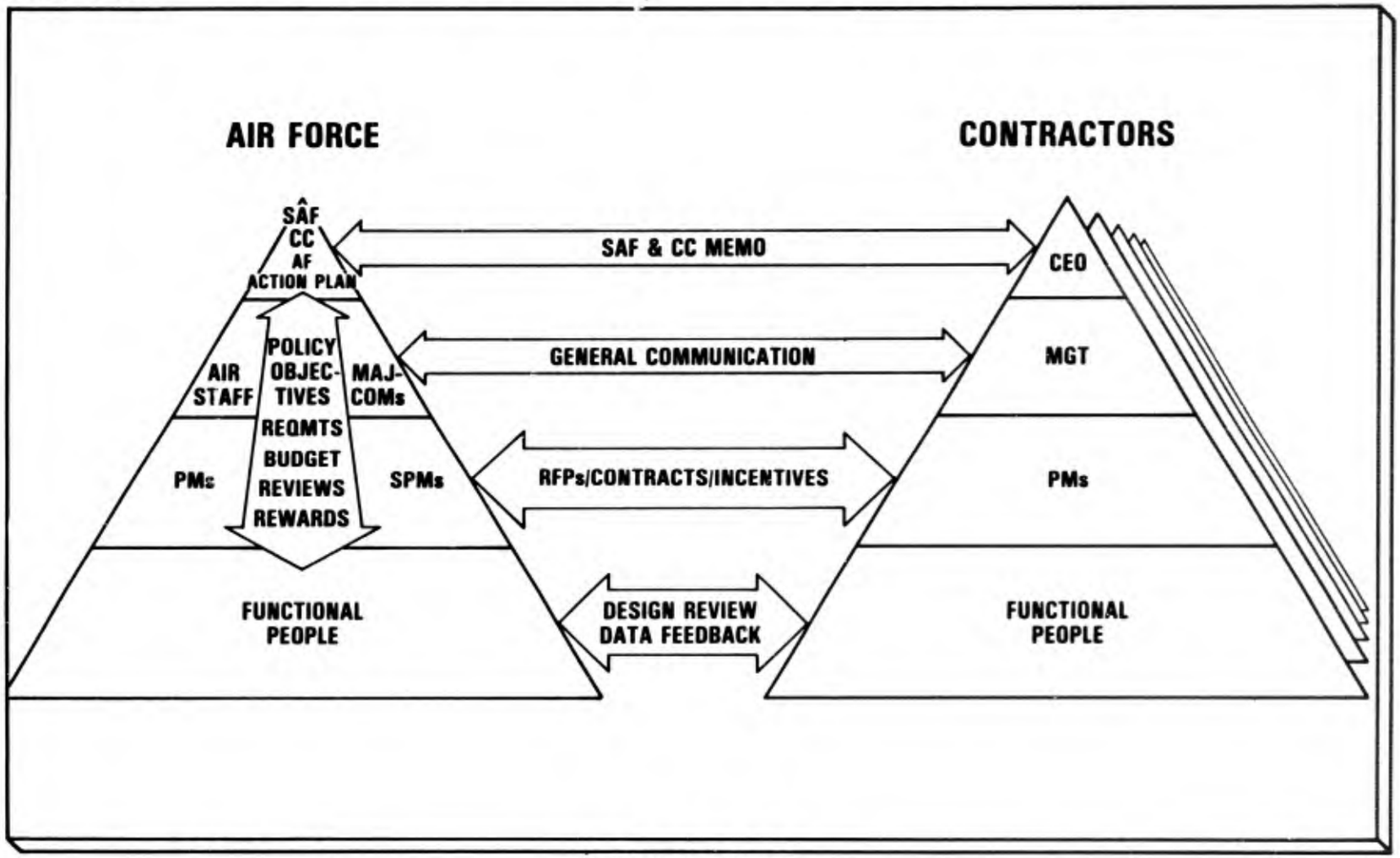
AIR FORCE/CONTRACTOR INSTITUTIONALIZATION PROCESS

ACTION PLAN DEVELOPMENT TEAM



G-8

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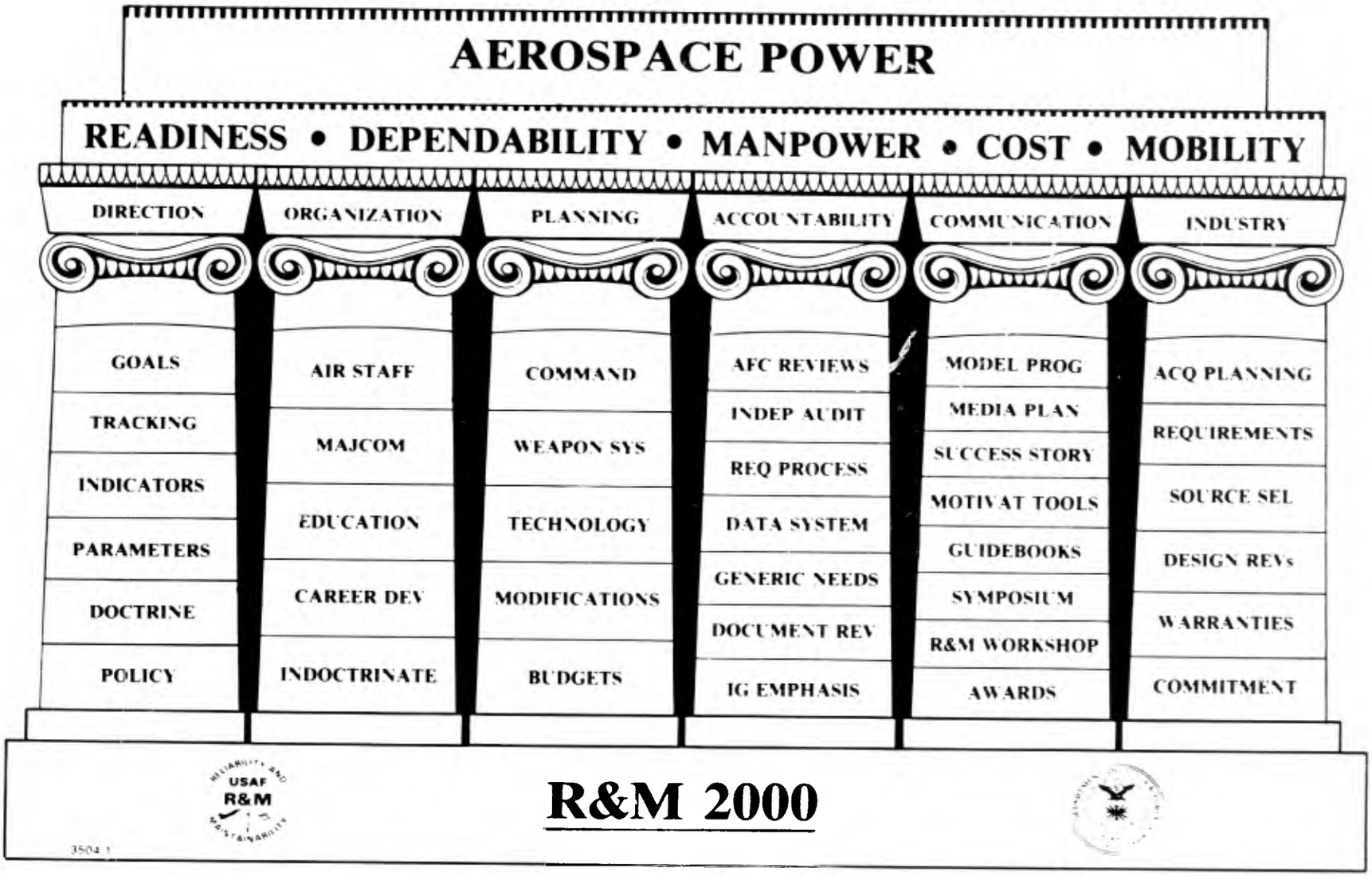
ACTION PLAN
DEVELOPMENT TEAM

R&M 2000: OBJECTIVES

- PROVIDE CLEAR DIRECTION THROUGH VISIBLE R&M GOALS AND POLICY TO INCREASE COMBAT EFFECTIVENESS
- ESTABLISH ORGANIZATIONAL FOCUS AND EXPAND TRAINING TO BUILD R&M TECHNICAL EXPERTISE, ADVOCACY, AUTHORITY, AND ACCOUNTABILITY
- IMPROVE R&M PLANNING TO CONSOLIDATE EFFORTS, TIE R&M TO OPERATIONAL GOALS, AND COORDINATE ACROSS COMMANDS
- ENSURE EFFECTIVE ACCOUNTABILITY AND FEEDBACK TO MEASURE PROGRESS IN THE R&M IMPROVEMENT PROGRAM
- PROVIDE POSITIVE COMMUNICATION AND MOTIVATION TO SUSTAIN COMMITMENT TO AND SUPPORT FOR R&M IMPROVEMENT
- OBTAIN INDUSTRY COMMITMENT TO ENSURE THAT CONTRACTORS HAVE THE MOTIVATION AND CAPABILITY TO SUPPORT R&M REQUIREMENTS

3504 3


AEROSPACE POWER
READINESS • DEPENDABILITY • MANPOWER • COST • MOBILITY
DIRECTION
ORGANIZATION
PLANNING
ACCOUNTABILITY
COMMUNICATION
INDUSTRY
GOALS
TRACKING
INDICATORS
PARAMETERS
DOCTRINE
POLICY
AIR STAFF
MAJCOM
EDUCATION
CAREER DEV
INDOCTRINATE
COMMAND
WEAPON SYS
TECHNOLOGY
MODIFICATIONS
BUDGETS
AFC REVIEWS
INDEP AUDIT
REQ PROCESS
DATA SYSTEM
GENERIC NEEDS
DOCUMENT REV
IG EMPHASIS
MODEL PROG
MEDIA PLAN
SUCCESS STORY
MOTIVAT TOOLS
GUIDEBOOKS
SYMPOSIUM
R&M WORKSHOP
AWARDS
ACQ PLANNING
REQUIREMENTS
SOURCE SEL
DESIGN REVs
WARRANTIES
COMMITMENT
USAF R&M
R&M 2000
3504-1

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I: PROVIDE CLEAR DIRECTION

REQUIRED ACTIONS

A. ESTABLISH OPERATIONAL SUPPORT GOALS

B. TRACK AND REPORT R&M IMPACT ON GOALS

C. ESTABLISH R&M MANAGEMENT INDICATORS

D. DEVELOP IMPROVED R&M PARAMETERS

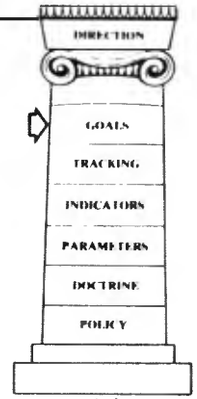
E. INCLUDE R&M IN AF DOCTRINE

F. REVISE POLICY TO REFLECT R&M 2000

3504 2

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I—ACTION A: ESTABLISH OPERATIONAL SUPPORT GOALS



PURPOSE

- TO VISIBLY TIE R&M TO OPERATIONAL REQUIREMENTS

METHODOLOGY

- AIR STAFF ESTABLISH AND DISSEMINATE GOALS FOR
  - —READINESS (INCREASE AVAILABILITY)
  - —DEPENDABILITY (IMPROVE MISSION SUCCESS)
  - —MANPOWER (LOWER MAINTENANCE DEMAND)
  - —COSTS (DECREASE O&S)
  - —MOBILITY (REDUCE DEMAND/INCREASE AVAILABILITY)
- MAJCOMs PLAN AND TRACK R&M AGAINST GOALS

3504 4

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE II: ESTABLISH ORGANIZATIONAL FOCUS AND EXPAND TRAINING

REQUIRED ACTIONS

A. ESTABLISH AIR STAFF ORGANIZATIONAL FOCUS

B. REVIEW MAJCOM R&M ORGANIZATION

C. IMPROVE R&M EDUCATIONAL OPPORTUNITIES

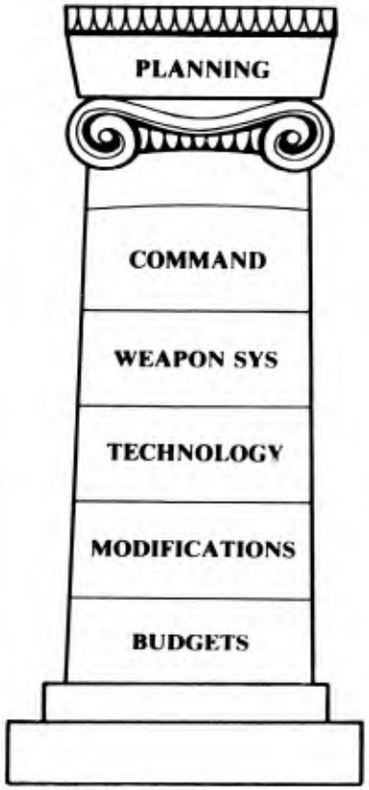
D. ESTABLISH CAREER DEVELOPMENT PROGRAM

E. PREPARE R&M ORIENTATION COURSES

3504 5

USAF R&M
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE III: IMPROVE R&M PLANNING



REQUIRED ACTIONS

A. INITIATE COMMAND-LEVEL R&M PLANS

B. UPGRADE WEAPON SYSTEM R&M PLANNING

C. ENHANCE R&M TECHNOLOGY PLANNING

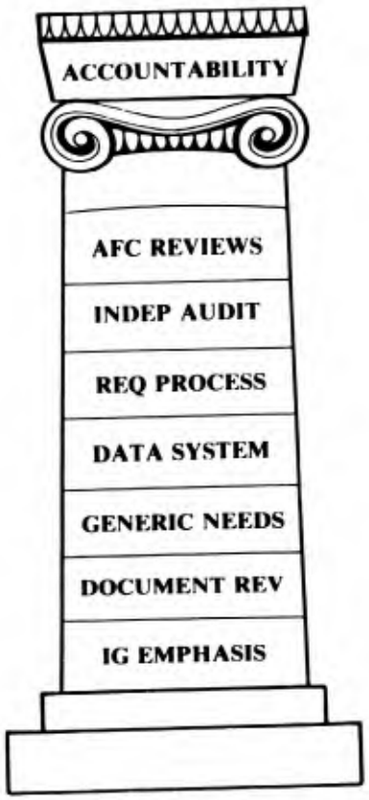
D. IMPROVE R&M MODIFICATION PLANNING

E. IDENTIFY AND TRACK R&M BUDGETS

3504 7

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV: ENSURE EFFECTIVE ACCOUNTABILITY AND FEEDBACK



REQUIRED ACTIONS

A. INTENSIFY WEAPON SYSTEM REVIEWS

B. CONDUCT INDEPENDENT AF/R&M REVIEWS

C. IMPROVE R&M COVERAGE IN REQUIREMENTS PROCESS

D. DEVELOP EFFECTIVE R&M DATA SYSTEM

E. IDENTIFY GENERIC NEEDS/OPPORTUNITIES

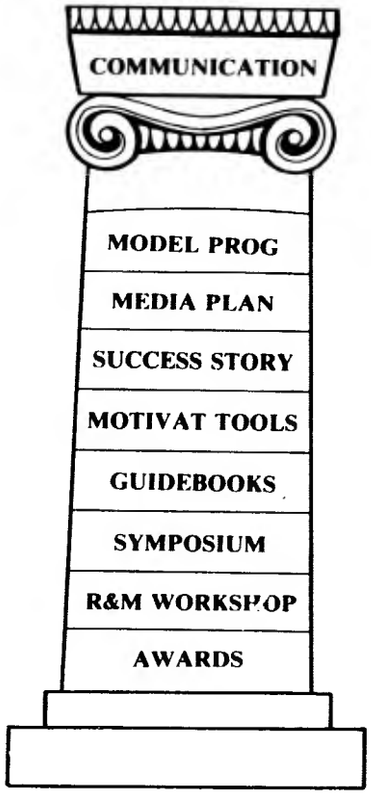
F. INTENSIFY REVIEW OF PROGRAM DECISION DOCUMENTATION

G. INCREASE AIR STAFF AND IG R&M SURVEILLANCE

3504 9

USAF R&M ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V: PROVIDE POSITIVE COMMUNICATION AND MOTIVATION



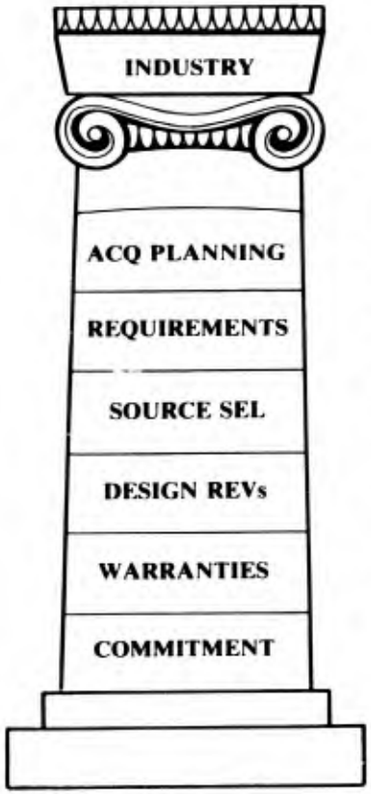
REQUIRED ACTIONS

A. IDENTIFY AND PROMOTE MODEL R&M PROGRAMS
B. IMPLEMENT R&M MEDIA PLAN
C. PUBLISH SUCCESS STORIES
D. DEVELOP AND DISSEMINATE MOTIVATIONAL TOOLS
E. PUBLISH R&M GUIDEBOOKS
F. CONDUCT AF AND INDUSTRY SYMPOSIUM
G. EXPAND AFSC/AFLC R&M WORKSHOP
H. IMPLEMENT AWARDS PROGRAM

3504 10

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI: OBTAIN INDUSTRY COMMITMENT



REQUIRED ACTIONS

A. EXPAND ACQUISITION PLANNING FOR R&M

B. IMPROVE R&M REQUIREMENTS IN CONTRACTS

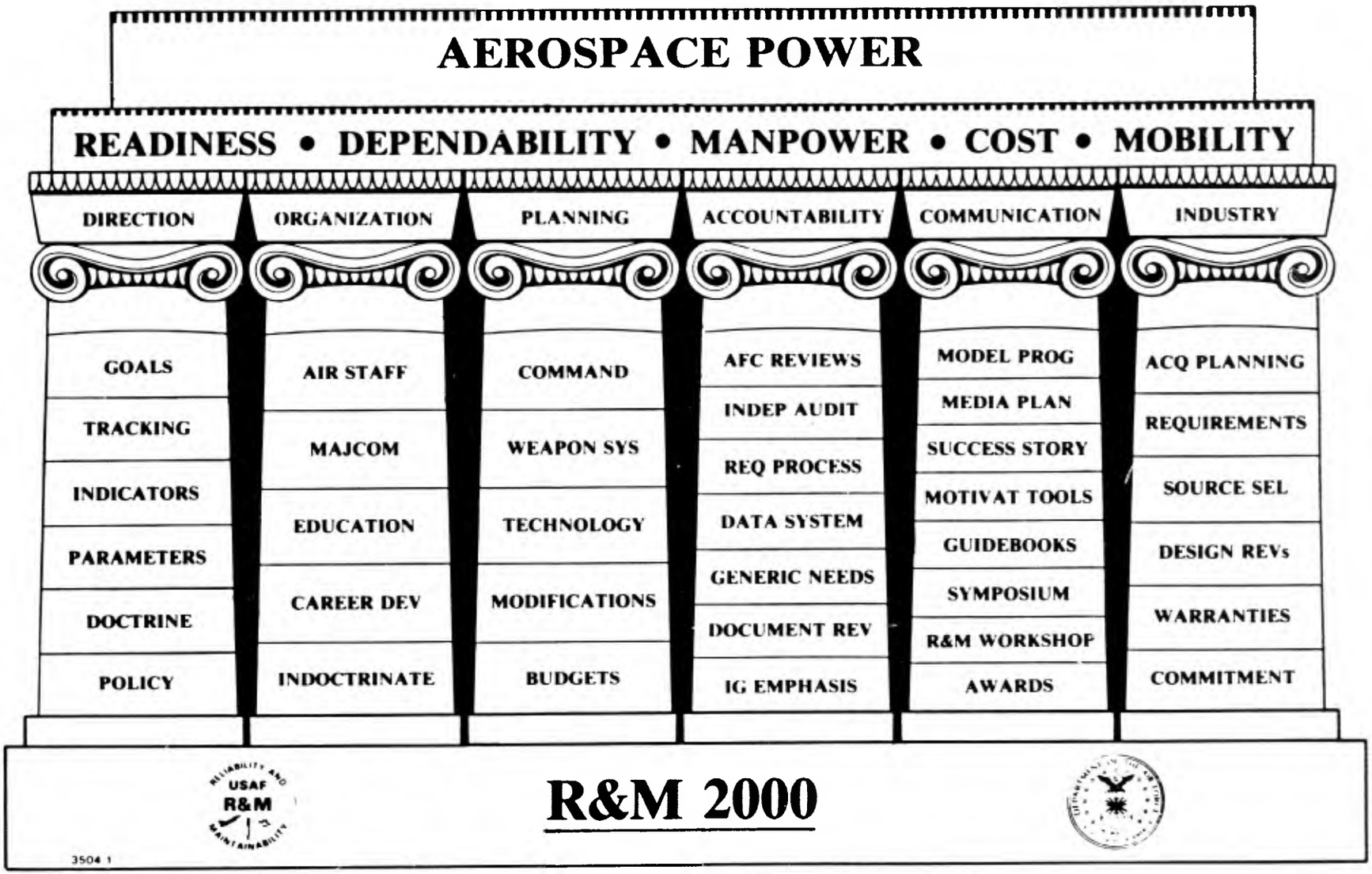
C. INCREASE R&M CONSIDERATION IN SOURCE SELECTION

D. INTENSIFY R&M ASSESSMENTS IN DESIGN REVIEWS

E. UPGRADE USE OF R&M WARRANTIES/INCENTIVES

F. ENSURE THAT INDUSTRY INSTITUTIONALIZES COMMITMENT

3504 11


AEROSPACE POWER
READINESS • DEPENDABILITY • MANPOWER • COST • MOBILITY
DIRECTION
ORGANIZATION
PLANNING
ACCOUNTABILITY
COMMUNICATION
INDUSTRY
GOALS
TRACKING
INDICATORS
PARAMETERS
DOCTRINE
POLICY
AIR STAFF
MAJCOM
EDUCATION
CAREER DEV
INDOCTRINATE
COMMAND
WEAPON SYS
TECHNOLOGY
MODIFICATIONS
BUDGETS
AFC REVIEWS
INDEP AUDIT
REQ PROCESS
DATA SYSTEM
GENERIC NEEDS
DOCUMENT REV
IG EMPHASIS
MODEL PROG
MEDIA PLAN
SUCCESS STORY
MOTIVAT TOOLS
GUIDEBOOKS
SYMPOSIUM
R&M WORKSHOP
AWARDS
ACQ PLANNING
REQUIREMENTS
SOURCE SEL
DESIGN REVs
WARRANTIES
COMMITMENT
USAF R&M
R&M 2000
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ACTION PLAN
DEVELOPMENT TEAM

R&M 2000: AIR STAFF RESPONSIBILITIES

- INSTITUTIONALIZE COMMITMENT TO IMPROVED R&M
- MANAGE R&M 2000 IMPLEMENTATION
  - —GOAL PROGRAM
  - —PLANNING PROGRAM
  - —R&M WEAPON SYSTEM REVIEWS
  - —COMMUNICATION AND MOTIVATION PROGRAM
  - —POLICY AND BUDGETS
- ESTABLISH R&M ORGANIZATIONAL FOCUS
  - —SPECIAL ASSISTANT FOR R&M

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ACTION PLAN
DEVELOPMENT TEAM

R&M 2000: USING COMMAND RESPONSIBILITIES

- INSTITUTIONALIZE COMMITMENT TO IMPROVED R&M
- TRACK AND REPORT PROGRESS TOWARD GOALS
- REVIEW AND UPGRADE R&M ORGANIZATION AND TRAINING
- PREPARE AND SUBMIT ANNUAL R&M PLAN
- PUBLISH R&M SUCCESS STORIES/LESSONS LEARNED
- INCREASE R&M CONSIDERATION IN SOURCE SELECTION

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ACTION PLAN DEVELOPMENT TEAM

R&M 2000: AFSC AND AFLC RESPONSIBILITIES

- INSTITUTIONALIZE COMMITMENT TO IMPROVED R&M
- TRACK AND REPORT PROGRESS TOWARD GOALS
- REVIEW AND UPGRADE R&M ORGANIZATION AND TRAINING
- PREPARE R&M PLANS (COMMAND, TECHNOLOGY, AND PROGRAM)
- IDENTIFY AND CROSSFEED R&M NEEDS/OPPORTUNITIES
- PUBLISH R&M MOTIVATIONAL MATERIAL
- INCREASE R&M CONSIDERATION IN SOURCE SELECTION
- ENSURE THAT INDUSTRY INSTITUTIONALIZES R&M COMMITMENT

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ACTION PLAN DEVELOPMENT TEAM

R&M 2000: IMPLEMENTATION

- AFC APPROVAL — JAN 85
  - —ACTION PLAN SIGNED
- CSAF AND SAF BRIEFING — JAN 85
  - —COVER MEMO SIGNED
  - —ACTION PLAN DISTRIBUTED
- R&M WORKING GROUP BEGIN IMPLEMENTATION — FEB 85
  - —UNDER DIRECTION OF STEERING GROUP
  - —FULL-TIME ACTION OFFICERS
  - —TRANSITION TO SPECIAL ASSISTANT

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ACTION PLAN
DEVELOPMENT TEAM

SUMMARY

- NEED TO IMPROVE R&M
  - —INTENSIFYING THREAT
  - —DIMINISHING MANPOWER
  - —RISING SUPPORT COSTS
- OPPORTUNITY TO IMPROVE R&M
  - —TECHNOLOGY MARGIN
  - —LEADERSHIP SUPPORT
  - —CONTRACTOR CAPABILITY
- WAY TO IMPROVE R&M

R&M 2000

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PART 2

BACKUP SLIDES TO FINAL BRIEFING

23 JANUARY 1985

RELIABILITY AND MAINTAINABILITY ACTION PLAN DEVELOPMENT TEAM

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ACTION PLAN
DEVELOPMENT TEAM

TEAM PRODUCTS

- INTERIM BRIEFING TO AFC ON 19 DECEMBER 1984
  - —FIRST, AF MUST INSTITUTIONALIZE COMMITMENT TO R&M
  - —THEN, AF TALENT CAN FOCUS ON AND SOLVE R&M PROBLEMS
- FINAL BRIEFING TO SAF AND AF/CC ON 23 JANUARY 1985
  - —INSTITUTIONALIZATION REQUIRES COMPLETION OF SIX OBJECTIVES
    - ESTABLISH DIRECTION AND GOALS
    - FOCUS ORGANIZATION AND TRAINING
    - IMPLEMENT PLANNING
    - ENSURE ACCOUNTABILITY AND FEEDBACK
    - INITIATE COMMUNICATION AND MOTIVATION
    - OBTAIN INDUSTRY COMMITMENT
- ACTION PLAN—R&M 2000
  - —AF CHARTER FOR R&M IMPROVEMENT
  - —37 ACTIONS TO CARRY OUT SIX OBJECTIVES
- FINAL REPORT
  - —TEAM ORGANIZATION, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS (VOL. I)
  - —TEAM DOCUMENTATION (VOL. II)

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ACTION PLAN
DEVELOPMENT TEAM

WHAT'S DIFFERENT TODAY

- THREAT IS INTENSIFYING AND DEMANDS
  - —LOWER VULNERABILITY (SYSTEMS, PEOPLE, AND SUPPORT EQUIPMENT)
  - —IMPROVED MOBILITY (LESS MOVED BETTER)
  - —IMPROVED READINESS (HIGHER AVAILABILITY)
  - —BETTER DEPENDABILITY (HIGHER MISSION SUCCESS)
- MANPOWER AVAILABILITY IS DECREASING AND DEMANDS
  - —REDUCED MAINTENANCE MANPOWER REQUIREMENTS
  - —LOWER AND FEWER SKILL LEVELS
- SUPPORT COSTS ARE INCREASING AND BUDGET REALITIES DEMAND
  - —MORE EFFICIENCY IN O&S COSTS
  - —LOWER SPARES, TEST EQUIPMENT, AND PEOPLE BUDGETS

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ACTION PLAN DEVELOPMENT TEAM

WHAT'S DIFFERENT TODAY—Continued

- TECHNOLOGY IS AVAILABLE AND CAN PROVIDE
  - —BOTH CAPABILITY AND R&M IMPROVEMENTS
  - —OPERATIONAL MARGIN TO TRADE FOR MORE R&M
- LEADERSHIP RECOGNIZES NEED AND OPPORTUNITIES AND PROVIDES
  - —DIRECTION AND COMMITMENT FOR R&M
  - —PRIORITY AND RESOURCES TO ACCELERATE R&M IMPROVEMENT
- CONTRACTORS HAVE DESIGN AND MANUFACTURING CAPABILITY AND CAN PROVIDE
  - —MORE TALENT AND RESOURCES FOR R&M
  - —ACCELERATED IMPROVEMENT OF SYSTEM R&M

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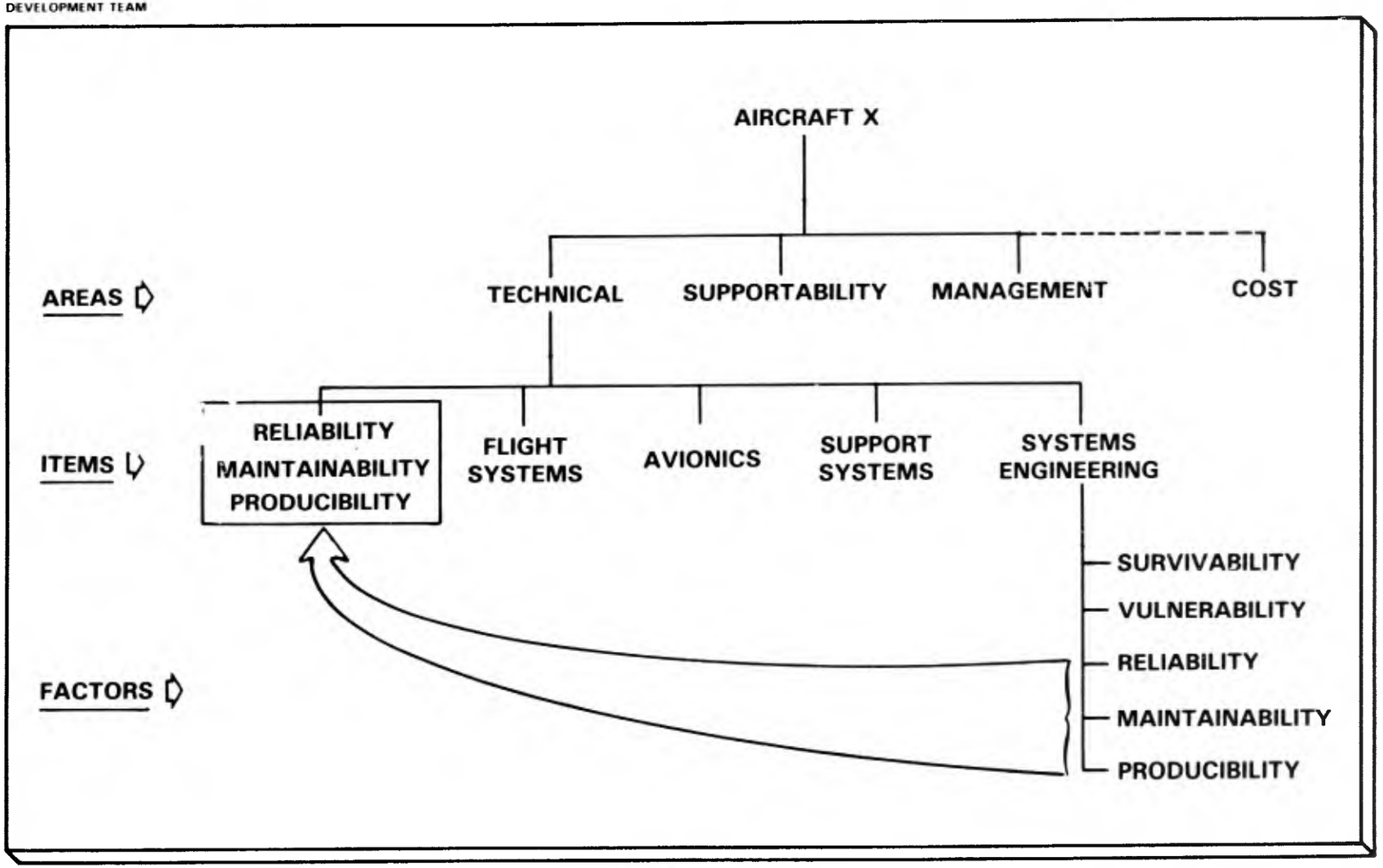
ACTION PLAN
DEVELOPMENT TEAM

SOURCE SELECTION EVALUATIONS



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ACTION PLAN DEVELOPMENT TEAM

R&M 2000: WHAT IT WILL CHANGE

	PRESENT	FUTURE
COMMITMENT	LIMITED	PERVASIVE
GOALS	UNCLEAR	VISIBLE AND OPERATIONAL
PLANNING	SPORADIC	COMPREHENSIVE
ORGANIZATION	FRAGMENTED	FOCUSED
PRIORITY	ONE OF MANY	ONE OF ESSENTIAL
OVERSIGHT	LITTLE	THOROUGH
COMMUNICATION	RANDOM	FREQUENT
CONTRACTOR	SPECULATING	CONVINCED
ACCOUNTABILITY	ELUSIVE	FIXED

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ACTION PLAN
DEVELOPMENT TEAM

R&M 2000: IMPACT ON NEW SYSTEMS

- R&M IMPACT ON OPERATIONAL SUPPORT GOALS TRACKED AND PROJECTED
- R&M MANAGEMENT INDICATORS REPORTED
- R&M PROGRAM PLAN MAINTAINED
- PROGRAM REVIEWS INTENSIFIED
- NEW TECHNOLOGY IMPLICATIONS ADDRESSED
- R&M INDEPENDENT AUDITS INITIATED
- REQUIREMENTS STATEMENTS IMPROVED
- R&M SOURCE SELECTION CONSIDERATION INCREASED
- APPLICATION OF LESSONS LEARNED IMPROVED
- CONTRACTORS MOTIVATED
- ACQUISITION DOCUMENTATION THOROUGHLY REVIEWED
- STAFF AND IG SURVEILLANCE INCREASED
- R&M DURING DESIGN REVIEWS EXPLORED
- MODEL PROGRAMS IDENTIFIED
- GOOD PROGRAMS REWARDED
- TRAINING AND EDUCATION OPPORTUNITIES IMPROVED
- CONTRACTS (REQUIREMENT STATEMENTS AND INCENTIVES) IMPROVED

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ACTION PLAN DEVELOPMENT TEAM

R&M 2000: IMPACT ON FIELDED SYSTEMS

- R&M IMPACT ON OPERATIONAL SUPPORT GOALS TRACKED AND PROJECTED
- R&M MANAGEMENT INDICATORS REPORTED
- R&M PLAN FOR EACH WEAPON SYSTEM MAINTAINED
- PROGRAM REVIEWS INTENSIFIED
- R&M INDEPENDENT AUDITS INITIATED
- STAFF AND IG SURVEILLANCE INCREASED
- MODEL PROGRAMS IDENTIFIED
- GOOD PROGRAMS REWARDED
- TRAINING AND EDUCATION OPPORTUNITIES IMPROVED
- BAD ACTORS/TECHNOLOGY NEEDS IDENTIFIED AND ADDRESSED
- MODIFICATION PLANNING INTEGRATED
- WARRANTY ADMINISTRATION IMPROVED
- CONTRACTORS STIMULATED TO RESPOND TO R&M NEEDS
- R&M DATA SYSTEMS UPGRADED

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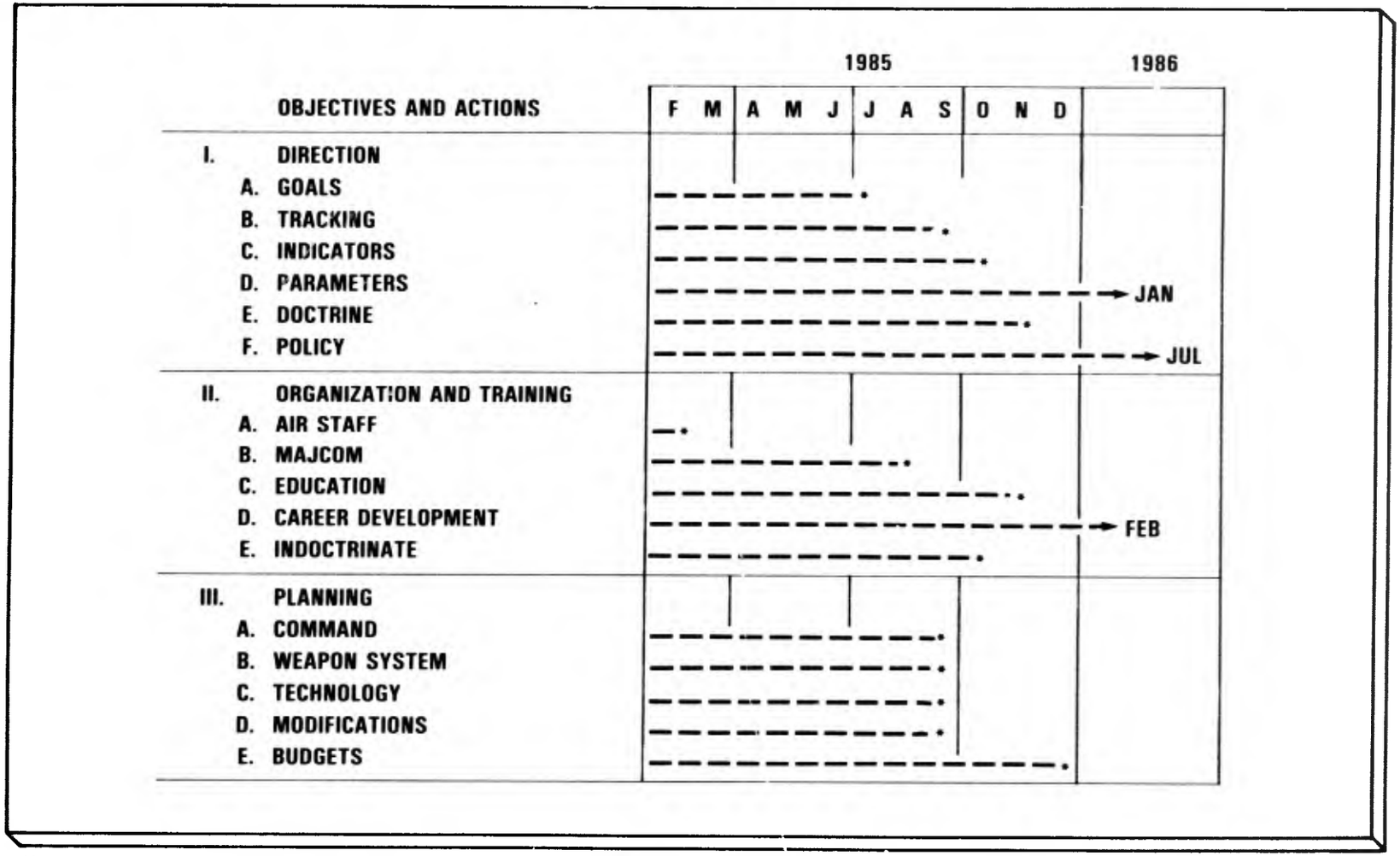
R&M 2000 - MAJOR ACTIONS BY ORGANIZATION

	I Direction and Goals	II Organization and Training	III Planning	IV Accountability and Feedback	V Communication & Motivation	VI Industry Commitment
Using Commands	Track & Report Wpn Sys R&M to Impact on Ops Spt Goals Revise Policy & Procedures to Reflect R&M Commitment	Review R&M Org Capability to Support R&M 2000 Upgrade Ed/Tng of R&M Staff	Write Command Level R&M Plan	Ensure R&M Institutionalized Across Command	Publish R&M Success Stories/ Lessons Learned	Improve Statements of R&M Reqs/Parameters in Acq Document Upgrade Consideration of R&M in Source Sel
AFSC/ AFLC	Track & Report Wpn Sys R&M to Impact on Ops Spt Goals Revise Policy & Procedures to Reflect R&M Commitment	Review R&M Org Capability to Support R&M 2000 Upgrade Ed/Tng of R&M Staff Establish R&M Career Dev Programs Develop R&M Orientation & Tng Courses	Write Command Level R&M Plan Maintain R&M Plans for Each System Write R&M Technology Plan Write Wpn Sys Modification Plan (AFLC)	Ensure R&M Institutionalized Across Command Identify and Crossfeed Generic R&M Needs/ Opportunities Conduct R&M Program Reviews	Identify Model R&M Programs Publish R&M Success Stories/ Lessons Learned Develop R&M Motivational Tools Publish R&M Guidebooks Upgrade R&M Workshop	Intensify R&M Assessment in Design Reviews Institutionalize R&M in Contractor Facilities Upgrade Consideration of R&M in Source Sel Upgrade R&M Acq Planning & Program Direction Improve Statement of R&M Reqs/Parameters in Acq Documents
AF/R&M	Manage AF R&M Ops Spt Goals Program Establish R&M Mgt Indicators Develop Improved R&M Parameters Revise Policy & Procedures to Reflect R&M Commitment	Establish Air Staff Organizational focus for R&M	Identify/Track R&M Budgets Review/Assess R&M Plans	Lead R&M 2000 Implementation Support ASB/ AFC Reviews Conduct Independent R&M Assessments Review SON/Acq Documents for R&M Factors Perform R&M Staff Assist Dev R&M Data System	Conduct Industry/AF R&M Symposium Manage AF R&M Awards Program Develop and Implement Media Plan for R&M	Upgrade Consideration of R&M in Source Sel Upgrade R&M Acq Planning & Program Direction Improve Statement of R&M Req/Parameters In Acq Documents
Others	Revise AF Doctrine to Address R&M (AF/XO/LE)	Review R&M Org Capability to Support R&M 2000 (AFOTEC) Establish Air Staff Organization for R&M (AF/LE/RD/XO)	Write SOA-Level R&M Plan (AFOTEC)	Increase R&M Surveillance (AF/IG)		Enhance Policy for Use of R&M Incentives/ Warranties (AF/RD) Upgrade R&M Acq Planning & Program Direction (AF/RD)

USAF R&M ACTION PLAN DEVELOPMENT TEAM

USAF R&M ACTION PLAN—R&M 2000 SCHEDULE



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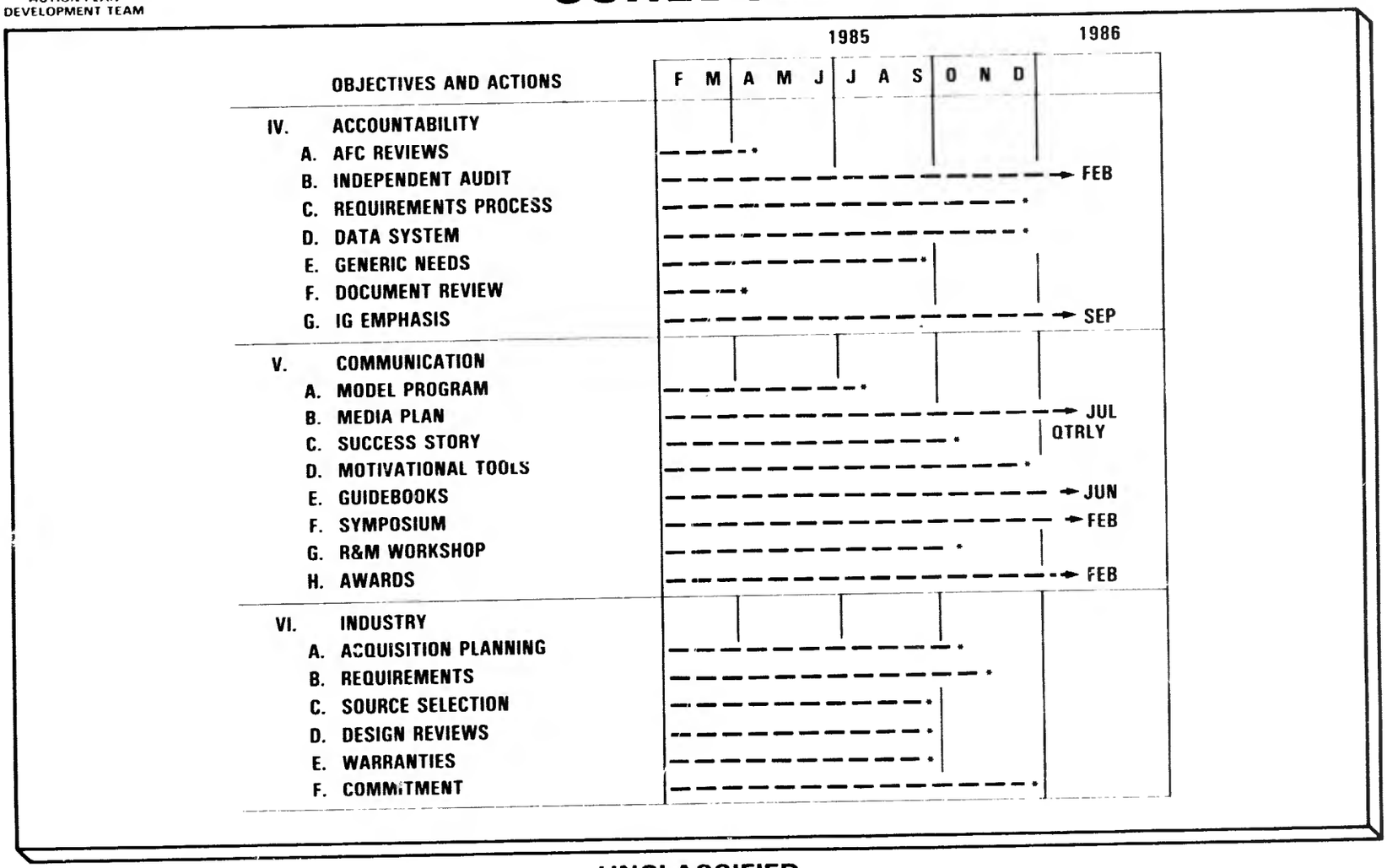
USAF R&M ACTION PLAN—R&M 2000 SCHEDULE

ACTION PLAN DEVELOPMENT TEAM



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USAF R&M 2X
RELIABILITY AND MAINTAINABILITY
ACTION PLAN DEVELOPMENT TEAM

ESTIMATED R&M FUNDING

- R&M INVESTMENT
  - —DIFFICULT TO SEGREGATE
  - —ABOUT 2–3% OF TOA
- R&M PROGRAM RESOURCES (FY 86 BES)

—CLASS IV MODS	$1,164M
—SYSTEM DEV ENGINEERING	$480M
—SUSTAINING ENGINEERING	$299M
—ENGINE CIP	$143M
—LOG R&D	$126M
—PRAM	$18M
—OTHERS (PE 6.3, PE 6.5, etc.)	$58M

- OPPORTUNITIES FOR INCREASED INVESTMENT
  - —ENGINE CIP
  - —PRAM
  - —SUSTAINING ENGINEERING

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ACTION PLAN
DEVELOPMENT TEAM

BRIEFING SCHEDULE

WHO	WHEN
AFALC/CC	7 JANUARY 1985
AFLC	8 JANUARY 1985
AF/RD/LE/XO	9 JANUARY 1985
AFSC/CC	14 JANUARY 1985
AIR STAFF BOARD	15 JANUARY 1985
AIR FORCE COUNCIL	18 JANUARY 1985
SAF/AL	22 JANUARY 1985
SAF/OS AND AF/CC	23 JANUARY 1985

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ACTION PLAN
DEVELOPMENT TEAM

PROGRAM REVIEW

- SCOPE
  - —VISITED AFSC, AFLC, ARMY, AND NAVY PROGRAMS
  - —INTERVIEWED OVER 90 PROGRAM PEOPLE
- FINDINGS
  - —ECHOED FINDINGS FROM OTHER REVIEWS
  - —NEED REALISTIC DESIGN REQUIREMENTS
  - —EXPAND R&M EMPHASIS IN DESIGN REVIEWS
  - —MAKE R&M VISIBLE IN SOURCE SELECTIONS
  - —RECOGNIZE CURRENT SUCCESSFUL EFFORTS

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ACTION PLAN
DEVELOPMENT TEAM

PROGRAMS VISITED

PROGRAM	ORGANIZATION
F-111	SACRAMENTO AIR LOGISTICS CENTER
A-10	SACRAMENTO AIR LOGISTICS CENTER
ATF	AERONAUTICAL SYSTEMS DIVISION
ENGINES	AERONAUTICAL SYSTEMS DIVISION
C-17	AERONAUTICAL SYSTEMS DIVISION
F-16	AERONAUTICAL SYSTEMS DIVISION
AMRAAM	ARMAMENT DIVISION
GPS	SPACE DIVISION
PAVE PILLAR	AIR FORCE WRIGHT AERONAUTICAL LAB (AFWAL)
JAFE	AIR FORCE WRIGHT AERONAUTICAL LAB (AFWAL)
MUNITIONS	AIR FORCE ARMAMENT LAB (AFATL)
F-18	NAVY
HH-60	ARMY

3504 62

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I—ACTION B: TRACK AND REPORT R&M IMPACT ON GOALS

PURPOSE

- TO REPORT R&M IMPACT ON OPERATIONAL SUPPORT GOALS BY COMMAND AND WEAPON SYSTEM

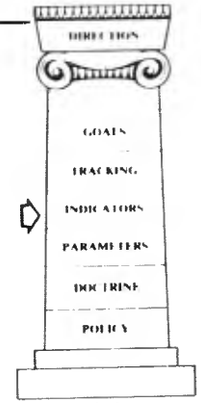
METHODOLOGY

- COORDINATE PARAMETERS, COVERAGE, AND FORMAT WITH MAJCOMs
  - —USE EXISTING DATA SYSTEMS AND PARAMETERS
- MAJCOMs REPORT PROGRESS TOWARD GOALS SEMIANNUALLY
- BRIEF SENIOR AIR FORCE LEADERSHIP SEMIANNUALLY
- ASSESS AND MODIFY GOALS AND REPORTING (AS REQUIRED)

3504 21

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I—ACTION C: ESTABLISH R&M MANAGEMENT INDICATORS



PURPOSE

- TO CLEARLY DISPLAY IMPACT OF R&M IMPROVEMENTS ON OPERATIONAL SUPPORT GOALS TO AF LEADERSHIP AND ORGANIZATIONS

METHODOLOGY

- ANALYZE CURRENT METHODS OF DISPLAYING R&M DATA
- DEVELOP MANAGEMENT INDICATORS THAT PORTRAY
  - —R&M GROWTH IN EACH MAJOR WEAPON SYSTEM
  - —COMPARISONS AMONG WEAPON SYSTEMS
  - —TECHNOLOGY INSERTION SUCCESSES
  - —IR&D FOR R&M
  - —BUDGET REQUIREMENTS AND INVESTMENTS
- COLLECT, ANALYZE, AND PRESENT INDICATORS QUARTERLY

3504 22

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I—ACTION D: DEVELOP IMPROVED R&M PARAMETERS

PURPOSE

- TO DEVELOP IMPROVED MEASURES FOR R&M THAT ACCURATELY DEPICT THEIR RELATIONSHIP TO OPERATIONAL SUPPORT GOALS

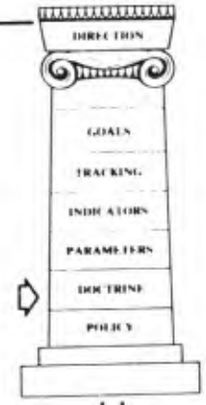
METHODOLOGY

- INITIATE GOAL PROGRAM WITH CURRENT R&M PARAMETERS SUCH AS
  - —MEAN TIME BETWEEN FAILURE
  - —MEAN TIME TO REPAIR
  - —MAINTENANCE CARGO TON–MILES
- MAJCOMs DEVELOP AND RECOMMEND IMPROVED R&M PARAMETERS
- ANALYZE INDEPENDENT STUDY EFFORTS COVERING R&M MEASUREMENT
- DEFINITIZE AND IMPLEMENT IMPROVED PARAMETERS

3504 23

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I—ACTION E: INCLUDE R&M IN AIR FORCE DOCTRINE



PURPOSE

- TO DOCUMENT THAT R&M IS AN ESSENTIAL ELEMENT OF OPERATIONAL CAPABILITY AND A FUNDAMENTAL VALUE OF THE AIR FORCE

METHODOLOGY

- WRITE A STATEMENT OF DOCTRINE BASED ON R&M 2000
- INCORPORATE INTO NEW OPERATIONS SUPPORT DOCTRINE MANUAL
- INCORPORATE DOCTRINE STATEMENT IN NEXT REVISION OF AFM 1–1

3504 24

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE I—ACTION F: REVISE POLICY TO REFLECT R&M 2000

PURPOSE

- TO REFLECT NEW EMPHASIS ON R&M IN REGULATIONS AND POLICIES TO ENSURE CONSISTENT DIRECTION FOR ALL FUNCTIONAL ORGANIZATIONS

METHODOLOGY

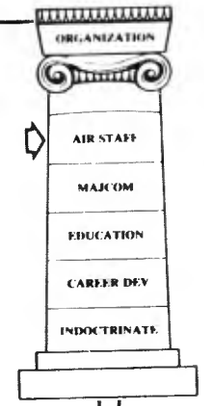
- REVIEW AND REVISE KEY AFRs
  - —USE R&M 2000 IDENTIFIED CHANGES TO START
- TECHNICAL SUPPORT AND COORDINATION BY HQ USAF/R&M

3504 25

UNCLASSIFIED

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE II—ACTION A: ESTABLISH AIR STAFF ORGANIZATIONAL FOCUS



PURPOSE

- TO PROVIDE FOCUS, ADVOCACY, AND TECHNICAL SUPPORT FOR INSTITUTIONALIZATION OF IMPROVED R&M (R&M 2000)

METHODOLOGY

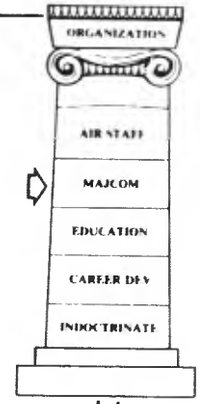
- ESTABLISH SPECIAL ASSISTANT FOR R&M
  - —ASSIGN GENERAL OFFICER
  - —10–12 ACTION OFFICERS
- ASSIGN RESPONSIBILITIES
  - —R&M 2000 IMPLEMENTATION
  - —GOALS AND PLANNING
  - —ASB AND AFC TECHNICAL SUPPORT

3504 6

UNCLASSIFIED

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE II—ACTION B: REVIEW MAJCOM R&M ORGANIZATION



PURPOSE

- TO ENSURE THAT ALL COMMANDS HAVE THE ORGANIZATIONAL ORIENTATION TO EFFECTIVELY SUPPORT THE INTENT AND REQUIREMENTS OF R&M 2000

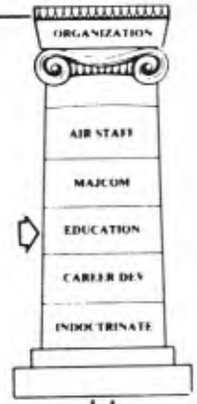
METHODOLOGY

- MAJCOMs ANALYZE ORGANIZATIONAL STRUCTURE AND CAPABILITIES FOR R&M
- MAKE ORGANIZATIONAL CHANGES IF NEEDED
- BRIEF AF/R&M
  - —ORGANIZATIONAL STRUCTURE
  - —APPROACH TO IMPLEMENT R&M 2000

3504 33

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE II—ACTION C: IMPROVE R&M EDUCATIONAL OPPORTUNITIES



PURPOSE

- TO INCREASE CAPABILITIES OF R&M TECHNICAL AND MANAGEMENT PERSONNEL

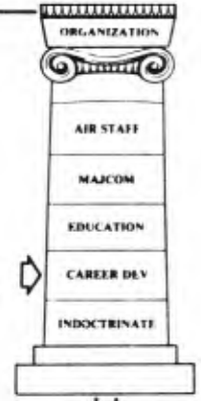
METHODOLOGY

- DEVELOP COMPREHENSIVE COMPENDIUM OF ALL AVAILABLE TRAINING COURSES
- DEVELOP TRAINING PLANS FOR R&M PERSONNEL
- REVISE OR DEVELOP COURSES TO MEET TRAINING NEEDS
- ASSURE THAT TRAINING IS OBTAINED THROUGH PROPER SCHEDULING AND FUNDING

3504 34

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE II—ACTION D: ESTABLISH CAREER DEVELOPMENT PROGRAM



PURPOSE

- TO ENSURE THAT AN ADEQUATE R&M TECHNICAL BASE IS AVAILABLE IN THE AIR FORCE BY IMPROVING ACCESSION AND PROGRESSION OF PERSONNEL IN R&M FUNCTIONS

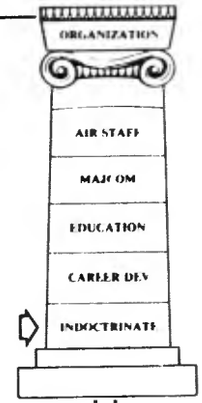
METHODOLOGY

- DEVELOP AN R&M CIVILIAN CAREER MANAGEMENT PROGRAM
- DEVELOP AN INTERCOMMAND R&M INTERN PROGRAM
- IDENTIFY NEEDS FOR ADVANCED ACADEMIC DEGREES IN R&M
- CONSIDER AN AFSC FOR MILITARY R&M PERSONNEL

3504 35

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE II—ACTION E: PREPARE R&M ORIENTATION COURSES



PURPOSE

- TO RAISE R&M "CONSCIOUSNESS" OF EXECUTIVES, PMs, SPMs, ENGINEERS, LOGISTICIANS, AND OTHER AF PERSONNEL WHO IMPACT OR INFLUENCE R&M

METHODOLOGY

- DEVELOP R&M ORIENTATION AND MOTIVATION BRIEFINGS FOR SELECTED AUDIENCES
- DEVELOP TRAINING PROGRAMS FOR
  - —PROGRAM MANAGERS
  - —SYSTEM PROGRAM MANAGERS
  - —ENGINEERS
  - —R&M STAFFS

3504 36

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE III—ACTION A: INITIATE COMMAND-LEVEL R&M PLANS

PURPOSE

- TO PROVIDE BASELINE, STRATEGY, AND COORDINATION FOR R&M IMPROVEMENTS

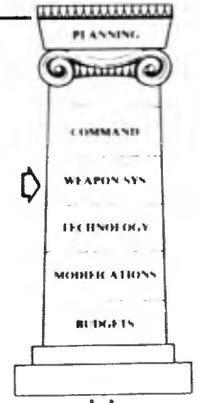
METHODOLOGY

- COMMANDS PREPARE ANNUAL R&M PLAN
- CONTENTS
  - —COMMAND INSTITUTIONALIZATION PROGRAM
  - —CONTRIBUTION OF R&M ACTIVITIES TO GOALS
  - —MAJOR INITIATIVES/ISSUES
  - —PERSONNEL AND TRAINING
  - —INDUSTRY INTEGRATION (AFSC/AFLC)
- AF/R&M REVIEW AND CONSOLIDATE ANNUAL PLANS

3504 B

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE III—ACTION B: UPGRADE WEAPON SYSTEM R&M PLANNING



PURPOSE

- TO ENSURE THAT ALL WEAPON SYSTEMS HAVE COMPREHENSIVE R&M PLANNING THAT TIES PROGRAMS TO AF OPERATIONAL SUPPORT GOALS AND PROVIDES ROADMAPS FOR R&M IMPROVEMENTS OVER WEAPON LIFE CYCLES

METHODOLOGY

- DEVELOP A COMPREHENSIVE PLAN FOR EACH WEAPON SYSTEM THAT SHOWS
  - —SPECIFIC R&M REQUIREMENTS
  - —CONTRIBUTION OF WEAPON SYSTEM TO OPERATIONAL SUPPORT GOALS
  - —LIFE-CYCLE TRACKING METHODS FOR R&M PARAMETERS
  - —MAJOR R&M BUILDING BLOCKS FOR CURRENT/FUTURE PHASES
  - —RELIABILITY GROWTH PLANS AND FORECASTS
  - —INCENTIVE AND WARRANTY FEATURES
  - —LESSONS LEARNED
- REVIEW WEAPON SYSTEM PLANS

3504 37

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE III—ACTION C: ENHANCE R&M TECHNOLOGY PLANNING

PURPOSE

- TO ENSURE INVESTMENT IN RELEVANT R&M–RELATED TECHNOLOGIES, MEET THE USER NEEDS, AND TAKE ADVANTAGE OF OPPORTUNITIES

METHODOLOGY

- DEVELOP ANNUAL TECHNOLOGY PLAN THAT SHOWS
  - —KEY TECHNOLOGY THRUSTS AND IMPLICATIONS
  - —TECHNOLOGY EFFORTS TARGETED AT USER NEEDS
  - —IR&D INVESTMENT IN R&M AREAS
  - —TECHNOLOGY TRANSITION TO NEW AND FIELDED SYSTEMS
  - —POTENTIAL CONTRIBUTION TO AF OPERATIONAL SUPPORT GOALS
- REVIEW TECHNOLOGY PLANS TO ENSURE THAT INVESTMENT IS TARGETED TOWARD USER NEEDS

3504 38

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE III—ACTION D: IMPROVE R&M MODIFICATION PLANNING

PURPOSE

- TO IMPROVE TECHNIQUES AND METHODS USED TO INITIATE R&M UPGRADES IN FIELDED SYSTEMS

METHODOLOGY

- DEVELOP MODIFICATIONS/PREFERRED SPARES PLAN
- ACCELERATE DEVELOPMENT OF MODIFICATIONS ANALYSIS TOOLS
- ASSESS R&M MODIFICATIONS FUNDING
- STREAMLINE AFR 57-4 MODIFICATIONS PROCESS

3504 39

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE III—ACTION E: IDENTIFY AND TRACK R&M BUDGETS

PURPOSE

- TO ENSURE THAT AF COMMITMENT TO R&M IS REFLECTED IN BUDGETS AND INVESTMENTS

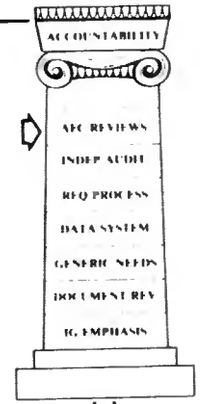
METHODOLOGY

- REVIEW FUNDING IN PRINCIPAL R&M AREAS
  - —RESEARCH
  - —DEVELOPMENT AND PRODUCTION
  - —MODIFICATIONS
- USE CURRENT POM PROCESS
- ANNUALLY REVIEW AND DEFEND R&M EFFORTS IN THE BUDGET CYCLE

3504 40

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION A: INTENSIFY WEAPON SYSTEM REVIEWS



PURPOSE

- TO ENSURE COMPREHENSIVE REVIEW OF R&M IN MAJOR AF PROGRAMS AND TO PROVIDE R&M VISIBILITY TO AF LEADERSHIP

METHODOLOGY

- ESTABLISH R&M REVIEW CRITERIA AND FORMATS
- COORDINATE REQUIRED BRIEFING TOPICS WITH AFSC/AFLC
- REVIEW R&M IN MAJOR PROGRAMS
- PROVIDE R&M ASSESSMENTS TO ASB/AFC REPRESENTATIVES

3504 41

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION B: CONDUCT INDEPENDENT AF/R&M REVIEWS

PURPOSE

- TO ENSURE SOUND R&M PLANNING AND EXECUTION BY SPOs, SPMs, AND CONTRACTORS ON MAJOR AF PROGRAMS

METHODOLOGY

- ESTABLISH OBJECTIVES AND ANALYTIC METHODS FOR INDEPENDENT REVIEWS
- IDENTIFY TEAM MEMBERS
- PERFORM FIRST ASSESSMENT BY FEBRUARY 1986

3504 42

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION C: IMPROVE R&M COVERAGE IN REQUIREMENTS PROCESS

PURPOSE

- TO IMPROVE ABILITY TO CLEARLY STATE R&M REQUIREMENTS IN EARLY ACQUISITION DOCUMENTATION SUCH AS THE SON

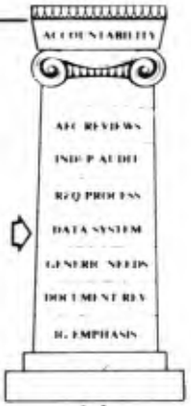
METHODOLOGY

- EXPAND MISSION AREA ANALYSIS TO ADDRESS R&M
- DETERMINE USEFULNESS OF AFSC BASELINE CORRELATION MATRICES
- CREATE ANNEX TO SON SHOWING ALL R&M REQUIREMENTS AND RATIONALE
- REVIEW SON, PSOC, SOC, PMD FOR INCLUSION OF R&M REQUIREMENTS

3504 43

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION D: ESTABLISH EFFECTIVE R&M DATA SYSTEM



PURPOSE

- TO DEVELOP A MODEL R&M DATA COLLECTION AND TRACKING SYSTEM THAT WILL QUANTIFY R&M PERFORMANCE AT ALL PHASES OF THE LIFE CYCLE, IDENTIFY OPERATIONAL DEFICIENCIES, AND PROVIDE AN EFFECTIVE FEEDBACK SYSTEM FOR ASSESSING R&M

METHODOLOGY

- EVALUATE CURRENT R&M DATA SYSTEMS
- IDENTIFY DEFICIENCIES IN PRESENT SYSTEMS
- DEVELOP A STANDARD R&M SYSTEM
- IMPLEMENT USE OF DATA SYSTEM ON MAJOR PROGRAMS

3504 44

USAF R&M
ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION E: IDENTIFY GENERIC NEEDS/APPLICATIONS

PURPOSE

- TO EXCHANGE NEEDS, INNOVATIVE TECHNIQUES, AND TECHNOLOGY ACROSS SYSTEMS AND TO ENSURE MAXIMUM UTILITY FROM R&M ACTIVITIES AND INVESTMENTS

METHODOLOGY

- DEVELOP A FEEDBACK INFORMATION SYSTEM THAT INCLUDES
  - —EFFECTIVE R&M PROCESSES AND TECHNIQUES
  - —OPPORTUNITIES FOR APPLYING INNOVATIONS
- CONSIDER TEST, ANALYZE, AND FIX (TAAF) ON ALL DEVELOPMENT PROGRAMS
- CONSIDER REALISTIC DEVELOPMENT TESTING TO ASSESS RELIABILITY PERFORMANCE
- STANDARDIZE QUALITY VERIFICATION CENTERS AT ALL ALCs
- PERFORM WORK PROCESS AUDITS AT ALL ALCs
- USE TECHNIQUES SUCH AS ACCELERATED MISSION TESTING TO IDENTIFY LOW R&M PERFORMANCE

3504 45

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION F: INTENSIFY REVIEW OF PROGRAM DECISION DOCUMENTATION

PURPOSE

- TO ENSURE THAT R&M REQUIREMENTS ARE CLEARLY ADDRESSED IN ACQUISITION DOCUMENTATION

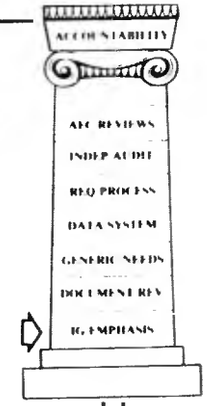
METHODOLOGY

- IDENTIFY KEY PROGRAM DOCUMENTS THAT MUST ADDRESS R&M
  - —STATEMENT OF NEED (SON)
  - —PROGRAM MANAGEMENT DIRECTIVE (PMD)
  - —REQUEST FOR PROPOSAL (RFP)
  - —PROGRAM MANAGEMENT PLAN (PMP)
- DETERMINE APPROPRIATE REVIEW LEVEL
- INSTITUTIONALIZE THE REVIEW PROCESS AND PROVIDE FOR FEEDBACK

3504 46

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE IV—ACTION G: INCREASE AIR STAFF AND IG R&M SURVEILLANCE



PURPOSE

- TO ASSIST COMMANDS IN BUILDING EFFECTIVE R&M PROGRAMS, TO ASSESS COMPLIANCE WITH AF POLICY AND PROCEDURES, AND TO REVIEW PROGRESS OF THE R&M INSTITUTIONALIZATION PROGRAM

METHODOLOGY

- DEVELOP SCHEDULE AND AGENDA FOR MAJCOM ''HOW GOES IT'' VISITS
- BEGIN SEMIANNUAL STAFF INTERCHANGE VISITS WITH AFSC/AFLC
- DEVELOP IG INSPECTION PLAN
  - —SPECIAL INTEREST ITEM
  - —FUNCTIONAL MANAGEMENT INSPECTION
  - —SYSTEM ACQUISITION MANAGEMENT INSPECTION

3504 47

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION A: IDENTIFY AND PROMOTE MODEL R&M PROGRAMS

PURPOSE

- TO IDENTIFY SUCCESSFUL R&M INITIATIVES AND USE THEM AS MODELS FOR OTHER AIR FORCE PROGRAMS

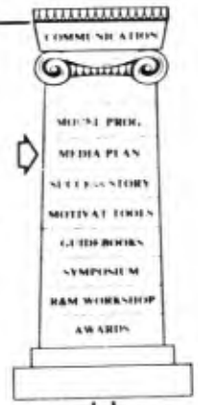
METHODOLOGY

- ESTABLISH CRITERIA FOR SELECTING MODEL PROGRAMS
- IDENTIFY SUCCESSFUL PROGRAMS AND CRITICAL R&M ELEMENTS
- PUBLISH FINDINGS ON SUCCESSFUL PROGRAMS
- USE MODEL PROGRAMS AS STANDARDS

3504 48

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION B: IMPLEMENT R&M MEDIA PLAN



PURPOSE

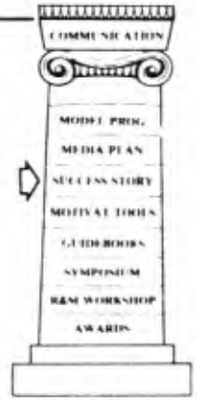
- TO PUBLICIZE AND SUSTAIN THE AF COMMITMENT TO IMPROVED R&M

METHODOLOGY

- DEVELOP COMPREHENSIVE MEDIA PLAN
  - —USE INFORMATION GATHERED THROUGH R&M 2000 ACTIONS
  - —IDENTIFY COMMUNICATION MEDIA
  - —IDENTIFY AUDIENCES (COMMANDERS, STAFF, CONGRESS, PUBLIC)
- SUSTAIN MEDIA CAMPAIGN

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION C: PUBLISH SUCCESS STORIES



PURPOSE

- TO SUSTAIN R&M EMPHASIS BY PUBLISHING SUCCESSFUL R&M EFFORTS AND MAKING EFFECTIVE USE OF R&M LESSONS LEARNED

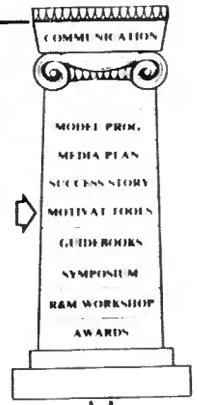
METHODOLOGY

- GATHER INFORMATION PERIODICALLY
- SOLICIT IDEAS FROM AF AND CONTRACTORS
- AF LEADERS USE IN PRESENTATIONS TO
  - —PUBLIC
  - —INDUSTRY
  - —CONGRESS
- EXPAND LESSONS-LEARNED PROGRAM EMPHASIS ON R&M

3504 50

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION D: DEVELOP AND DISSEMINATE MOTIVATIONAL TOOLS



PURPOSE

- TO ESTABLISH AND SUSTAIN MOTIVATION OF AF AND CONTRACTOR PERSONNEL TOWARD R&M IMPROVEMENT

METHODOLOGY

- IDENTIFY POTENTIAL MOTIVATIONAL TOOLS
  - —POCKET GUIDES
  - —DATA SHEETS
  - —POSTERS
- PUBLISH AND DISTRIBUTE MOTIVATIONAL TOOLS
- PUBLISH A QUARTERLY FACT SHEET ON STATUS OF R&M 2000

3504-51

ACTION PLAN
DEVELOPMENT TEAM

OBJECTIVE V—ACTION E: PUBLISH R&M GUIDEBOOKS

PURPOSE

- TO PROVIDE "HOW-TO" GUIDES FOR SUCCESSFUL R&M PROGRAM MANAGEMENT

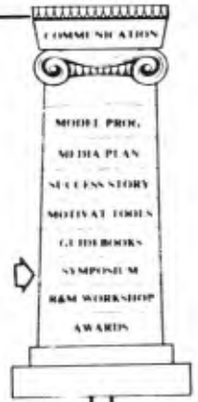
METHODOLOGY

- DETERMINE CONTENT AND FORMAT OF GUIDEBOOKS
- PROVIDE TOPIC SHEETS TO AIR UNIVERSITY
- ENCOURAGE PARTICIPATION OF PME STUDENTS
- PUBLISH AND DISSEMINATE GUIDEBOOKS

3504 52

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION F: CONDUCT AF AND INDUSTRY SYMPOSIUM



PURPOSE

- TO DEMONSTRATE ENDURING AF COMMITMENT TO R&M AND ASSESS PROGRESS OF R&M IMPROVEMENT PROGRAM

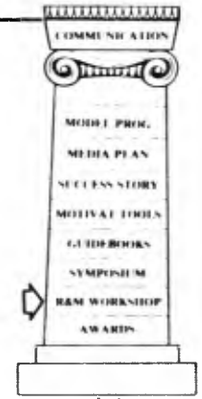
METHODOLOGY

- REVIEW PAST SUCCESSFUL SYMPOSIA
- PLAN R&M SYMPOSIUM FOR ABOUT FEBRUARY 1986
- GAIN HIGH-LEVEL EXECUTIVE SUPPORT
- ACQUIRE GUEST SPEAKER WITH R&M RENOWN
- HOLD SYMPOSIUM

3504 53

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION G: EXPAND AFSC/AFLC R&M WORKSHOP



PURPOSE

- TO EXPAND R&M WORKSHOP PARTICIPATION TO INCLUDE (IN ADDITION TO R&M SPECIALISTS) MANAGERS AND STAFF PERSONNEL WHO HAVE MAJOR INFLUENCE ON R&M IMPROVEMENT EFFORTS

METHODOLOGY

- IDENTIFY POTENTIAL TOPICS WITH MANAGEMENT INTEREST
- ENCOURAGE PMs, SPMs, DESIGNERS, etc., TO ATTEND
- ADDRESS PROGRESS OF R&M 2000
- HOLD WORKSHOP

3504 54

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE V—ACTION H: IMPLEMENT AWARDS PROGRAM

PURPOSE

- TO ENSURE THAT R&M EXCELLENCE IS RECOGNIZED AND REWARDED

METHODOLOGY

- ESTABLISH CRITERIA FOR AWARDS
- SOLICIT NOMINATIONS FROM MAJCOMs
- SELECT WINNER AND ARRANGE PRESENTATION BY SAF
- PROVIDE REGULATORY COVERAGE FOR AWARD PROGRAM

3504 55

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI—ACTION A: EXPAND ACQUISITION PLANNING FOR R&M

PURPOSE

- TO ENSURE THAT R&M IS EFFECTIVELY ADDRESSED IN BUSINESS STRATEGY AND CONTRACT PLANNING

METHODOLOGY

- CLEARLY STATE R&M REQUIREMENTS AND PRIORITY IN PROGRAM MANAGEMENT DIRECTIVES (PMDs)
- REQUIRE COVERAGE OF R&M IN BUSINESS STRATEGY PANELS
- REQUIRE COMPREHENSIVE WEAPON SYSTEM R&M PLAN
  - —ATTACHMENT TO PROGRAM MANAGEMENT PLAN (PMP)
  - —ADDRESS ALL R&M ISSUES
  - —CONTRACT STRATEGY FOR R&M
- REQUIRE TRANSITION OF R&M PLAN TO AFLC AT PROGRAM MANAGEMENT RESPONSIBILITY TRANSFER (PMRT)

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ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI— ACTION B: IMPROVE R&M REQUIREMENTS IN CONTRACTS

PURPOSE

- TO ENSURE THAT CONTRACT DOCUMENTS CLEARLY STATE FIRM R&M REQUIREMENTS

METHODOLOGY

- ESTABLISH MANAGEMENT CONTROLS AND REVIEW PROCESSES TO ENSURE THAT R&M REQUIREMENTS ARE
  - —DERIVED FROM OPERATIONAL NEEDS
  - —EXPRESSED AS REQUIREMENTS, NOT GOALS
  - —MEASURABLE, VERIFIABLE, AND ENFORCEABLE
  - —VERIFIED BEFORE PRODUCTION DECISION
- AF/R&M WILL REVIEW POLICIES AND MANAGEMENT CONTROLS

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ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI—ACTION C: INCREASE R&M CONSIDERATION IN SOURCE SELECTION

PURPOSE

- TO SELECT CONTRACTORS WHO OFFER SYSTEMS WITH EFFECTIVE R&M, AND TO CLEARLY COMMUNICATE TO INDUSTRY THE AF COMMITMENT

METHODOLOGY

- REVISE KEY POLICY TO ENSURE THAT R&M IS A MAJOR CONSIDERATION
  - —HOI 800–2 (PMDs)
  - —AFR 800–18 (R&M)
  - —AFR 70–15 (SOURCE SELECTION)
- ENCOURAGE ASSESSMENT OF REQUIREMENTS VERSUS TECHNOLOGY
- ESTABLISH PROCEDURES TO IMPLEMENT POLICY (MAJCOMs)

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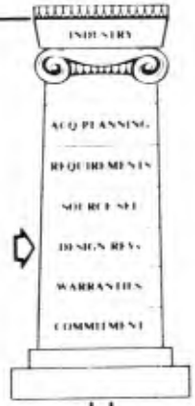
ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI—ACTION D: INTENSIFY R&M ASSESSMENTS IN DESIGN REVIEWS



PURPOSE

- TO REINFORCE R&M COMMITMENT BY CRITICALLY ASSESSING CONTRACTORS' DESIGN PROGRESS

METHODOLOGY

- ESTABLISH DESIGN REVIEW PROCEDURES
  - —CONSISTENT WITH R&M 2000 PRIORITY
  - —INCLUDE R&M EXPERTISE
- ESTABLISH POLICIES AND PROCEDURES TO ASSIST SPO EVALUATION OF
  - —CONTRACTOR RELIABILITY DESIGN GUIDELINES
  - —CONTRACTOR DESIGN FOR MAINTAINABILITY CHECKLISTS
- UPGRADE ROLE OF IN-PLANT GOVERNMENT ENGINEERS

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI—ACTION E: UPGRADE USE OF R&M WARRANTIES/INCENTIVES

PURPOSE

- TO REINFORCE AF COMMITMENT AND TO MOTIVATE CONTRACTORS' R&M PERFORMANCE THROUGH EFFECTIVE CONTRACT WARRANTIES AND INCENTIVES

METHODOLOGY

- BROADEN AF POLICY STATEMENTS FOR APPLYING WARRANTIES AND INCENTIVES
- REQUIRE CONSIDERATION OF WARRANTIES AND INCENTIVES IN PROGRAM MANAGEMENT DIRECTIVES (PMDs)
- REVIEW STATUS OF WARRANTIES AND INCENTIVES DURING PROGRAM ASSESSMENTS
- INCREASE USE AND CAPABILITY OF PRODUCT PERFORMANCE AGREEMENT CENTER (PPAC)
- TRACK WARRANTY/INCENTIVE APPLICATION AND EFFECTIVENESS

ACTION PLAN DEVELOPMENT TEAM

OBJECTIVE VI—ACTION F: ENSURE THAT INDUSTRY INSTITUTIONALIZES COMMITMENT

PURPOSE

- TO ENSURE THAT AEROSPACE CONTRACTORS IMPLEMENT EFFECTIVE R&M PROGRAMS CAPABLE OF MEETING AIR FORCE REQUIREMENTS

METHODOLOGY

- AFSC/AFLC ESTABLISH R&M INSTITUTIONALIZATION PROGRAM WITH INDUSTRY
- CONDUCT INDUSTRY R&M SYMPOSIA
- INFLUENCE ASSOCIATIONS TO FEATURE R&M IN PRODUCT EXHIBITS
- CREATE AN INDUSTRY AWARENESS PROGRAM FEATURING
  - —RECOGNITION AND AWARDS
  - —MOTIVATIONAL DEVICES
  - —AUDIO-VISUAL DISPLAYS
- SUBMIT ARTICLES TO TRADE AND PROFESSIONAL PERIODICALS
- BRIEF R&M 2000 TO INDUSTRY

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ANNEX H

IMPLEMENTATION PLANS FOR REQUIRED ACTIONS IN R&M 2000

1 FEBRUARY 1985

IMPLEMENTATION PLANS

FOR

REQUIRED ACTIONS

IN

R&M 2000

1 FEBRUARY 1985

FOREWORD

R&M 2000 identifies six key management objectives designed to support the senior-level commitment to R&M, convince the Air Force and industry of the necessity of this commitment, and focus our manpower and program resources on institutionalizing this commitment. Within each of the six objectives, a series of required actions are identified that will ensure the basic objective is achieved. All 37 required actions identify the OPR(s), OCR(s), and suspense for completion of the action.

As a supplement to R&M 2000, a proposed implementation plan has been prepared for each of these required actions. The purpose of these plans is to provide the OPRs for each action with additional information and guidance with which to initiate the implementation process. The use of these implementation plans is not mandatory, since there may be several alternatives to successfully achieving the intent of the required actions and objectives. However, the plans do represent a significant amount of time, work, and discussion on the part of the team, are based on team findings and field inputs, and should be useful as guides where not specifically implemented.

USAF R&M ACTION PLAN - R&M 2000

OBJECTIVE I: DIRECTION AND GOALS

Action A: Implement a weapon system R&M objective program that directly relates R&M improvement to the following operational support goals:

- Improving readiness by increasing availability
- Increasing dependability by improving mission completion success
- Lowering manpower requirements by decreasing total maintenance manpower
- Decreasing costs
- Improving mobility

Rationale: R&M investments must produce improvements in critical elements of operational supportability. There must be a direct linkage between the attainment of optimal levels of R&M and the impact on the Air Force's ability to conduct successful operations. It is necessary to clearly identify the elements of supportability influenced by R&M and develop the measures to tie R&M to those elements. Once the proper measures of R&M are established and the translation of those measures to direct operational support is accomplished, the Air Force will be in a position to optimize R&M investments and gauge the influence of R&M on operational goals. The following actions are designed to ensure that the commands build R&M programs to support Air Force operational support goals.

Methodology:

1. Coordinate and disseminate additional guidance on initial reporting of operational support goals.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/MP) SUSPENSE: Mar 85

2. Coordinate with MAJCOMs on use of data, format, and essential detail to tie R&M to achievement of operational support goals.
(reference Objective I, Action B)
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Mar 85

3. Ensure operational support goals are included in R&M planning processes.
(reference Objective III, Action A)
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Apr 85

4. Ensure operational support goals are included in program reviews.
(reference Objective IV, Action A)
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Apr 85

5. Refine guidance and complete implementation of goal program.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/MP, MAJCOMs) SUSPENSE: Jul 85

6. Ensure operational support goals are included in management indicator reviews. (reference Objective I, Action C)
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Oct 85

7. Ensure operational supportability objectives are included in regulation (AFR 800-18) revisions. (reference Objective I, Action F)
(OPR: AF/LE-R OCR: AF/LE) SUSPENSE: Jul 86

USAF R&M ACTION PLAN - R&M 2000

OBJECTIVE I: DIRECTION AND GOALS

Action B: Track, project, and report semiannually the R&M impact on the operational support goals by command and major weapon systems to ensure that R&M improvement can be assessed.

Rationale: Contributions of R&M improvement by commands and major weapon systems to the specific operational support goals of the Air Force must be delineated. Semiannual reporting of R&M status is required so an R&M baseline can be established and progress tracked in terms of combat effectiveness. Depicting R&M improvement in commands and by major weapon systems will provide the detailed data to show how R&M impacts operational goals. These actions are required so that R&M can be tied to operational support goals at the command and weapon system level and this information reported to appropriate Air Force organizations and decision makers.

Methodology:

1. Evaluate current data bases for availability and validity of the information needed to track R&M contributions to operational goals.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Mar 85

2. Coordinate with MAJCOMs on use of data bases, format, and detail in tracking, projecting, and reporting R&M information.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Mar 85

3. Provide definition of known R&M parameters to MAJCOMs in clear, understandable terms.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/MP) SUSPENSE: Mar 85

4. Initiate semiannual reporting of R&M contributions to operational support goals to track improvement in combat effectiveness.
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: Sep 85

5. Recommend improvements in reporting and refinement of data to maximize use of R&M feedback system.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Oct 85

6. Collect and aggregate R&M data semiannually to show the impact of R&M on combat effectiveness across the Air Force and brief senior Air Force leadership.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Oct 85

7. Semiannually publicize progress toward improving R&M in the Air Force using the aggregate R&M data to show impacts on overall operational supportability.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Dec 85

8. Once reporting system is debugged, place procedures and reporting system into the regulation.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Jul 86

OBJECTIVE I: DIRECTION AND GOALS

Action C: Establish R&M management indicators to clearly reflect impact of R&M improvements on operational support goals.

Rationale: To portray R&M impact on the Air Force and show Air Force leadership and organizations the status of R&M improvements, a set of indicators that illustrate the R&M baseline and progress by command and major weapon system must be developed. The indicators should address the quantitative R&M goals and also subjective R&M factors such as the status of recent program reviews, R&M 2000 implementation, and successes/failures. Management indicators will become a vehicle for gauging the R&M program success in enhancing Air Force combat capability and for educating Air Force personnel on the nature and importance of the R&M improvement program.

Methodology:

1. Analyze current methods of displaying R&M data in the Air Force.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Mar 85

2. Develop a set of management indicators that effectively portray the progress being made in various R&M areas such as:

- Growth of R&M in each major weapon system and command
- R&M comparisons between weapon systems
- New technology insertion in developing and fielded weapon systems
- Degree to which R&M is included in IR&D
- Progress in development and implementation of standard data system
- R&M budgetary requirements and investment

(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Aug 85

3. Report management indicators to AF/LE-R quarterly.
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: Sep 85

4. Implement the collection and analysis of R&M management indicators and brief to AF/LE/RD/XO quarterly and to higher levels as required.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Oct 85

OBJECTIVE I: DIRECTION AND GOALS

Action D: Develop improved R&M parameters (measurable, verifiable, and enforceable) that can be translated directly to established Air Force operational support goals.

Rationale: To ensure accurate measurement of R&M, parameters must be developed to effectively translate R&M improvements into operational support goals. Initially, the identification and use of a set of R&M parameters such as mean time between critical failure (MTBCF), mean time between maintenance action (MTBMA), mean time to repair (MTTR), and maintenance-related cargo tonnage will allow baselining and progress in R&M to be depicted. However, over time, inputs from the MAJCOMs and independent study will be used to develop an improved set of common R&M parameters that can be used in future R&M analyses. With these improved measures, the Air Force will be able to more accurately track progress in R&M. Actions below are designed to initiate the development of improved parameters to ensure accurate and effective measurement and tracking of R&M impact on operational support goals.

Methodology:

1. Analyze current R&M parameters for areas worthy of use as common parameters.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Mar 85

2. Provide definitions of known R&M parameters to MAJCOMs in clear, understandable terms.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/MP) SUSPENSE: Mar 85

3. Develop a specific set of R&M parameters that best portray commands' and weapon systems' quantifiable contribution to the Air Force operational support goals and submit to AF/LE-R for approval.
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: Jul 85

4. Use command and other inputs to determine a common set of R&M parameters that will become the standard for R&M determinations and baseline setting.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/MP) SUSPENSE: Sep 85

5. Assess Rand activity for developing R&M parameters that are directly translatable into operational support goals.
(OPR: AF/LE-R OCR: AF/LE/RD) SUSPENSE: Sep 85

6. Task commands to provide R&M reports in terms of a common set of improved R&M parameters that will allow comparative analysis across commands and weapon systems.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Jan 86

7. Provide a semiannual report to AF/LE-R by weapon system showing R&M progress. Include a command summary. (reference Objective I, Action B)
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: Mar 86

USAF R&M ACTION PLAN - R&M 2000

OBJECTIVE I: DIRECTION AND GOALS

Action E: Revise basic aerospace doctrine to include R&M as a fundamental building block of operational supportability to ensure the commitment to R&M is institutionalized at the basic level.

Rationale: Doctrine is the most fundamental statement of the Air Force's values. If R&M is to play an essential role in the value system of the Air Force, it must be an integral part of the basic doctrine. Placing R&M doctrine into the AFM 1 series, including the new operations support doctrine manual, will provide R&M a firm foundation in Air Force values, goals, and policy.

Methodology:

1. Coordinate R&M 2000 with AF/XO and LE, the OPRs for AFM 1-1 and the new operations support doctrine manual, to assure appropriate inclusion of R&M in the doctrine manuals.
(OPR: AF/LE-R OCR: AF/XO/LE) SUSPENSE: Apr 85

2. Evaluate, develop, and incorporate R&M doctrine into the current rewrite of the operations support doctrine manual and into the next revision of AFM 1-1.
(OPR: AF/XO/LE OCR: AF/LE-R) SUSPENSE: Nov 85

USAF R&M ACTION PLAN - R&M 2000

OBJECTIVE I: DIRECTION AND GOALS

Action F: Revise policy and procedures to encompass the new emphasis on R&M improvement to ensure consistent direction is provided to all functional organizations who must support the R&M goals.

Rationale: Policy and procedures form the basis for implementation of R&M across the Air Force. A major thrust of the R&M improvement program is to upgrade how R&M functions are prioritized in the Air Force. A basic mechanism for institutionalizing R&M is to reflect the renewed emphasis and commitment in clear terms that will spread across the Air Force. They must emphasize authority, necessity, and accountability. The actions below will ensure that R&M emphasis is placed into appropriate regulations and policies.

Methodology:

1. Review Air Force and command regulations for revision in light of R&M 2000.
(OPR: AF/LE-R, MAJCOMs OCR: AF/LE/RD/XO) SUSPENSE: Jul 85

2. Provide input to Air Force regulation OPRs that revises R&M emphasis and thrust.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Jul 85

3. OPRs will incorporate R&M emphasis and thrust into Air Force and command regulations.
(OPR: AF/LE/RD/XO, MAJCOMs OCR: AF/LE-R) SUSPENSE: Dec 85

4. Coordinate and verify that Air Force regulations incorporate new R&M commitment.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Jul 86

OBJECTIVE II: ORGANIZATION AND TRAINING

Action A: Establish the Office of the Special Assistant to Deputy Chief of Staff/Logistics & Engineering and Deputy Chief of Staff/Research, Development & Acquisition for Reliability and Maintainability on the Air Staff. The Office of the Special Assistant for R&M will have the responsibility, authority, and expertise to become the focus for the R&M improvement program and to ensure the institutionalization of improved R&M. The charter of the organization will include the following:

- Manage and implement the Air Force institutionalization program (R&M 2000)
- Establish operational support goals and track the impact of R&M improvements on goals
- Act as advocate and focal point for Air Force R&M
- Establish and coordinate Air Force policy for R&M
- Develop, coordinate, and implement command, weapon system, and technology R&M planning
- Perform reviews and oversight of program R&M performance
- Provide R&M technical support to the Air Staff Board and Air Force Council including advisability to proceed
- Work with industry to ensure they have commitment and capability to meet Air Force R&M requirements
- Establish an active R&M communication and motivation program
- Monitor institutionalization of R&M improvement at major commands

Rationale: A major finding of R&M 2000 was the lack of a central focus or advocacy for R&M. To address this problem, Air Staff R&M resources will be consolidated into an R&M organization with the technical expertise, authority, and commitment to become the Air Staff advocate for R&M. The actions below will establish the R&M organization.

Methodology:

1. Approve [illegible]al Assistant to DCS/LE and RD for R&M on the Air Staff to become the ce[illegible] advocate for R&M.
(OPR: AF/LE/RD/XO OCR: AF/MP/SA/AC) SUSPENSE: Feb 85

2. Assign ten full-time action officers as the initial cadre for the Office of the Special Assistant for R&M.
(OPR: AF/LE/RD/XO/MP/SA/AC OCR: AF/LE-R) SUSPENSE: Feb 85

3. Procure facilities, equipment, and material for the new R&M organization to efficiently and quickly go into operation.
(OPR: AF/LE/RD/XO OCR: AF/LE-R) SUSPENSE: Feb 85

4. Complete staffing the organization with the proper mix of personnel with R&M engineering, analytical, procurement, and data skills.
(OPR: AF/LE/RD OCR: AF/LE-R SUSPENSE: Aug 85

5. Incorporate the charter for the Office of the Special Assistant to DCS/LE and RD into HP 21-1.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/MP/SA/AC/DA) SUSPENSE: Jun 85

USAF R&M ACTION PLAN - R&M 2000

OBJECTIVE II: ORGANIZATION AND TRAINING

Action B: Review organization and infrastructure for adequacy in light of renewed R&M commitment and inform the Air Staff of results and plans to ensure consistent organizational structures exist or evolve to support R&M improvement.

Rationale: R&M 2000 found organizational disparities and fragmentation of R&M responsibilities throughout all levels of Air Force management. Meeting the demands reflected in R&M 2000 will require the review and possible reorientation of command R&M staff support. This tasking asks the commands to examine their capability to respond to the full range of R&M issues and ensure they are positioned in a way that will make R&M coequal with cost, schedule, and performance parameters.

Methodology:

1. Brief charter, operation, and structure of the new AF/LE-R organization to MAJCOMs to ensure their understanding of Air Staff R&M organization, responsibilities, and approach.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Mar 85

2. Perform review of existing R&M organizations and structures at MAJCOM levels and below.
(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Jun 85

3. Assess ability to accommodate R&M issues and develop proposals to correct deficiencies in terms of reorganization or reprioritization of resources.
(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Jul 85

4. Brief AF/LE-R on organizational structure and initiatives to institutionalize R&M within their command or agency.
(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Aug 85

OBJECTIVE II: ORGANIZATION AND TRAINING

Action C: Expand and improve R&M educational opportunities by compiling and publishing a compendium of available DOD, Service, civilian, and industrial R&M training; strengthening curricula supporting R&M from basic technical courses through the post-graduate levels; and managing training of R&M technical and managerial personnel to increase their capabilities and level of expertise.

Rationale: During R&M 2000, several educational and training areas were noted where additional support was required. Courses must be upgraded to ensure adequate technical training is provided and to place R&M in proper perspective by emphasizing its importance to and impact on the Air Force mission. Attainment of appropriate levels of training is essential so personnel throughout the R&M community have the background and capability to implement R&M 2000. The actions below are designed to upgrade R&M education and training programs.

Methodology:

1. Document all existing sources of R&M education and training within your command. Forward your compendium to AF/LE-R for consolidation.
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: May 85

2. Revise, expand, or add to applicable courses the renewed emphasis on R&M as reflected in R&M 2000.
(OPR: AU, ATC OCR: AF/LE-R) SUSPENSE: Jul 85

3. Establish appropriate levels of R&M education and training for all personnel directly involved with R&M activity to include program managers, system program managers, engineers, and MAJCOM staff.
(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Aug 85

4. Establish funding requirements for R&M training based on new training programs.
(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Aug 85

5. Evaluate Air Force educational and training programs including a comparison of Air Force training with that of other Services, civilian institutions, and industry.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Aug 85

6. Ensure established training requirements are met by verifying and tracking the training status of R&M-related personnel.
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: Nov 85

USAF R&M ACTION PLAN - R&M 2000

OBJECTIVE II: ORGANIZATION AND TRAINING

Action D: Establish career development programs for the R&M discipline to ensure personnel accession, progression, and growth are available to support the demand for technical expertise required by R&M 2000.

Rationale: Meeting the objectives of R&M 2000 requires a solid base of military and civilian R&M professionals. The Air Force R&M career development program requires attention. For example, both the Army and Navy have civilian R&M intern programs while the Air Force has none. Renewed emphasis is needed for both civilian and military personnel to ensure proper motivation, accession, and progression of the career force. The actions below are designed to ensure that adequate career development programs are initiated.

Methodology:

1. Develop an R&M civilian career management program with the objective of managing accessions, progression, and growth for personnel in the R&M community.
   (OPR: AFLC, AFSC OCR: AF/LE-R/MP) SUSPENSE: Jun 85

2. Develop an R&M intercommand intern program to serve as a cross-fertilization technique for R&M principles among AFSC, AFLC, and AFALC.
   (OPR: AFSC, AFLC OCR: AF/LE-R/MP) SUSPENSE: Aug 85

3. Review the requirement for advanced R&M academic degrees across the commands.
   (OPR: AF/LE/RD OCR: AF/LE-R/MP) SUSPENSE: Aug 85

4. Examine the need for and role of an R&M Air Force Specialty Code for military personnel.
   (OPR: AF/MP OCR: AF/LE-R) SUSPENSE: Aug 85

5. Implement R&M civilian career management program and intern program.
   (OPR: AFSC, AFLC OCR: AF/LE-R/MP) SUSPENSE: Feb 86

OBJECTIVE II: ORGANIZATION AND TRAINING

Action E: Prepare and administer R&M orientation and training short courses for appropriate executives, program managers, system program managers, staffs, and engineers to enhance their ability to influence R&M events and programs.

Rationale: Effective implementation of R&M 2000 will require, in the near term, briefings, orientations, and short training courses aimed at providing management and R&M personnel with the background and methodology to implement the R&M improvement program. The actions below are designed to ensure this training base is developed and implemented.

Methodology:

1. Brief R&M 2000 to MAJCOM and SOA focal points. Briefing will be at the Pentagon.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Mar 85

2. Brief R&M 2000 to MAJCOM and SOA staffs when requested.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Apr 85

3. Develop executive and staff "road shows" on R&M to provide R&M orientation and motivation to personnel throughout the Air Force.
(OPR: AU OCR: AF/LE-R) SUSPENSE: Oct 85

4. Develop and provide training for program managers and engineers to acquaint them with the R&M aspects of their activities and motivate them to pursue R&M with the same concern as they have for cost, schedule, and performance.
(OPR: AFSC OCR: AF/LE-R, MAJCOMs) SUSPENSE: Oct 85

5. Develop and provide training programs for system program managers and engineers to acquaint them with the R&M aspects of their activities and motivate them to pursue R&M with the same concern as they have for cost, schedule, and performance.
(OPR: AFLC OCR: AF/LE-R, MAJCOMs) SUSPENSE: Oct 85

OBJECTIVE III: PLANNING SYSTEM

Action A: Prepare and submit an annual R&M plan describing the command R&M improvement program. Command-level R&M plans will include the operational support goal program, organizational approaches, key initiatives, personnel and training, budgets, R&M issues and problem areas, industry integration (AFSC and AFLC), modification programs (AFLC), and design and manufacturing emphasis (AFSC and AFLC). The plans are aimed at clearly outlining the Commands' current R&M program status, goals, and the approaches being taken to institutionalize R&M within the Command and achieve the objectives of R&M 2000.

Rationale: Institutionalizing R&M will require command-level planning to establish accountability and to focus the necessary resources for long-term R&M improvement. Properly structured and creative planning will not only maintain Air Force senior management oversight and involvement, but will encourage a healthy and meaningful dialogue among operating, developing, and supporting MAJCOMs. The following actions are designed to implement R&M planning within major commands.

Methodology:

1. Disseminate information to MAJCOMs on format, content, structure, and other necessary information to initiate the R&M planning process.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Apr 85

2. Initiate R&M planning.
(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Apr 85

3. Submit annual command R&M plans. Specific sections of coverage must include the following:

- Command R&M Institutionalization Program
- Operational Support Goals
- Organizational Approaches
- Key Programs and Initiatives
- Personnel/Training
- Budget
- R&M Issues and Problem Areas
- Industry Integration (AFSC/AFLC)
- Modification Program and Forecasts (AFLC)
- Design and Manufacturing (AFSC/AFLC)

(OPR: MAJCOMs, AFOTEC OCR: AF/LE-R) SUSPENSE: Sep 85

4. Revise AFR 800-18 to include requirement and general format for annual command R&M plans.
(OPR: AF/LE OCR: AF/LE-R) SUSPENSE: Jul 86

5. Review, analyze, and consolidate information from MAJCOM and AFOTEC R&M plans.
(OPR: AF/LE-R OCR: MAJCOMs, AFOTEC) SUSPENSE: Oct 85

6. Provide feedback for FY 87 R&M planning cycle via revised planning guidance.
(OPR: AF/LE-R OCR: MAJCOMs, AFOTEC) SUSPENSE: Jan 86

OBJECTIVE III: PLANNING SYSTEM

Action B: Prepare and maintain a current R&M plan for each system that shows the impact on operational support goals and includes areas such as a description of R&M tasks being employed, specific requirements, tracking systems for R&M parameters, incentives and warranty features, and lessons learned. AFLC and AFSC will coordinate plans with each other and with the using MAJCOMs.

Rationale: Effective R&M planning at the weapon system level is essential to R&M improvement in the Air Force. Program managers and system program managers directly influence the structure and application of R&M program resources. R&M 2000 found that some weapon system R&M plans do exist, but there is great variety in coverage and quality. A comprehensive weapon system R&M plan must be established on each program to show how programs treat R&M as coequal with cost, schedule, and performance and how R&M contributes to achievement of R&M operational support goals. Investment, forecasts, tradeoffs, initiatives, and requirements are essential elements of good R&M planning. The actions below are designed to ensure sound R&M planning for all Air Force weapon systems.

Methodology:

1. Review scope and adequacy of R&M weapon system plans and ensure a plan is developed and maintained on each weapon system that supports the R&M 2000 objectives and initiatives. Specific sections of coverage should include but not be limited to the following:

- Specific R&M requirements for weapon systems
- Contribution of weapon systems to operational support goals
- Cradle-to-grave tracking system for R&M parameters
- Major R&M building blocks in current and future phases
- Reliability growth forecasts
- Incentive and warranty features
- Lessons learned

(OPR: AFLC, AFSC OCR: MAJCOMs) SUSPENSE: Sep 85

2. Review weapon system R&M plans as part of program reviews.
(OPR: AF/LE-R OCR: AFLC, AFSC) SUSPENSE: Oct 85

3. Perform weapon system R&M plan reviews as part of staff assistance and IG activities.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/IG) SUSPENSE: Oct 85

OBJECTIVE III: PLANNING SYSTEM

Action C: Prepare and submit an annual R&M technology plan to ensure R&M considerations are included in new technology efforts, successful technology is transitioned to development and operational systems, and user needs are adequately addressed. The plan should cover such areas as key technology thrusts and their contribution to Air Force R&M objectives and goals; potential and planned technology applications to weapon systems; improvements in manufacturing, repair, and logistics processes; laboratory interfaces with users, developers, and supporters; logistics R&D and joint Service initiatives for R&M; and efforts to stimulate, influence, and exploit R&M in contractor independent research and development.

Rationale: R&M improvement is dependent on development of new technology and proper application of this new technology. Adequate funding must be invested in basic research and development projects. When substantive R&M improvements are identified in the laboratories or industry, it is important to move those successes quickly into programs. Cross-fertilization of successes must be fostered and communication lines kept open among users, developers, and researchers. Technology planning is a fundamental part of the R&M planning process. Actions below are designed to ensure the Air Force meets future R&M requirements and takes advantage of current technological opportunities.

Methodology:

1. Develop an annual plan showing how new R&M technology will be developed, used, and inserted into planning and programming for weapon systems and logistics processes. Specific sections of coverage must include the following:

- Potential contributions to operational support goals
- Key technology thrusts (VHSIC, fiber optics, composites)
- Implications of technology applications to weapon systems
- Roadmaps for R&M technology insertion
- Laboratory interface among user, developer, and supporter
- R&D investment in R&M
- Logistics R&D investment in R&M
- Efforts to stimulate and assess contractor independent R&D
- Industrial technology insertion and logistics processes applications

(OPR: AFLC, AFSC OCR: AF/LE-R, MAJCOMS) SUSPENSE: Sep 85

2. Screen and collect technology plans to assure that maximum use of technology applications is being made throughout the Air Force.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Oct 85

3. Perform technology plan reviews in staff assistance, surveillance, and major program review activities.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/IG) SUSPENSE: Oct 85

OBJECTIVE III: PLANNING SYSTEM

Action D: Prepare and submit an annual integrated plan covering weapon system modifications and preferred spares initiatives that outlines their contribution to R&M and operational support goals. The plan will include a priority ranking of improvements (modifications and preferred spares) required on fielded systems, R&M cost-payback analyses, and required funding to accommodate R&M improvements.

Rationale: There are several ways to enhance the R&M in weapon systems that have been fielded. They include the Class IV modification process and the development of preferred spares. The efficiencies of these methods require improvement. For example, the period from modification selection to fleetwide installation is too lengthy. Integration of the modifications effort with the preferred spares procurement system would produce more optimal results. An approach requiring cost/benefit assessment would enable prioritized funding as well as maximized R&M benefits to the overall fielded weapon system fleet. Other initiatives whose integration could lead to enhanced R&M include improved parts screening, repair process improvements, and expanded parts testing. The following actions are intended to improve the modification process for upgrading of our fielded systems.

Methodology:

1. Accelerate the development of an analytic methodology for assessing modifications to identify areas where modifications are most needed and then prioritize upgrades based on cost/benefit analysis in R&M terms.
(OPR: AF/LE OCR: AF/LE-R, AFLC) SUSPENSE: Apr 85

2. Once developed, use the modifications assessment analytical methodology to support the Air Staff budget process and expand its use to the ALCs' prioritization process.
(OPR: AF/LE OCR: AF/LE-R, AFLC) SUSPENSE: Jul 85

3. Develop a modification/preferred spares (MPS) plan to establish the use of a MPS system to enhance R&M in fielded weapon systems. The MPS plan may be incorporated into the command R&M plan (reference Objective III, Action A) and should include the following:

- Areas of most urgent R&M need based on feedback by Mission Design Series (MDS) and work unit code
- Sources of data
- Prioritization of areas based on R&M performance
- Cost/benefit analysis of MPS (engineered and nonengineered)
- Timeliness of MPS completion
- Prioritization of overall MPS efforts
- Budget forecasts based on prioritization

(OPR: AFLC OCR: AF/LE, MAJCOMs) SUSPENSE: Sep 85

OBJECTIVE III: PLANNING SYSTEM

Action E: Identify and track budgets that relate to R&M and formulate fiscal R&M programs for the future to develop a sound investment baseline for R&M.

Rationale: R&M requires commitment of resources (funding and manning) in several principal areas: in research to maintain a technology base, permit "parallel development" of reliability technology, and to improve materials, techniques, and processes for R&M; in development and procurement to support engineering design, Test-Analyze-And-Fix (TAAF), reliability growth and testing, and contract incentives; and finally, in operational systems to support product improvements for supportability and to correct deficiencies. The commitment to R&M is reflected by the degree to which projects and programs are funded to achieve reliable and maintainable systems. The actions below are designed to ensure adequate budgetary support for R&M initiatives.

Methodology:

1. Review the FY 88 POM submittals to ensure adequate R&M support in light of R&M 2000. Review program elements where funds can be obligated and benefits can be quantified.
(OPR: AFLC, AFSC OCR: AF/LE-R, MAJCOMs) SUSPENSE: Sep 85

2. Identify, defend, and advocate R&M-related efforts in the budget process.
(OPR: AF/LE-R OCR: AF/LE/RD/XO/PR/AC, MAJCOMs) SUSPENSE: Dec 85

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action A: Begin thorough R&M weapon system reviews on major programs to provide R&M technical support to the Air Staff Board and Air Force Council. Include coverage of areas such as incentives and warranties, contribution to operational support goals, and current tasks and initiatives.

Rationale: R&M 2000 found great variability in the emphasis, content, and results of R&M programs and how this R&M information was presented to the Air Staff Board (ASB) and Air Force Council (AFC). Formal review of R&M programs will identify R&M standards for programs to emulate, promote a greater understanding of R&M, and provide consistency in reporting. These reviews provide a routine mechanism to identify R&M issues to Air Force decision-makers for discussion during planned weapon system briefings such as Weapon System Program Assessment Reviews (WSPARs) and Secretary of the Air Force Program Reviews (SPRs). The following actions are designed to establish an Air Staff R&M review process.

Methodology:

1. Establish review criteria to include subjects, documents, and formats to assess program R&M.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Mar 85

2. Identify and track schedule of weapon system briefings to the ASB and AFC.
(OPR: AF/LE-R OCR: AF/CVS) SUSPENSE: Mar 85

3. Establish the content of R&M-related charts through coordination with AFSC, AFLC, program managers, and system program managers. Data should include such subjects as impact on operational support goals, warranties and incentives, building blocks, ground rules, and thresholds.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Apr 85

4. Review briefings prior to presentation to the ASB and AFC.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Apr 85

5. Provide R&M assessments to ASB and AFC representatives as required.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Apr 85

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action B: Begin independent R&M reviews of major programs to ensure sound R&M initiatives are being planned and implemented by program managers, system program managers, and contractors on major Air Force programs.

Rationale: To institutionalize the Air Force commitment, R&M must be treated with the same importance as cost, schedule, and performance. A required task prior to most milestone decisions is completion of an Independent Cost Analysis (ICA). The independent R&M review is an equivalent concept to the ICA. The output from the independent R&M review team will be an assessment of the total R&M program to include contractor performance, quantification of risk and cost of proceeding to the next phase, and a "go/no-go" recommendation based on R&M implications. The following actions will establish the capability to do independent R&M reviews prior to milestone decisions or as directed by Air Force leadership.

Methodology:

1. Prepare guidelines to include objectives and analysis methodology for the independent R&M reviews.
(OPR: AF/LE-R OCR: AF/AC/LE/RD/XO) SUSPENSE: Aug 85

2. Establish schedule for independent reviews. (NOTE: Consider the SRAM II scheduled for Milestone II decision in Feb 86 as possible initial review.)
(OPR: AF/LE-R OCR: AF/AC/LE/RD) SUSPENSE: Aug 85

3. Establish membership and specific tasking for first independent R&M review team.
(OPR: AF/LE-R OCR: AF/RD/LE, AFSC, AFLC) SUSPENSE: Aug 85

4. Gather data, analyze data, and prepare report.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Dec 85

5. Brief results of first independent R&M review as required.
(OPR: AF/LE-R OCR: AFSC, AFLC, AF/AC/LE/RD) SUSPENSE: Feb 86

6. Document requirement for independent R&M reviews in AFR 800-18.
(OPR: AF/LE OCR: AF/LE-R/RD) SUSPENSE: Jul 86

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action C: Revise the methodology and timeliness of establishing R&M operational needs by requiring statement of parameters in a manner directly related to the operational need and capable of translation into measurable, verifiable, and enforceable contract requirements.

Rationale: One of the major impediments to developing a sound R&M program is the difficulty in clearly stating firm R&M requirements. The requirements process must promote disciplined, responsive, and accountable tracking of R&M during Statement of Need (SON) development, staffing, and validation. This applies to the Air Staff and participating commands and agencies. The following implementation actions are designed to develop firm R&M requirements in the SON to establish the earliest possible visibility for R&M.

Methodology:

1. Expand Mission Area Analysis (MAA) to cover R&M aspects of all major mission areas and supportability issues.
(OPR: AF/XO OCR: AF/LE-R) SUSPENSE: Jul 85

2. Ensure program reviews address the ability to trace requirements through the SON, System Operational Concept (SOC), and Program Management Directive (PMD) to determine that R&M has been adequately included in all stages of early weapon system planning.
(OPR: AF/LE-R OCR: AF/XO/RD/LE) SUSPENSE: Aug 85

3. Assure that training is administered where required to ensure personnel who establish requirements are acquainted with R&M technology to input appropriate planned requirements in weapon systems development documents.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Sep 85

4. Review all early weapon system planning such as SONs, SOCs, and PMDs for sufficient levels of R&M documentation.
(OPR: AF/LE-R OCR: AF/XO/RD/LE) SUSPENSE: Oct 85

5. Create an annex to the SON for all weapon systems, which will list the R&M requirements for new systems or systems modifications. The R&M requirements will be stated in R&M parameters that are measurable, verifiable, and enforceable.
(OPR: AF/LE-R OCR: MAJCOMs, AF/RD/XO) SUSPENSE: Dec 85

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action D: Provide a plan to develop and implement an R&M data collection system that tracks measurable R&M parameters so that R&M can be evaluated throughout the weapon system life cycle.

Rationale: R&M 2000 found that many data systems exist across the Air Force to gather R&M data. A standard method of baselining and tracking R&M in measurable and verifiable terms would be very beneficial. There must be a data system that enables managers to specifically quantify a system's R&M status at any time during its life cycle. Once this capability is established, more sophisticated analyses become possible, and logical R&M strategies can be developed on a cost-effective basis. It becomes paramount that this process begins as early as possible in the weapon system development process and be traceable through the various R&M "ups and downs" as a weapon system ages. Intelligent business and investment strategies become significantly easier when an adequate data base is available. The actions below are designed to produce the data system needed.

Methodology:

1. Evaluate the present data systems and processes to identify what data is available to quantify R&M in weapon systems.
(OPR: AFLC, AFSC OCR: AF/LE-R) SUSPENSE: Sep 85

2. Analyze current selected R&M data to determine direction for future development of data systems. In order to analyze this data, AF/LE-R should program and plan for their own computer hardware (Z-100s) and software support.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Sep 85

3. Prepare plan to acquire an R&M data collection system that tracks R&M parameters from cradle to grave.
(OPR: AF/LE-R OCR: AFLC, AFSC) SUSPENSE: Dec 85

4. Develop and implement a standard data base for R&M that is usable across commands, throughout the system life cycle, and enables analyses of R&M at any point in a weapon system's life cycle.
(OPR: AFLC, AFSC OCR: AF/LE-R) SUSPENSE: Sep 92

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action E: Establish a system to identify generic R&M needs, innovations, and technological successes and transfer this information across all applicable weapon systems to guarantee maximum utility and payback are attained from R&M investments and actions.

Rationale: There are many R&M initiatives, needs, and opportunities in the Air Force that can contribute to the success of other programs. An effective method of transmitting these benefits across the Air Force is required. The environment and system that will enable cross-fertilization of these many initiatives must be developed. Communication of R&M ideas, problems, successful programs, and new R&M initiatives must be transferred from weapon system to weapon system and from laboratory to laboratory. The actions below are designed to encourage cross-fertilization of information that may have broad application.

Methodology:

1. Consider incorporating reliability testing using Test-Analyze-And-Fix (TAAF) methodology on all future development programs.
(OPR: AFSC OCR: AF/LE/RD/LE-R) SUSPENSE: Jul 85

2. Consider performing developmental testing under simulated operational mission conditions to identify reliability performance on all future developmental testing.
(OPR: AFSC, AFLC OCR: AF/LE/RD/LE-R) SUSPENSE: Jul 85

3. Initiate a system of "user friendly" work process audits at the Air Logistics Centers to assure that work control documents, processes, equipment, tools, parts, and workmanship are at the levels that maintain the maximum possible R&M in items subject to repair.
(OPR: AFLC OCR: AF/LE/LE-R) SUSPENSE: Aug 85

4. Review the feasibility of expanding efforts to identify weak Line Replaceable Units (LRUs) through such methods as accelerated mission testing.
(OPR: AFLC OCR: AF/LE/LE-R) SUSPENSE: Aug 85

5. Adopt and standardize the Quality Verification Center (QVC) concept currently established at some of the Air Logistics Centers as a means to ensure that only quality materials and parts are used in repair processes.
(OPR: AFLC OCR: AF/LE/LE-R) SUSPENSE: Oct 85

6. Develop a feedback system where specific R&M needs and innovations can be specifically targeted for applications throughout the R&M world. The feedback system should include:
- Identification of generic R&M innovations
- Identification of generic R&M needs
- Target programs where innovations apply
- Transfer of technology/knowledge to appropriate organizations

(OPR: AFLC, AFSC OCR: AF/LE-R) SUSPENSE: Sep 85

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action F: Review selected weapon system decision documentation including statement of need, program management directive, decision coordinating paper, request for proposal, source selection plan, acquisition plan, and R&M plan on weapon system programs to ensure R&M is adequately addressed and to assess their impact on operational support.

Rationale: Throughout the acquisition process, key documents are generated for direction, planning, reporting, and decision making. These documents typically address a wide range of topics including reliability and maintainability. The purpose of this review is to monitor the implementation of existing Air Force R&M policy and procedures and to assist in the process of developing standardized approaches to R&M applicable across the wide variety of programs. These actions are designed to ensure review of basic program documentation for R&M considerations.

Methodology:

1. Determine which programs require review by AF/LE-R and which programs may be reviewed by MAJCOMs (based upon thresholds such as dollar value, program stage, or program visibility) to ensure implementation of Air Force R&M policies and procedures.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Mar 85

2. Request OPRs provide identified documents to AF/LE-R for review.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Mar 85

3. Begin review of key program documents to include items such as statement of need, program management directive, acquisition plan, decision coordinating paper, request for proposal, source selection plan, and R&M program plan.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Apr 85

4. Ensure MAJCOM R&M plans cover review of acquisition documents not meeting Air Staff criteria/thresholds.
(OPR: MAJCOMs OCR: AF/LE/RD/XO/LE-R) SUSPENSE: Sep 85

5. Revise regulations to formalize review process as required.
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Jul 86

OBJECTIVE IV: ACCOUNTABILITY AND FEEDBACK

Action G: Establish Air Force review of command and weapon system R&M activities through active staff assistance and IG surveillance to assess the degree of compliance with Air Force R&M policy and procedures, to assist commands in building effective R&M programs, and to evaluate R&M 2000 implementation effectiveness.

Rationale: The Air Staff has the responsibility of establishing R&M policy and ensuring this policy is followed. Staff assistance visits are necessary to provide for informal exchange of ideas between AF/LE-R and MAJCOM staffs on progress towards implementing R&M 2000. IG surveillance will provide the formal mechanism for assessing how well the Air Force is adhering to the new R&M policy. The following actions are designed to evaluate how R&M policy is being implemented in the Air Force.

Methodology:

1. Identify schedule and agenda for staff assistance visits to using commands to discuss progress in implementing R&M 2000 and to resolve MAJCOM issues.
(OPR: AF/LE-R OCR: AF/RD/LE, MAJCOMs) SUSPENSE: May 85

2. Begin staff assistance visits to using commands.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Jul 85

3. Plan for semiannual staff interchange visits with AFSC and AFLC to exchange ideas and resolve R&M issues.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Nov 85

4. Begin semiannual staff assistance visits to AFSC and AFLC.
(OPR: AF/LE-R OCR: AFSC or AFLC) SUSPENSE: Dec 85

5. Identify IG focal point for R&M.
(OPR: AF/IG OCR: AF/LE-R) SUSPENSE: Sep 85

6. Review IG feedback from previous inspections for R&M findings.
(OPR: AF/LE-R OCR: AF/IG) SUSPENSE: Sep 85

7. Insert R&M into the IG training school and ensure that R&M is a factor considered in Air Force and command inspections.
(OPR: AF/IG OCR: AF/LE-R) SUSPENSE: Dec 85

8. Review the planned IG schedule and identify proper timing and type of IG reviews. Consider a Special Interest Item on R&M in late 1985 followed by a Functional Management Inspection or System Acquisition Management Inspection beginning in late 1986.
(OPR: AF/LE-R OCR: AF/IG) SUSPENSE: Dec 85

9. Begin Functional Management Inspection or System Acqusition Management Inspection.
(OPR: AF/IG OCR: MAJCOMs, AF/LE-R) SUSPENSE: Sep 86

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action A: Identify and promote successful R&M programs from the technology base and from development, production, and fielded systems to serve as models and standards of excellence across the Air Force.

Rationale: R&M 2000 showed successful R&M programs stood out because of certain traits such as management commitment, R&M emphasis, iterative design, and firm R&M requirements. The Air Force must identify programs from each phase of the life cycle to serve as models for R&M implementation. These programs will be the standards against which the merits of other programs are judged. The following actions are designed to identify and promote successful R&M efforts.

Methodology:

1. Contact AFSC and AFLC focal points to discuss and establish criteria for selection of model R&M programs.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Apr 85

2. Identify successful R&M programs from four phases (technology base, development, production, modifications to fielded systems). Identify the critical elements that make these programs successful.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Jun 85

3. Establish these programs as models for others to emulate and use these criteria to judge other R&M programs.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Jul 85

4. Publish and disseminate these success stories to challenge and guide others.
(OPR: AFSC, AFLC OCR: AF/LE-R, SAF/PA) SUSPENSE: Jul 85

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action B: Develop and implement a coordinated internal information plan to clearly communicate the senior-level commitment to sustain and broaden the Air Force emphasis on R&M.

Rationale: R&M 2000 showed communicating and maintaining the commitment to R&M was a crucial step in convincing both the Air Force and industry of the seriousness of the R&M improvement effort. This coordinated communications plan is an umbrella task that takes the output of other actions and integrates them to support the R&M 2000 effort. The following actions are designed to provide an internal information plan for near-term publicity and to generate and maintain the R&M focus and interest over the next several years.

Methodology:

1. Review and prioritize sources of R&M information and identify potential avenues of communication to the Air Force and industry.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Apr 85

2. Establish a plan for telling the R&M story in media such as Airman Magazine, Air Force Now, and an AFCOLR video tape update by AFSC/CC and AFLC/CC.
(OPR: AF/LE-R OCR: SAF/PA, AFSC, AFLC) SUSPENSE: Apr 85

3. Target communications to Air Force leadership, program managers, system program managers, R&M functionals, and industry counterparts.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Apr 85

4. Identify what, if any, special contacts with Congress and their staffs are appropriate to explain the R&M improvement effort.
(OPR: AF/LE-R OCR: SAF/LL, AF/AC) SUSPENSE: Apr 85

5. Develop a coordinated, comprehensive communication plan to support the R&M 2000 effort to include activities such as media stories, model R&M programs, and a symposium.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Apr 85

6. Carry out communication plan.
(OPR: AF/LE-R OCR: AF/AC, SAF/LL/PA) SUSPENSE: Jul 86

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action C: Identify, publish, and use R&M success stories and lessons learned to sustain an effective communication and motivation program across organizations and weapon systems.

Rationale: Institutionalization requires that R&M emphasis endure over time. Success stories published on a regular basis sustain R&M interest and use the principle, "success breeds success." R&M lessons learned provide specific feedback on positive points and shortcomings in existing R&M programs. The following actions are designed to establish regular reporting of success stories and effective use of lessons learned.

Methodology:

1. Identify and publish successful stories on R&M management initiatives or weapon systems programs.
(OPR: MAJCOMs OCR: AF/LE-R, SAF/PA) SUSPENSE: Quarterly

2. Send R&M success stories to AF/LE-R and SAF/PA.
(OPR: MAJCOMs OCR: AF/LE-R, SAF/PA) SUSPENSE: Quarterly

3. Incorporate R&M success stories into presentations by AF leadership to industry, Congress, and the public.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Quarterly

4. Review AFSC/AFLC lessons learned programs and expand emphasis on R&M.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: June 85

5. Ensure these R&M lessons learned are used by all programs.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Sep 85

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action D: Publish motivational tools such as pocket R&M guides or fact sheets on successful R&M programs to provide information and sustain interest in R&M.

Rationale: R&M 2000 showed the importance of convincing all levels of the Air Force on the importance of improving R&M to achieve institutionalization. Motivational tools such as pocket guides, fact sheets, poster campaigns, and bumper stickers are proven methods of reinforcing fundamental concepts, generating interest, and maintaining momentum towards improved R&M in the Air Force. The following actions are designed to develop and distribute R&M motivational material.

Methodology:

1. Arrange a meeting with AFSC and AFLC focal points to discuss motivational tools.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Jun 85

2. Identify potential motivational tools and assign OPRs to develop and distribute them.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Jun 85

3. Disseminate motivational tools.
(OPR: AFSC, AFLC OCR: AF/LE-R, SAF/PA) SUSPENSE: Dec 85

4. Begin publishing a quarterly fact sheet or letter to the commanders summarizing the status of R&M 2000.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Dec 85

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action E: Publish guidebooks for implementing successful R&M programs on new and fielded systems to provide a source of R&M information for program managers, system program managers, engineers, and other functional personnel.

Rationale: R&M 2000 showed the competing demands on program managers and system program managers, demonstrated the need to give clear guidance that R&M is wanted, and showed how to achieve a good R&M program. Guidebooks for managers and new engineers will provide useful case studies and standard elements of successful R&M programs. The following actions are designed to encourage professional military education students to write guidebooks to serve as ready references on how to set up effective R&M programs.

Methodology:

1. Discuss content of guidebooks and assign OPRs.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Jun 85

2. Prepare topic sheets on R&M for Air University.
(OPR: AFSC, AFLC OCR: AU, AF/LE-R) SUSPENSE: Jun 85

3. Work with officers researching guidebooks to ensure access to programmatic data.
(OPR: AFSC, AFLC OCR: AU, AF/LE-R) SUSPENSE: Dec 85

4. Publish and distribute guidebooks.
(OPR: AFSC, AFLC OCR: AU, AF/LE-R) SUSPENSE: Jun 86

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action F: Conduct a symposium for senior Air Force and industry leaders to promote R&M initiatives, exchange R&M ideas, and assess the progress towards institutionalizing the commitment to R&M.

Rationale: R&M 2000 showed sustained Air Force commitment is essential to convince industry the Air Force is serious about improved R&M. A senior-level Air Force and industry R&M symposium scheduled about one year after release of R&M 2000 will provide the opportunity to jointly address R&M improvement and reinforce why we must succeed. The following actions are designed to arrange a symposium to provide a high-visibility forum to sustain R&M commitment.

Methodology:

1. Examine past high-level management symposia to identify positive features and to avoid pitfalls.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Sep 85

2. Identify points of contact from MAJCOMs and potential speakers of high R&M renown.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Oct 85

3. Prepare action plan for symposium to include proposed date, location, duration, attendance, and agenda.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Oct 85

4. Implement action plan for symposium.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Jan 86

5. Hold symposium.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Feb 86

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action G: Expand the scope of the AFSC/AFLC R&M workshop to address R&M from a managerial perspective and include participation by program managers and system program managers to foster increased R&M emphasis and commitment.

Rationale: R&M 2000 showed commitment to R&M must be institutionalized by three main groups: Air Force leadership, program managers and system program managers, and R&M functionals including R&M specialists and design engineers. The annual AFSC/AFLC R&M workshop provides a good exchange of technical R&M information for R&M functionals. This workshop should be expanded to include managerial topics and to encourage program managers' and system program managers' attendance. The following actions are designed to expand the influence of the AFSC/AFLC R&M workshop on managers.

Methodology:

1. Review past attendance and topics at R&M workshops to identify potential to add managerial topics.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Jul 85

2. Coordinate proposed agenda with AF/LE-R. Address the progress of R&M 2000 at workshop.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Aug 85

3. Invite program managers, system program managers, design engineers, and other people who have influence over R&M progress to attend R&M workshop.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Oct 85

4. Conduct R&M workshop.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Oct 85

OBJECTIVE V: COMMUNICATION AND MOTIVATION

Action H: Establish an Air Force award program for individual and organizational R&M excellence to recognize R&M achievement and to motivate others to excel.

Rationale: Successful efforts must be rewarded to maintain support for R&M 2000 and to challenge others to excel. The proposed annual award (plaque or similar item) presented by the Secretary of the Air Force will acknowledge individual or organizational R&M contributions. The following actions are designed to ensure R&M excellence is recognized and rewarded.

Methodology:

1. Plan, organize, and establish criteria for R&M award program.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Sep 85

2. Identify timing for the first award.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Sep 85

3. MAJCOMs forward nominations to AF/LE-R.
(OPR: MAJCOMs OCR: AF/LE-R) SUSPENSE: Nov 85

4. Select winner and arrange presentation of the award.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Feb 86

5. Revise AFR 800-18 to address the R&M award program.
(OPR: AF/LE OCR: AF/LE-R) SUSPENSE: Jul 86

OBJECTIVE VI: INDUSTRY COMMITMENT

Action A: Incorporate R&M considerations into weapon system acquisition planning to ensure business strategy, program direction, and contract preparation effectively address R&M throughout the acquisition process.

Rationale: The overall acquisition strategy determines the focus and direction of acquisition and modification programs. It is the basis for developing source selection criteria, product performance agreement approaches, and contract content. It also forms the basis for the demands we will place on ourselves and our contractors during the life of the program. An integral element of that overall strategy must be the plan for achievement of a reliable, maintainable system. Current acquisition strategies often do not adequately address R&M, therefore making it unlikely formal communications with industry will do so. For example, Program Management Directives (PMDs) are not required to include R&M parameters or address the overall importance of R&M in the program. The Program Management Plan (PMP) often does not adequately address R&M management or other R&M issues such as concurrency and the transition from design to production. This action is designed to ensure R&M is adequately addressed in the development of weapon system acquisition strategies.

Methodology:

1. Establish procedures for Air Staff and command-level review of PMDs, PMPs, acquisition plans, and other related documents that impact the strategy for establishing and achieving R&M through contractor activities. (reference Objective IV, Action F)
(OPR: AF/LE-R OCR: AF/LE/RD/XO) SUSPENSE: Apr 85

2. Require clear, concise statements of specific program R&M requirements in every applicable PMD as well as a statement identifying the level of importance R&M will have in all planning, solicitation, and contractual documents.
(OPR: AF/RD OCR: AF/LE-R, AF/LE) SUSPENSE: Sep 85

3. Require a weapon system R&M plan be included as an attachment to all PMPs to provide a single, coordinated strategy for managing all aspects related to achievement of the required system R&M during both the near-term contractor activity and the long-term system life. (reference Objective III, Action B)
(OPR: AFLC, AFSC OCR: MAJCOMs SUSPENSE: Sep 85

4. Require the PMP and accompanying weapon system R&M plan be "transitioned" to AFLC at program management responsibility transfer to be used as the basis for a system management plan.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Sep 85

5. Include as topics for discussion at Business Strategy Panels (BSPs) R&M related issues such as R&M requirements, reliability growth, treatment of R&M in source selection, concurrency, transition from design to production, and product performance agreements.
(OPR: AFSC, AFLC, AF/RD OCR: AF/LE-R, MAJCOMs) SUSPENSE: Oct 85

OBJECTIVE VI: INDUSTRY COMMITMENT

Action B: Improve the translation of operational needs to ensure request for proposal and contract specifications contain R&M parameters expressed as measurable, verifiable, and enforceable requirements.

Rationale: The formal mechanism for institutionalizing the Air Force R&M commitment is the contract. Documents such as the system specification, statement of work, and data requirements lists form the basis for system/modification design, development, and acceptance. R&M 2000 identified the lack of clear R&M requirements as one of the key impediments to achieving improved R&M. Defining R&M requirements in these documents is essential to the other R&M 2000 recommendations. Without contractually enforceable R&M requirements, no basis exists for demanding improved R&M, nor is any improvement likely. These actions are designed to ensure every contract identifies R&M requirements in a manner capable of being measured, verified, and enforced.

Methodology:

1. Establish and implement management controls designed to ensure:

- R&M requirements are derived from and traceable to operational requirements

- R&M parameters are expressed in the specification, statement of work, and other contract documents as firm requirements and not as goals

- R&M requirements are expressed in measurable, verifiable, and enforceable terms

- Prior to production, R&M requirements are verified by analysis, inspection, and/or demonstration testing. Ensure a clear definition of test failure is included in the specification.

(OPR: MAJCOMs OCR: AF/LE-R/XO/RD) SUSPENSE: Sep 85

2. Advise AF/LE-R of the management controls in place to ensure satisfactory completion of this action.

(OPR: MAJCOMs OCR: AF/LE-R/XO/RD) SUSPENSE: Nov 85

OBJECTIVE VI: INDUSTRY COMMITMENT

Action C: Increase consideration of R&M in all weapon system source selections and include R&M expertise in source selection organizations to ensure the Air Force commitment to R&M is reflected in contract awards.

Rationale: R&M 2000 identified a consistent theme from industry and government that the Air Force must go beyond an internal commitment and obtain the attention of industry if the R&M improvement effort is to succeed. The clearest signal we can provide to industry is through the source selection process. Executive summary letters, instructions for proposal preparation, and evaluation factors for award must reflect R&M as coequal with cost, schedule, and other performance requirements. Similarly, source selection notifications and debriefings must emphasize the role R&M played in the outcome. Critical assessment of R&M in noncompetitive and follow-on awards must also be emphasized. This action is designed to ensure industry is committed to improved R&M by awarding contracts for Air Force weapon systems based upon a balanced consideration of R&M and other performance requirements.

Methodology:

1. Encourage the use of techniques such as draft requests for proposal, industry conferences, presolicitation, and preproposal conferences to explore technology maturity in relation to proposed R&M requirements.
(OPR: MAJCOMs OCR: AF/LE-R/RD) SUSPENSE: Jul 85

2. Require the program management directive to address R&M requirements and their importance in the overall structure of the program as coequal with cost, schedule, and other performance requirements to ensure the program will be conducted and the sources selected based in part upon that direction.
(OPR: AF/RD OCR: AF/LE-R/LE) SUSPENSE: Sep 85

3. Require evaluation of R&M as a major consideration in all applicable source selections in a manner coequal with cost, schedule, and other performance requirements and ensure representation of appropriate levels of R&M expertise in source selection organizations.
(OPR: MAJCOMs OCR: AF/LE-R/RD) SUSPENSE: Sep 85

4. Establish policy and procedures to monitor the consideration of R&M in all applicable source selections to determine the degree of compliance.
(OPR: MAJCOMs OCR: AF/LE-R/RD) SUSPENSE: Sep 85

5. Revise AFR 70-15 to identify R&M as considerations in all applicable source selections.
(OPR: AF/RD OCR: AF/LE-R) SUSPENSE: Jul 86

OBJECTIVE VI: INDUSTRY COMMITMENT

Action D: Implement in-depth assessment of R&M during all design reviews to provide early evaluation of R&M plans and progress and to ensure R&M is being treated in a manner equal to other performance requirements.

Rationale: A successful program must include concise R&M requirements in the specification and statement of work and emphasize R&M as major criteria in the contractors' proposal evaluation. It is essential this emphasis be continued throughout the contractual design review process. Throughout this process, the Air Force must insist that the reliability and maintainability of the system under consideration be specifically considered in a manner consistent with its priority as coequal to cost, schedule, and other performance requirements. Similarly, the Air Force must insist that prime contractors flow-down this concern for R&M to each of their subcontractors and vendors. These actions are designed to establish procedures that will ensure such priority is given.

Methodology:

1. Require in-plant Contract Administration Service (CAS) engineers to actively participate in design reviews and periodic evaluations of contractor R&M activity.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Jun 85

2. Establish procedures to ensure consideration of reliability and maintainability in each prime contractor, subcontractor, and vendor design review in a manner consistent with its priority as coequal to cost, schedule, and other performance requirements.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Sep 85

3. Establish policies and procedures to assist program offices in the evaluation of contractor-developed Reliability Design Guidelines and Design for Maintainability Checklists required by MIL-STD-1521A (USAF).
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Sep 85

4. Ensure all participants in design reviews are knowledgeable of the program R&M objectives and are properly trained to assess the contractors' plans and progress toward achieving the contract R&M requirements.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Sep 85

OBJECTIVE VI: INDUSTRY COMMITMENT

Action E: Enhance the use of Product Performance Agreements (PPAs) by establishing and implementing an aggressive policy for their use, improving warranty administration, and intensifying management review of PPAs to ensure contractor commitment and motivation.

Rationale: Contractor motivation to achieve improved R&M is essential to the ultimate success of R&M 2000. This motivation can be developed or fostered by the contractor through pursuit of internal goals such as increased market share, enhanced corporate image, and/or increased profit. Contractor motivation for enhanced R&M can also result from external factors such as government contract financial incentives, extended field use warranties, and emphasis in award fee plans. These various incentives, or Product Performance Agreements (PPAs), are some of the numerous techniques available to the program manager. When properly applied, these agreements can provide two benefits. First, they can be an effective means of assuring visibility and emphasis by government and contractor management on achievement of R&M requirements. Second, PPAs can provide tangible and intangible benefits such as improved performance, reliability, and quality; reduced life cycle cost; early and rapid resolution of problems; realistic estimates of field performance; contractor responsibility for field performance; and improved evaluation of field performance and motivation in design and production. However, these agreements alone cannot achieve increased R&M, nor are they a substitute for a well-planned and executed R&M program. They must be an integral part of an overall R&M program carried throughout the design and development phase and based on a clear statement of system R&M requirements. Today, more effective use of these agreements is hampered by the absence of formal reporting requirements, consistent policy, and direction. The Air Force has established the Product Performance Agreement Center (PPAC) to assist in correcting these deficiencies and to facilitate the effective use of PPAs by Air Force acquisition activities. However, the present PPAC manning level has severely limited the technical assistance PPAC has been able to provide in this inherently complicated and broad-based area. The following actions will improve the effectiveness of PPAs across our weapon system acquisitions.

Methodology:

1. Review PPA approach being used to motivate the contractor as a part of all weapon system reviews prior to Air Staff Board and Air Force Council briefings.
(OPR: AFSC, AFLC OCR: AF/RD/LE-R) SUSPENSE: Apr 85

2. Require the Product Performance Agreement Center (PPAC) be an active participant in development of the R&M strategy on all major programs. Investigate the need to accelerate Air Force manning of the center in advance of the planned FY 86/FY 87 manning increases to provide the capability to support this expanded scope of work.
(OPR: AFSC, AFLC OCR: AF/RD/LE) SUSPENSE: Jul 85

3. Ensure program management directives require consideration of PPAs to motivate the contractor to design and produce reliable and supportable systems.

(OPR: AF/RD OCR: AF/LE-R) SUSPENSE: Aug 85

4. Enhance the Air Force implementation policy for the application of PPAs for improved R&M by establishing policy in Federal Acquisition Regulation (FAR) Supplements that stresses the following points:

- Every Air Force system and subsystem acquisition must consider the use of PPAs and document any decision not to incorporate such an agreement. Decision to not incorporate PPAs should receive appropriate levels of management review.

- The PPA strategy must be an integral part of and complementary to the overall program strategy.

- R&M should be incentivized in the development phase, primarily through the use of award fees and incentives. Contractors should be formally notified as early as possible in the acquisition (design stage) of our intent to require warranties/guarantees during production to assure R&M inherent in the design is achieved during an extended period of field use.

- R&M incentives must be simple, easily understood, and be of sufficient value as compared to other incentives or contract requirements.

- R&M must be emphasized as an essential element of weapon system award fee plans.

- Evaluation of contractor performance subject to a PPA must be based on a sufficient period of field use and measurable, verifiable parameters. Contractors should be given reasonable access to the facilities and records that apply to the items covered by the PPA.

- Development of PPAs requires the combined efforts of program engineers, contracting officers, logisticians, cost analysts, users, and maintainers.

- The Air Force must recognize and provide for the administrative skills, tracking systems, and maintenance procedures essential to effective PPA management and field administration.

(OPR: AF/RD OCR: MAJCOMs, AF/LE-R) SUSPENSE: Sep 85

5. Establish and implement a plan for the overall management of PPA issues in the Air Force. This plan should include such topics as the development of a PPA data reporting system and warranty cost effectiveness models, symposia/workshops to involve users in PPA strategy, and the publication of studies, analyses, and guidebooks to assist program managers/system program managers in selecting, tailoring, and implementing PPAs and assessing their effectiveness.

(OPR: AF/RD OCR: MAJCOMs, AF/LE-R) SUSPENSE: Sep 85

OBJECTIVE VI: INDUSTRY COMMITMENT

Action F: Establish a program designed to encourage aerospace contractors to implement R&M motivation programs and to employ effective R&M design and manufacturing techniques to ensure their commitment and capability to meet Air Force requirements.

Rationale: Air Force and industry must work together to obtain highly reliable and maintainable weapon systems. This action plan addresses a methodology for institutionalizing R&M within the Air Force. In parallel with this internal effort, it is essential to involve industry in a similar effort to institutionalize R&M within their corporate structure. Periodic joint Air Force/industry meetings involving various management levels can be designed to (1) reinforce the Air Force commitment; (2) alleviate industry's skepticism concerning the initiative based upon their experience with past R&M "pushes;" (3) serve as a forum for Air Force/contractor interchanges on programs, procedures, techniques, successes, and failures in R&M; (4) encourage industry to adopt improved R&M as one of their corporate goals. These actions are designed to complement other recommendations by ensuring both sides of the acquisition equation - Air Force and industry - are fully supportive, committed, and capable of responding to this initiative.

Methodology:

1. Brief R&M 2000 to industry for their information to demonstrate our resolve to make R&M coequal to cost, schedule, and performance.
(OPR: AF/LE-R OCR: SAF/PA) SUSPENSE: Jun 85

2. Establish procedures for periodically submitting articles on R&M to industry and professional journals and magazines.
(OPR: AF/LE-R OCR: MAJCOMs) SUSPENSE: Jun 85

3. Create an industry awareness program to keep R&M visible, provide motivation for contractors to be interested in R&M, and to get industry involved in R&M. Designed along the lines of a Zero Defects program, the Air Force R&M awareness program would include:

- A recognition and awards program to recognize R&M achievement and motivate industry leadership and workers to improve R&M

- The use of video-taped presentations, R&M handouts, and posters to generate interest, focus attention, and keep R&M visible.
(OPR: AF/LE-R OCR: AF/LE, SAF/PA, MAJCOMs) SUSPENSE: Nov 85

4. Work with industry and professional associations to ensure R&M is adequately addressed in hardware and technology "shows," or to sponsor shows that focus on R&M.
(OPR: AF/LE-R OCR: AFSC, AFLC) SUSPENSE: Nov 85

5. Establish an ongoing program with key contractors and subcontractors designed to encourage each contractor to review their internal policies and procedures to ensure each has a motivated work force properly trained and equipped to design and manufacture reliable weapon systems and components.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Dec 85

6. Initiate annual R&M symposia for various levels of Air Force and corporate management designed to develop continuing support for the Air Force initiative. These symposia should include:

- Senior management discussion of Air Force overall R&M objectives, long-range plans, and assessments of corporate institutionalization

- Program management-level discussion of programmatic R&M issues, initiatives, and R&M objectives

- Staff engineering interchanges on effective techniques, tradeoffs, initiatives, and new technologies in R&M.
(OPR: AFSC, AFLC OCR: AF/LE-R) SUSPENSE: Dec 85

ANNEX I

CHARTER FOR AIR STAFF SPECIAL ASSISTANT FOR RELIABILITY AND MAINTAINABILITY

CHARTER

FOR

SPECIAL ASSISTANT TO DEPUTY CHIEF OF STAFF/LOGISTICS & ENGINEERING AND DEPUTY CHIEF OF STAFF/RESEARCH DEVELOPMENT & ACQUISITION FOR RELIABILITY AND MAINTAINABILITY

The Air Force requires improved Reliability and Maintainability (R&M) in weapon systems to meet future operational support goals within existing resources. The Air Force is institutionalizing its commitment to achieve these improvements by ensuring R&M is treated equally with cost, schedule, and performance. The Office of the Special Assistant to Deputy Chief of Staff/Logistics & Engineering and Deputy Chief of Staff/Research Development & Acquisition for R&M is established to consolidate in the Air Staff the responsibility, authority, and expertise to guide the Air Force initiative to improve R&M. The Special Assistant is an essential element of commitment to achieve Air Force operational support goals through improved R&M. The responsibilities of the Special Assistant for R&M include the following:

- Manage and implement the Air Force R&M institutionalization program (R&M 2000)
- Establish operational support goals and track the impact of R&M improvements on goals
- Act as advocate and focal point for Air Force R&M
- Establish and coordinate Air Force policy for R&M
- Develop and implement command, weapon system, and technology R&M planning
- Perform reviews and oversight of program R&M performance
- Provide R&M technical support to the Air Staff Board and Air Force Council including advisability to proceed
- Work with industry to ensure they have commitment and capability to meet Air Force R&M requirements
- Establish an active R&M communication and motivation program
- Monitor institutionalization of R&M improvement at the major commands

ANNEX J

BIBLIOGRAPHY

BIBLIOGRAPHY

This bibliography provides a listing of the key R&M documents reviewed by the literature team. The index number refers to an internal filing number used by the team's librarian to aid in finding documents. This index number has meaning only to the team's librarian and should not be used when trying to locate these documents from other sources.

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O-01	LESSONS LEARNED BULLETIN - ENGINEERING DATA, AFALC/PTL	-	Undated
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