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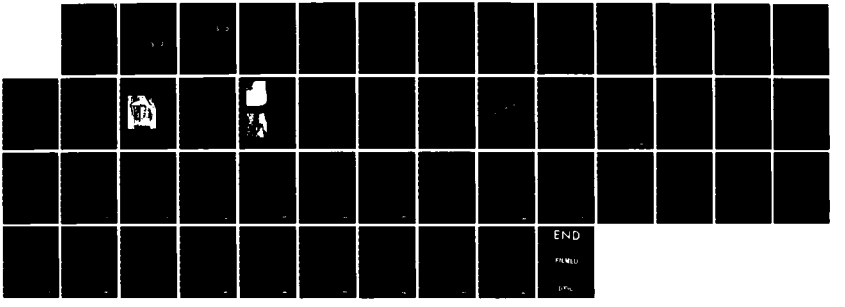

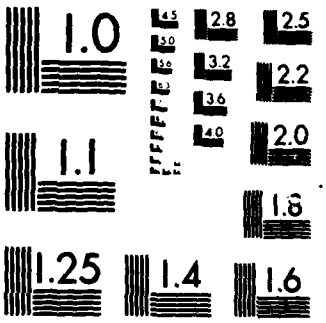

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FIRE RESISTANT FUEL PROGRAM ANALYSIS AND PROGRAM MANAGEMENT DOCUMENTATION

FINAL REPORT

31 January, 1986

C. A. DYE

Prepared for the
Belvoir Research Development and Engineering Center

Under
Contract Number DAAK70-84-D-0053
Task Order Number 0010

"The views, opinions and/or findings contained in this report are those of the authors and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other documentation."

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This report describes programmatic analyses and subsequent programmatic recommendations in accordance with AR70-1.

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FIRE RESISTANT FUEL PROGRAM ANALYSIS AND PROGRAM MANAGEMENT DOCUMENTATION

STUDY GIST

PRINCIPAL FINDINGS:

There was an urgent need to transition management of the Fire Resistant Fuel (FRF) Program from the Materials Fuels and Lubricants Laboratory (MFLL) to the Logistics Support Directorate (LSD). It is recommended that the LSD develop program management documentation (PMD) that support a Milestone I review as soon as possible. Documentation, in accordance with AR 70-1, required to prepare for a Milestone I decision to include the following:

- System Concept Paper
- Concept Formulation Package
- Test Evaluation Master Plan.

There is likewise an urgent need to have TRADOC take a more definitive position on the Operational and Organizational plan for FRF. The best way to accomplish this task is to proceed as quickly as possible to a Milestone I decision. In this case, should TRADOC disconcur, a higher level authority can decide.

MAIN ASSUMPTIONS:

This is a high visibility program that carries a rather high priority, especially since the emphasis placed on the program by the Hon. James R. Ambrose, the Undersecretary of the Army.

AR 70-1 guidelines, practices and procedures must be adhered to in the development of an FRF programmatic acquisition strategy.

PRINCIPAL LIMITATIONS:

Technical risks associated with the addition of water and an emulsifier to neat diesel fuel. The three most important limitations are as follow:

- o Plugging of filters in fuel lines at or near 0° Centigrade must be overcome with vehicle modifications.
- o Ancillary equipment, other than engines, must be examined to insure secondary effects of significant magnitude do not occur. For example:
  - What is the implication of FRF to personnel heaters?
  - Must regular neat diesel be continued for this application?
- o FRF when used in a common pipeline will contaminate other fuels. This poses a special set of logistics issues.

SCOPE OF THE EFFORT

To assess the status of the FRF program and to make programmatic recommendations.

OBJECTIVE:

To recommend programmatic steps in accordance with AR 70-1 that will lead to a timely fielding of FRF.

BASIC APPROACH:

A careful study of FRF program structure was performed through interface with BRDEC personnel and TRADOC personnel from the Quartermaster School responsible for O&O concepts. Consideration of AR 70-1 was then given to make specific programmatic recommendations.

STUDY SPONSOR: U.S. Army Belvoir Research Development and Engineering Center

PRINCIPAL INVESTIGATOR: Mr. Charles A. Dye, Science Applications International Corporation

COMMENTS AND QUESTIONS: U.S. Army Belvoir Research Development and Engineering Center
ATTN: STRBE-VF (Mr. Mario LePara)
Fort Belvoir, Virginia 22060

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SECTION 1

BACKGROUND

The Department of Defense (DoD) through the Army Materiel Command (AMC), through the Troop Support Command (TROSCOM), has tasked the Belvoir Research Development and Engineering Center (BRDEC) to develop a fire resistant fuel (FRF) primarily for use in combat vehicles. This document provides an overview of user requirements, the development effort required to field a FRF, plus technological risks, and a summary of program management documentation (PMD) required by AR 70-1 with a straw man overview of organizational responsibilities that seem appropriate for fielding a FRF.

Science Applications International Corporation (SAIC) performed the work herein documented under contract DAAK70-84-D-0053, Task Order Number 0010.

Section 2 discusses user requirements. The development effort that is required and technological risks are covered in Section 3. A discussion of organizational responsibilities is presented in Section 4. PMD required for a typical full scale development effort is presented in the SAIC pamphlet in Appendix A, based upon AR 70-1 and AMC/TRADOC Pamphlet 70-2. A second SAIC developed pamphlet presented at Appendix B discusses major documents in the full scale development process in terms of content and responsible agencies and activities.

SECTION 2

USER REQUIREMENTS

High level interest in a near-term FRF was asserted by the Under Secretary of the Army, the Hon. James R. Ambrose, on 11 February 1983. This resulted in the previously cancelled LOA on development of a fire-resistant fuel mixer system (originally approved on 27 May 1980) to be reinstated. Several briefings and related correspondence occurred regarding a FRF between various levels within AMC, TRADOC and the Department of the Army (DA) during the period 9 March 1983 through 5 November 1983. Nothing in the form of a substantive, funded program was accomplished during the 9 March 1983 through 5 November 1983 period.

A message was sent on 28 December 1984 from AMC requesting that the U.S. Army Forces Command (FORSCOM) and the U.S. Army Training and Doctrine Command (TRADOC) participate with U.S. Army Troop Support Command (TROSCOM) to develop a coordinated FRF production plan for subsequent staffing and presentation to Mr. Ambrose.

User requirements were developed based upon an example corps that was extracted from the Total Army Analysis 1988 (NATO Scenario). It contained the following:

- 2 Heavy Divisions (one with 4 BDES)
- 1 Infantry Division
- 1 Armored Division
- 1 Separate Infantry Brigade
- 1 Airborne Ranger Battalion.

Diesel fuel consumption was computed to be 1,516,250 gallons per day. The total diesel fuel consumption considering tracked vehicles only would be 1,032,308 gallons per day.

In order to quantify the resupply of FRF components to the fighting force, it was first determined where various FRF components would be located,

i.e., the purified water, the FRF premix, and the neat diesel required for mixing FRF.

Figure 2-1 provides a schematic of fuel movement in a theater of operations. The fuel is brought to the theater via a multi-product ocean going tanker and discharged into a distribution network consisting of multi-product pipelines, tactical hoselines, rail and tank truck assets.

The following three mix options were considered by TRADOC:

- o CONUS
- o Corps or division rear
- o Using unit

For each general mix option the criteria used for evaluation considered the following:

- o OPERATIONAL FACTORS
  - Rapid Transition From Peace to War
  - Mixing Installation Vulnerability
  - Impact Characteristics
  - Compatibility With Existing Systems
  - Simplicity/Complexity
  - FRF System Impact On Combat Performance
  - Safety
  - Energy Consumption
  - Quality Surveillance
- o Personnel requirements
- o Equipment resources requirements
- o Training requirements
- o Life cycle costs.

The first mixing option, CONUS or theater rear mixing, had corps and division areas receiving only FRF treated diesel. Although this option would be the simplest from a logistical point of view, use of this option was precluded for the following reasons:

- o Long lead time to move
- o FRF unavailable to critical units during early stages of the war

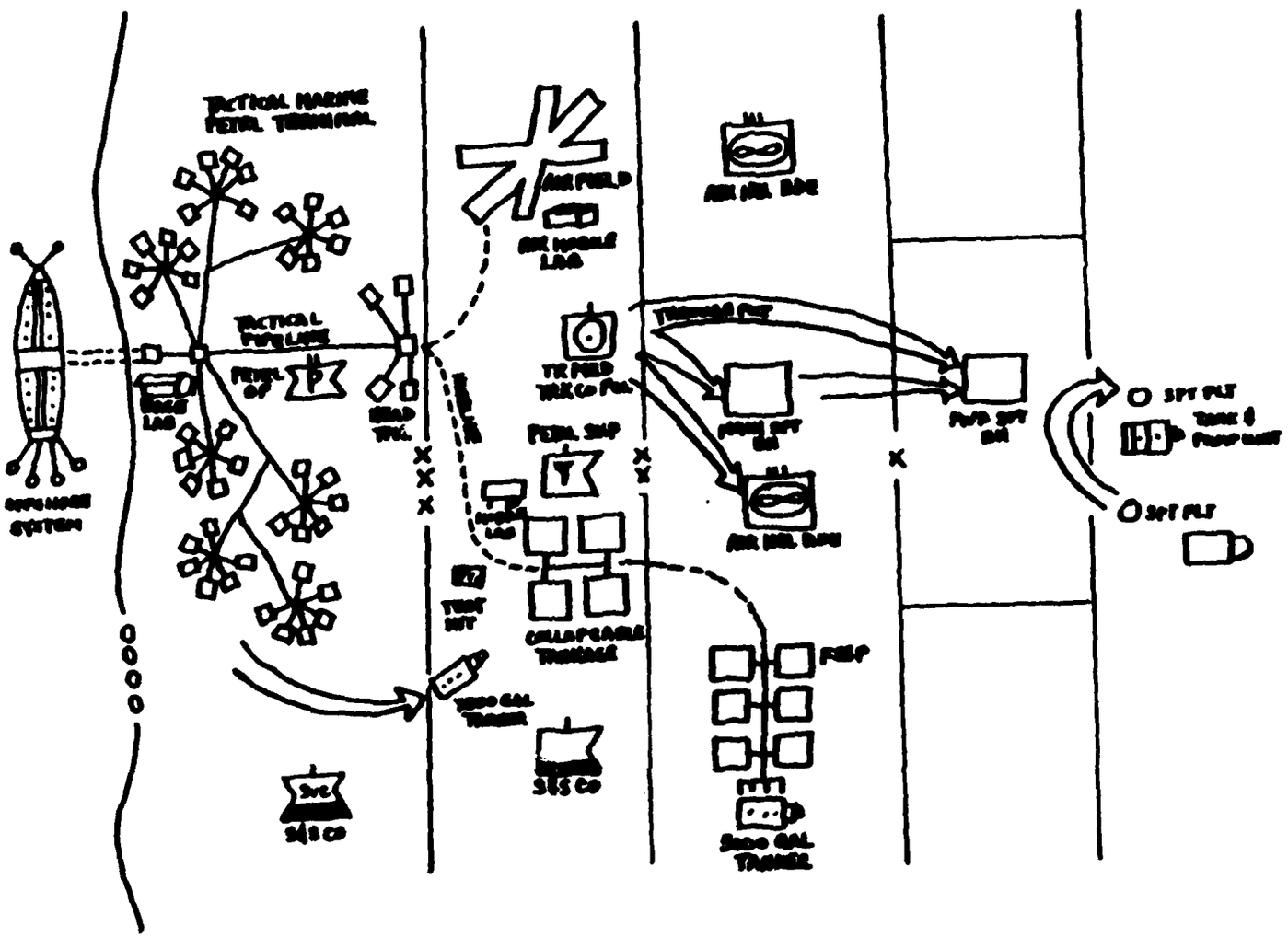


Figure 2-1. Petroleum Distribution System

- o Current FRF formulation incompatibility with other hydrocarbon fuels
- o Multi-product transport systems subject to FRF residual contamination
- o FRF long-term stability in cold climatic conditions
- o Lack of acceptance by allied forces and sister services
- o Reduced fuel flexibility on the tri-service level
- o Need for Army unique ocean tanker assets.

The second mixing option, corps or division rear mixing, was considered to have the following advantages and disadvantages:

Advantages

- o Response time short since various components of FRF could be prepositioned
- o Contamination of multi-product systems precluded
- o Quality control of FRF mix achieved with available petroleum training personnel
- o Fuel allocation flexibility preserved on the DFSP level.

Disadvantages

- o Transportation and storage of the FRF pre-mix in the corps area
- o Additional burden on corps/division support personnel
- o Selective FRF for combat vehicles precluded
- o Excessive number of vehicles and devices to augment current POL transportation assets.

In the third mixing option, unit mixing, each unit would have it's own FRF mixer. This option was considered to have the following advantages and disadvantages:

Advantages

- o Rapid changeover from peace to war possible
- o Mixing installation vulnerability decreased
- o Reduced total transportation requirements for pre-mix and water.

Disadvantages

- o Mini field mixer/water purification vehicle not yet designed
- o Quality control uncertain
- o Increased supply lines for FRF pre-mix
- o Decreased probability of finding adequate water purity will result in requirement to transport water
- o Additional personnel required per gallon of fuel mixed
- o Increased RAM problems
- o Systems degraded in an arid environment.

TRADOC took the position that the best mixing option could not be determined fully until technical issues relating to the transportability and stability of the fuel, acceptability of the fuel system heater retrofit that may be required on all vehicles, the impact on ancillary equipment, power loss definition, the water purity needed for FRF production, and the military worth were assessed.

It was agreed by TRADOC, AMC and DA that these issues would be addressed and then an in-process review (IPR) would be held in February 1986.

SECTION 3

FRF DEVELOPMENT AND TECHNOLOGICAL RISKS

Army capability to win any war is directly dependent on the availability of a plentiful and dependable fuel supply. FRF concepts are based upon mixing water with neat diesel fuel. Proportionate parts of pure water, neat diesel fuel and an emulsifier, when blended in an FRF mixer, become a stable solution (i.e., a water-in-fuel microemulsion) that both burns in diesel engines and is self-extinguishing when in a pool state.

Limited testing completed to date has demonstrated that FRF would in most instances reduce the amount of burn-out that is often experienced in combat vehicles. Whether the reduction in fires after the initial fireball is significant regarding human life remains to be proven; however, there can be little doubt of the benefit to combat equipment in repair and replacement.

The objective of the FRF program is to formulate a stable fuel, to develop a field mixer system(s), and to field a FRF that eliminates or significantly reduces the threat of fuel fire due to ballistic penetration.

Accomplishments as of February, 1985 included the following:

- o FRF formulation was completed
- o Ballistic tests were considered promising
- o Preliminary engine tests were promising
- o A single prototype mixer was developed.

FRF production is illustrated in Figure 3-1. The diesel fuel and pre-mix are first mixed in the proportions indicated. The water is then introduced into the mixer in the percent shown. After mixing, the FRF is available for use.

The currently available prototype mixer is shown in Figure 3-2. It is a three stage vortex mixer system with microprocessors that control the input to the required percentages, i.e., 78% diesel, 10% water, and 12% pre-mix. Should

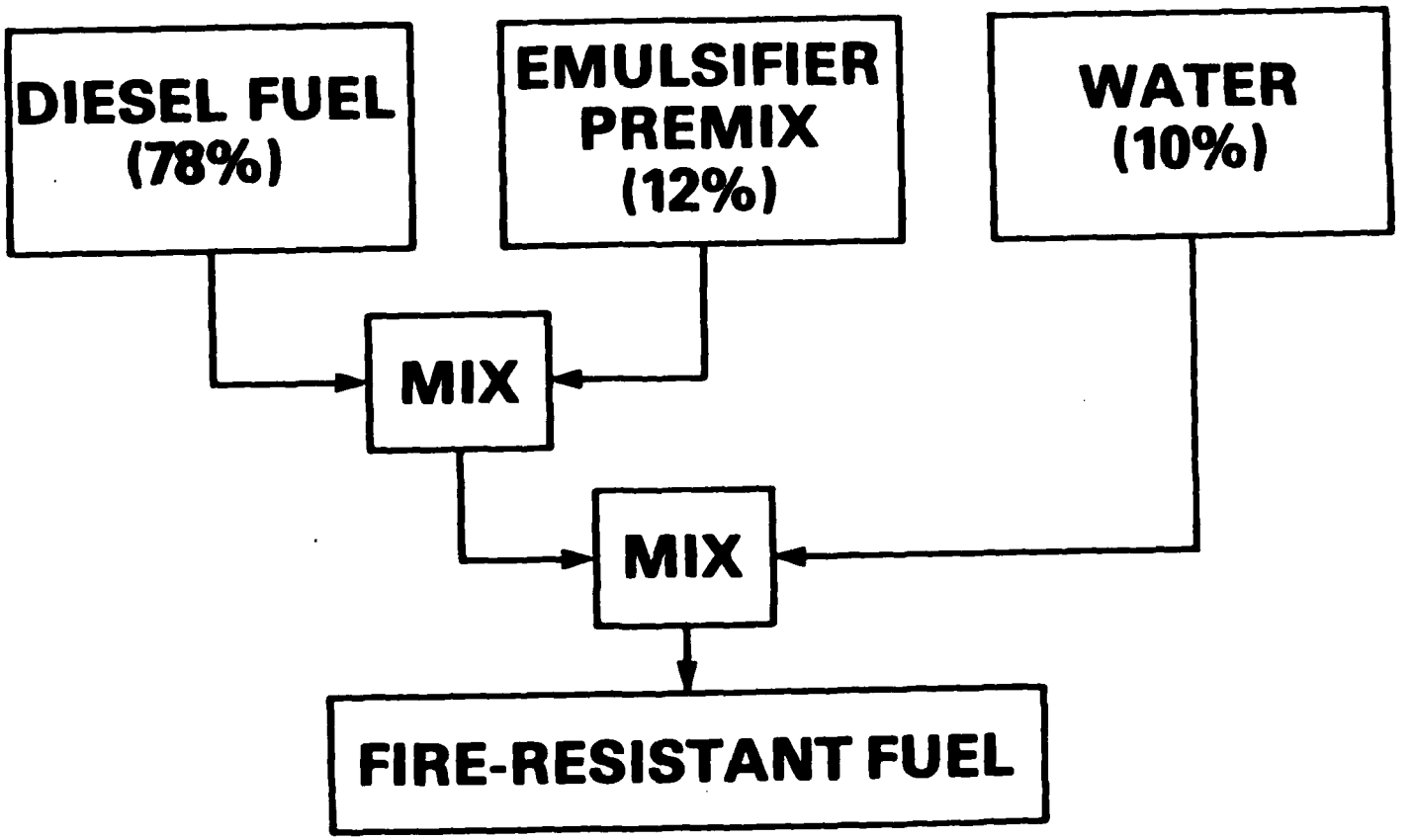


Figure 3-1. FRF Mixing Schematic.

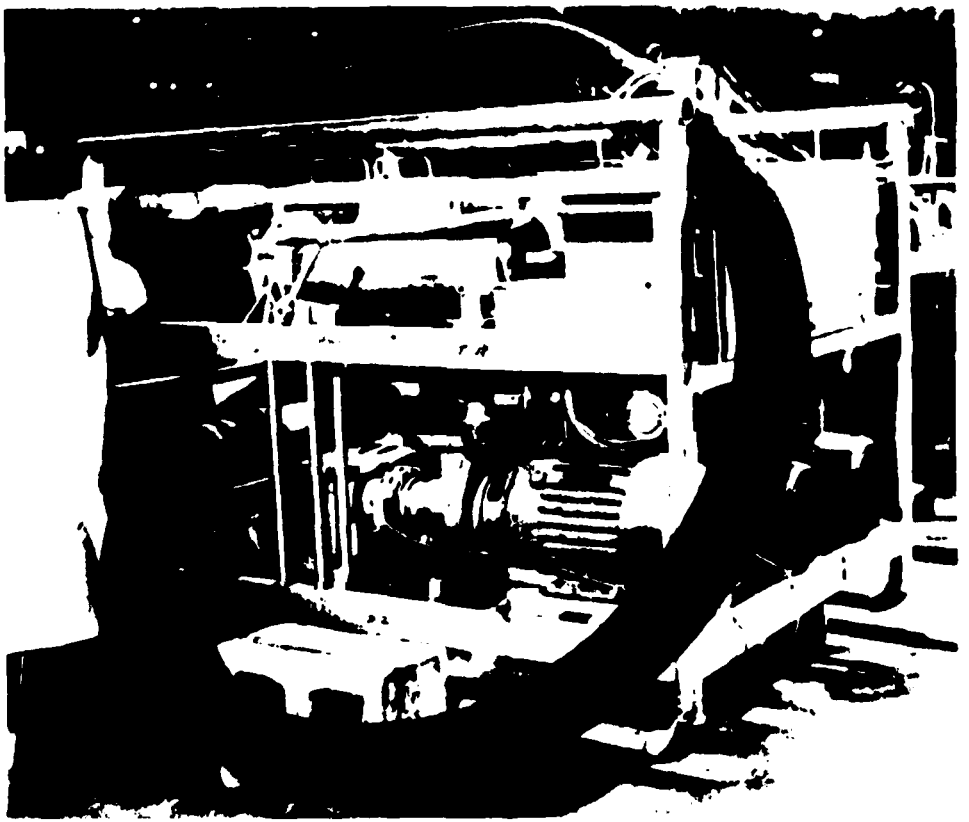


Figure 3-2. 300 GPM FRF Prototype Field Mixer

any of the input streams fall below the required percentage level, the system automatically stops.

FRF survivability benefits expressed in a qualitative manner are considered to be the following:

- o Decreased ignition susceptibility
- o Retarded flame spread rate
- o Self-extinguishing ground fires
- o Signature reduction.

An example demonstration of FRF benefits is depicted in Figure 3-3. The picture on the left shows non-ignited fuel draining from the tank seconds after it had experienced an explosion from a 3.2-inch precision shaped charge. The picture on the right shows the same test using current diesel fuel the same number of seconds after explosion.

An area of great concern is to find a way to assess the true benefit of FRF in terms of lives saved, dollars saved, and unit readiness in an actual conflict. If this is not done, as difficult as it may be, the Army may well not be able to justify large expenditures in terms of dollars and logistics personnel that are required for the FRF program in the near-term.

The U.S. Army Materiel Systems Analysis Activity (AMSAA) is currently tasked to determine personnel lives and equipment savings from introduction of FRF.

Technical issues related to FRF development are discussed below:

- o The FRF, by its very nature, adds water, which offers no energy, to be used for combustion. This results in some power loss. The exact power loss will vary from combat system to combat system, but preliminary tests indicate that a loss slightly greater than that of going from summer fuel to winter fuel is to be expected.
- o Fuel filter plugging has occurred at or around 0 degrees centigrade. For this reason, heaters that maintain fuel temperatures above 0 degrees centigrade around filters and other areas need to be investigated.

DRAINING OF NONIGNITED FUEL AFTER FRF TEST

FLAMING WITHIN AND BENEATH VEHICLE DURING NEAT FUEL TEST

DEMONSTRATION OF EFFECTIVENESS OF FIRE-RESISTANT DIESEL FUEL (FRF) AT 77°C IN M-113 ARMORED PERSONNEL CARRIER USING 3.2-INCH PRECISION SHAPED CHARGES (54°C BASE FUEL FLASH POINT)

Figure 3-3. M-113 FRF Test

- o The quality of water required is more stringent in purity than is required for potable water. For this reason availability of good water or a means of producing good water is essential for the near-term FRF.

- o The emulsifier presents potential contamination problems in the event that MOGAS or aviation fuel is passed through the same transport or handling equipment. After contamination by FRF, MOGAS or aviation fuel cause serious damage to combat systems.

- o Standardization across services and NATO Allies is also a potential stumbling block.

- o FRF in combat system engines may work fine, yet other systems or sub-systems may become problems. For example, heaters that currently burn diesel may not operate using FRF -- since pool burning is self-extinguishing!

The technical approach selected by the Belvoir Research Development and Engineering Center is to first determine the feasibility of mixing fuels and their stability in a wide range of temperature and water purity levels.

Problems associated with the contamination of multi-product fuel lines must be overcome by operational considerations since there exist no near-term technically feasible alternatives to the current FRF formulation.

It must be proven that there is a true benefit to FRF by completing survivability analyses.

FRF must be tested in military vehicles and ancillary equipment to levels that ensure proof of principle.

A shortened full scale development program that results in the fielding of FRF as soon as possible is then envisioned. The exact time required to fielding will be dependent upon the number of waivers given by DA in the materiel acquisition process, evaluation of ancillary difficulties that may arise from non-combustion engine uses of FRF, technical approaches developed to treat the icing problem at below freezing temperatures, and the minimal amount of time required for working out the bugs as FRF is integrated into the Army's fleet of vehicles.

SECTION 4

FRF PROGRAM RECOMMENDATIONS

FRF PROGRAM STRUCTURE

Belvoir Research Development and Engineering Center is partitioned into three R&D groups as follow:

- o Combat Engineering Support Directorate
- o Logistics Support Directorate
- o Materials, Fuels, and Lubricants Laboratory.

The first two groups perform R&D activities from concept formulation through the fielding of materiel items. The Materials, Fuels and Lubricants Laboratory (MFLL) concentrates on early development issues, mainly of a technical nature. Even though the MFLL Fuels and Lubricants Division must be involved in FRF development, the Logistics Support Directorate should probably manage the overall FRF program.

In addition to the BRDEC, other activities need to participate in the fielding of FRF. The U.S.Army Tank- Automotive Command (TACOM) will need to develop a concept for insuring that fuel lines do not experience freezing at temperatures below freezing. The problem that must be overcome is plugging at the fuel filters when the temperature is at or below 0 degrees centigrade due to the 10% water content in FRF and the emulsifier ingredients.

Other U.S. Army participants are expected to include the following:

- o TRADOC
- o TROSCOM
- o AMC
- o Logistics Evaluation Agency (LEA)
- o Test and Evaluation Command (TECOM)
- o Operational Test and Evaluation Agency (OTEA)
- o Department of the Army (DA)
- o AMSAA.

Contractors are expected to be used to expedite the program in the following areas:

- o Hardware development
- o Program management documentation
- o Systems integration analyses.

The existing FRF program plan for early development activities is shown in Figure 4-1 for the 300 GPM FRF mixing concept at corps or division rear. The plan shown is the one briefed to Mr. Ambrose on 28 February 1985. Let us now analyze the displayed program plan in light of events that have subsequently occurred and in light of the materiel acquisition process as defined by AR 70-1 and AMC/TRADOC Pamphlet 70-2. An overview of materiel acquisition activities defined in the materiel acquisition process is presented at Appendix A.

ISSUES

It should be noted, that the only funds placed in the FRF program since 28 February 1985 have been from reprogramming funds within the MFLL R&D budget. For this reason, ongoing activities deal primarily with proof of principle R&D issues.

The items shown below have not yet been addressed and require funding from sources outside the normal MFLL budget.

- o Develop performance data for the white macroemulsion which is produced at 5 degrees centigrade.
- o Determine the use of this white macroemulsion.

In addition to the technical issues discussed above there is a need to define programmatic responsibilities clearly. It is recommended that the Logistics Support Directorate of the BRDEC be assigned as program manager and an assignment of the responsibility to a project engineer be made in the near future.

CORPS OR DIVISION REAR
300 GPM

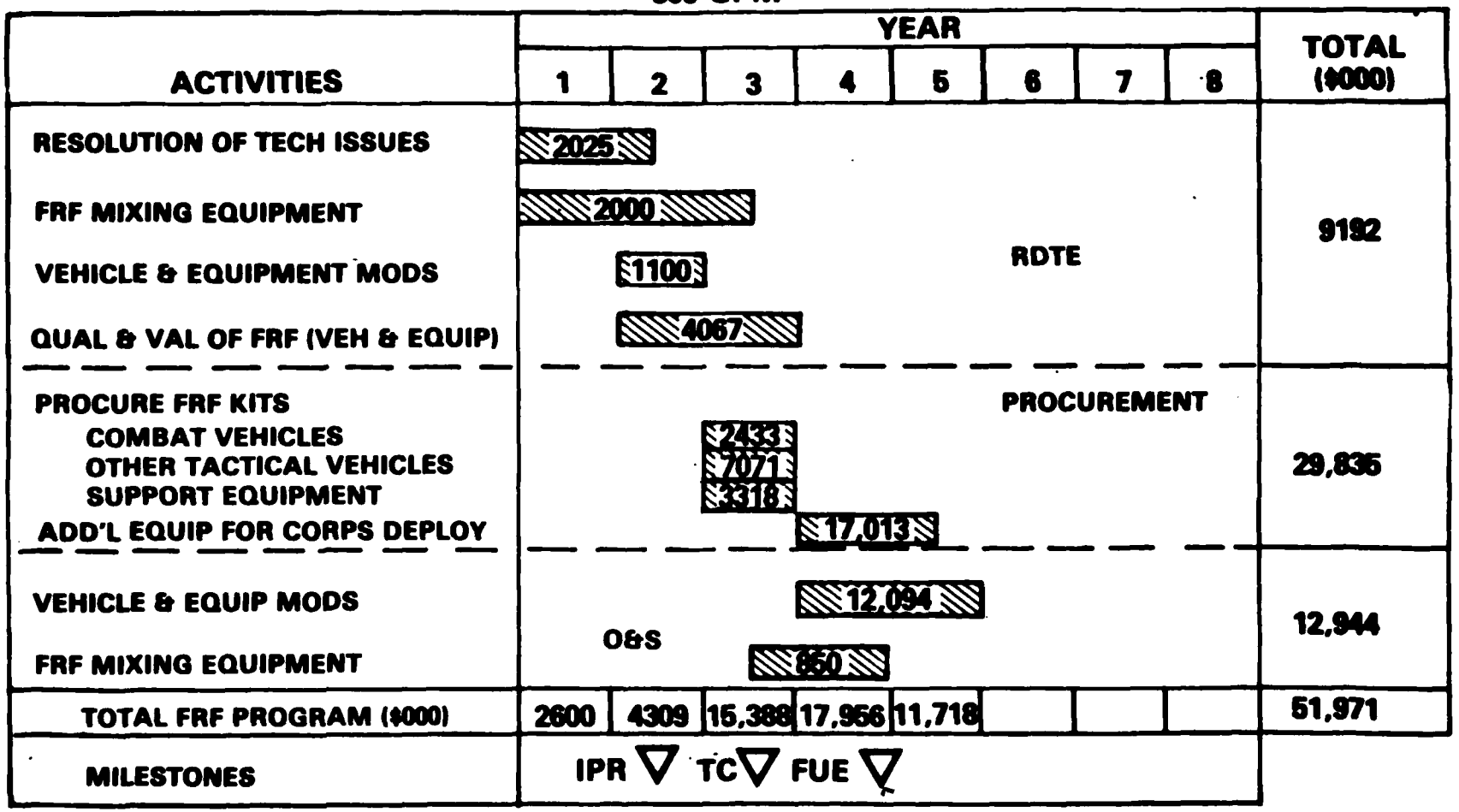


Figure 4-1. 300 GPM FRF Mixing Concept.

The project engineer must then develop a fully coordinated program plan that will result in the fielding of FRF as soon as possible. An IPR committee should be established and its chairperson designated. The Operational and Organizational (O&O) Plan must be developed and finalized by TRADOC. The acquisition strategy (AS) should be developed by the BRDEC for approval at a Milestone I IPR. After approval, adequate funding must be obtained to implement the AS. Other program issues such as testing, training and contract support should also be addressed as soon as possible.

The only way to obtain consensus on the FRF program within the community is to force decisions in the materiel acquisition process. The first decision point is at Milestone I. In order to get to a Milestone I IPR, the BRDEC must develop program management documentation as follow:

- o System concept paper
- o Test evaluation master plan
- o Concept formulation package.

Inasmuch as none of the above are completed to date they would become a top priority.

APPENDIX A

ACQUISITION DOCUMENTATION GUIDE

21 December 1985

Victoria I. Young

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
Military Operations Analysis Division
1710 Goodridge Drive
McLean, Virginia 22102

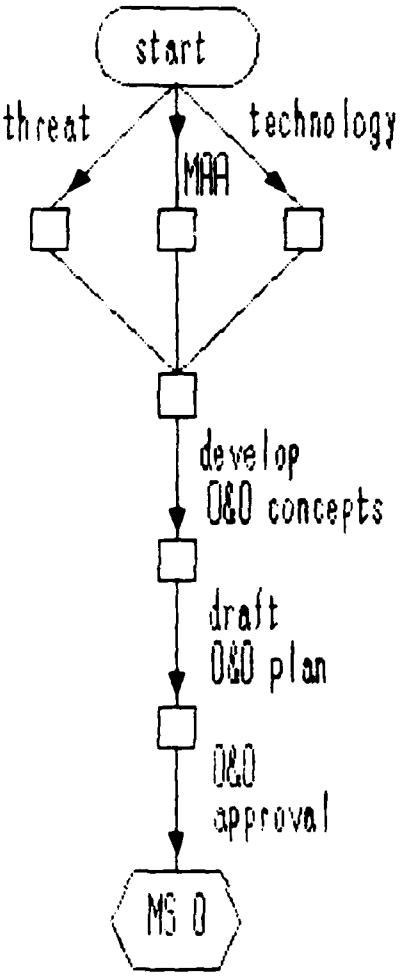
FOREWORD

This pamphlet is designed to be used as a handy reference by personnel working in Army materiel acquisition. It is primarily designed for In-Process Review (IPR) programs, therefore discussion of Justification for Major System New Starts, Integrated Program Summary, and other Program Management Documentation (PMD) for higher level acquisitions is deleted. For additional requirements associated with DoD Major, Designated Acquisition, and DA IPR programs, see applicable references.

The pamphlet is organized in the following manner:

- a graphical display of the major actions of a Full Scale Development Program with associated documentation
- a description of the program documentation
- definition of terms and abbreviations

PHASE 0 PROGRAM INITIATION



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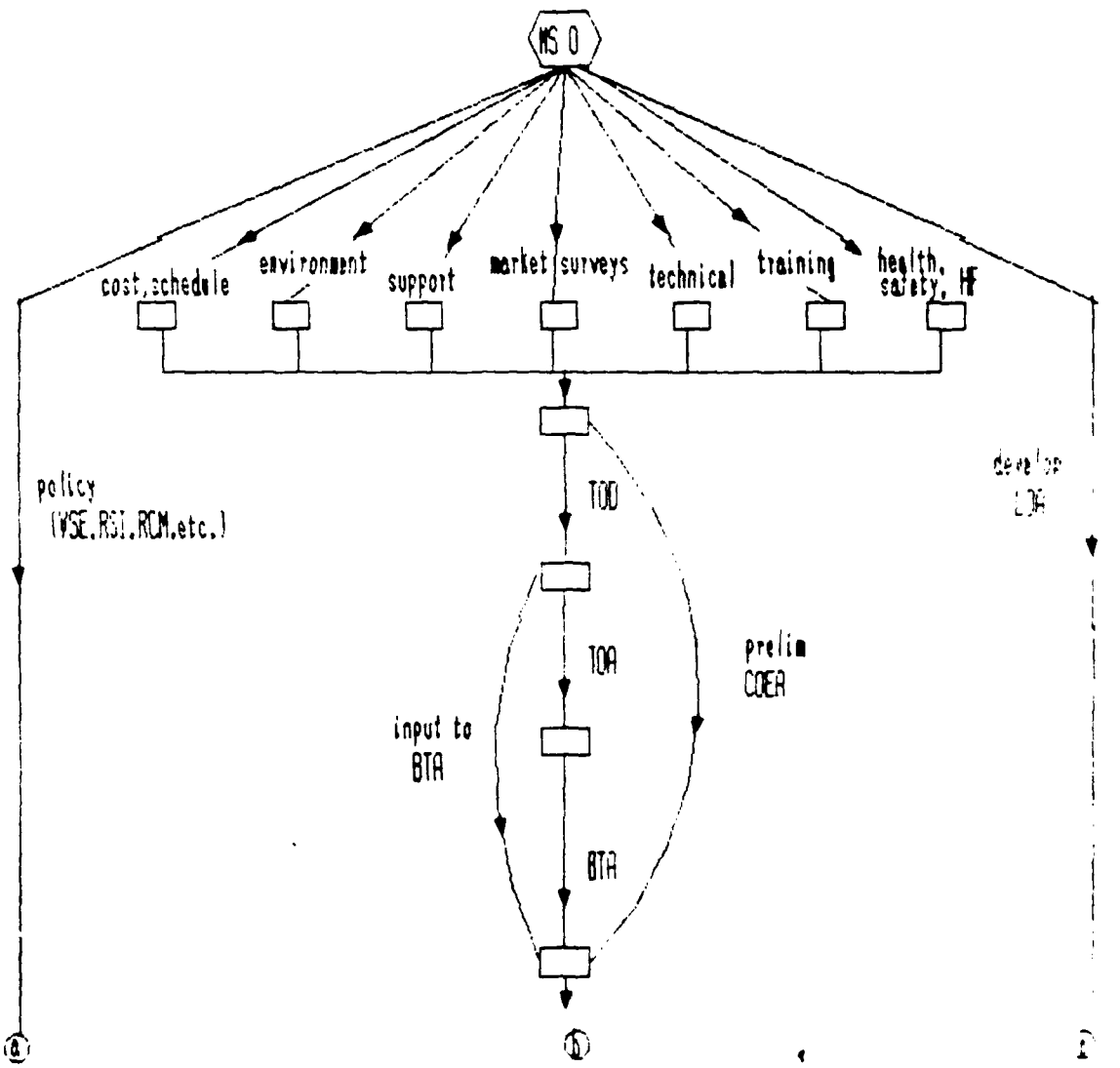
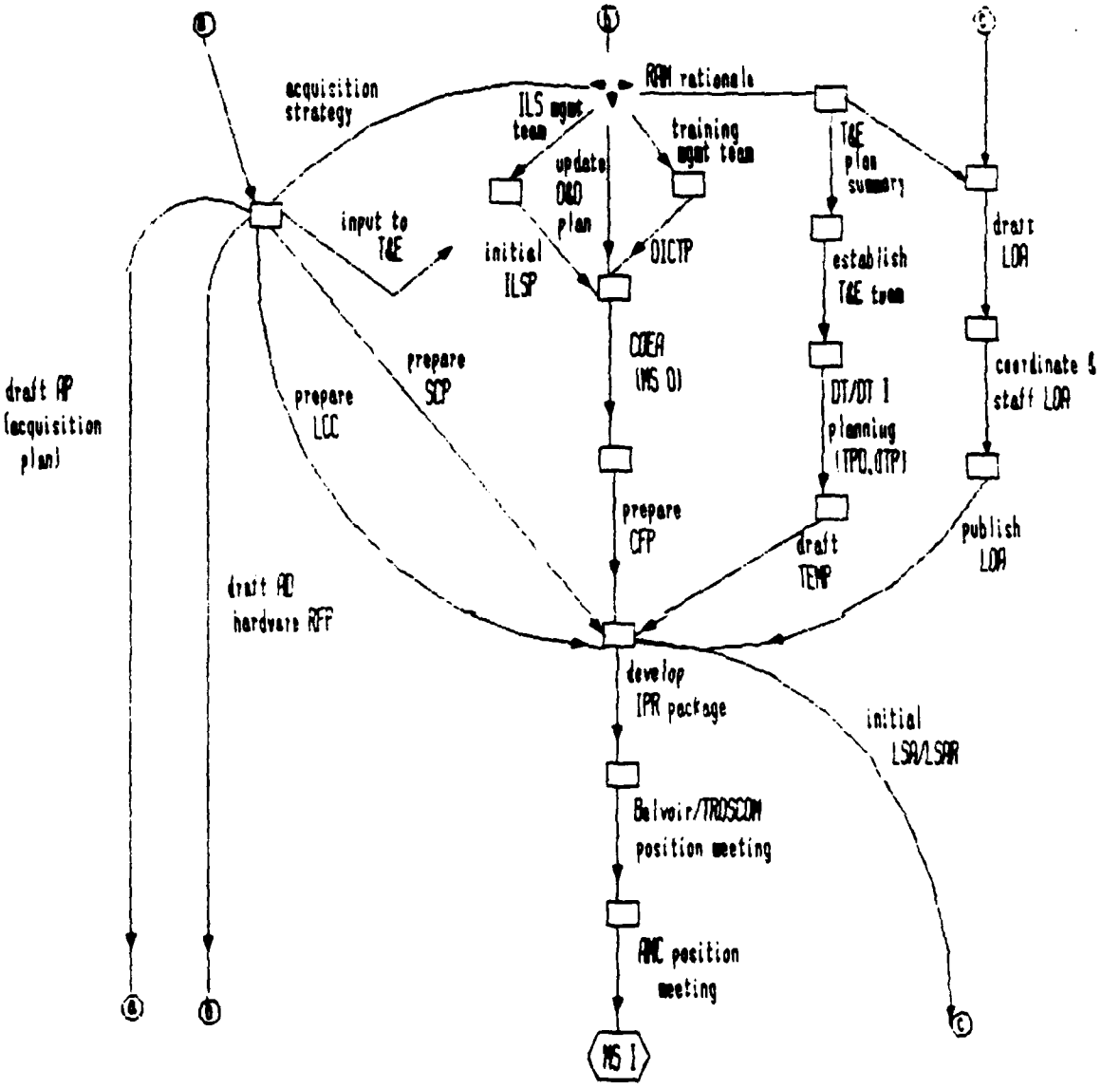
O & O PLAN

PHASE I CONCEPT EXPLORATION



ACQUISITION LIFE CYCLE MANAGEMENT MODEL

PHASE I (CON'T)



DOCUMENTATION:

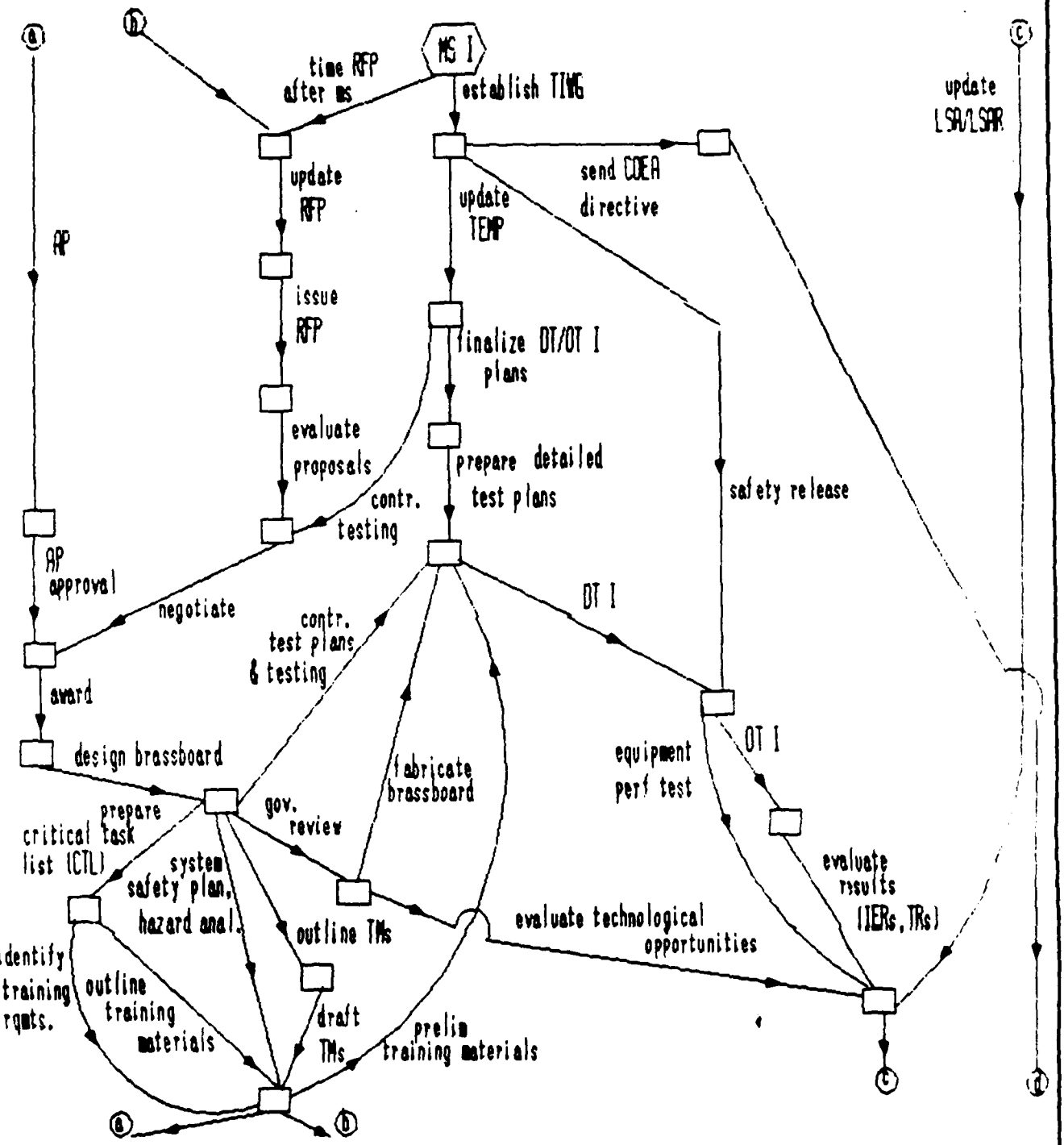
- ACQUISITION PLAN
- ACQUISITION STRATEGY
- TEMP
- LOA
- COEA (MS O)
- ILSP
- OITCP
- SCP
- CFP

UPDATE:

- O&O PLAN

ACQUISITION LIFE CYCLE MANAGEMENT MODEL

PHASE II DEMONSTRATION AND VALIDATION



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ACQUISITION LIFE CYCLE MANAGEMENT MODEL

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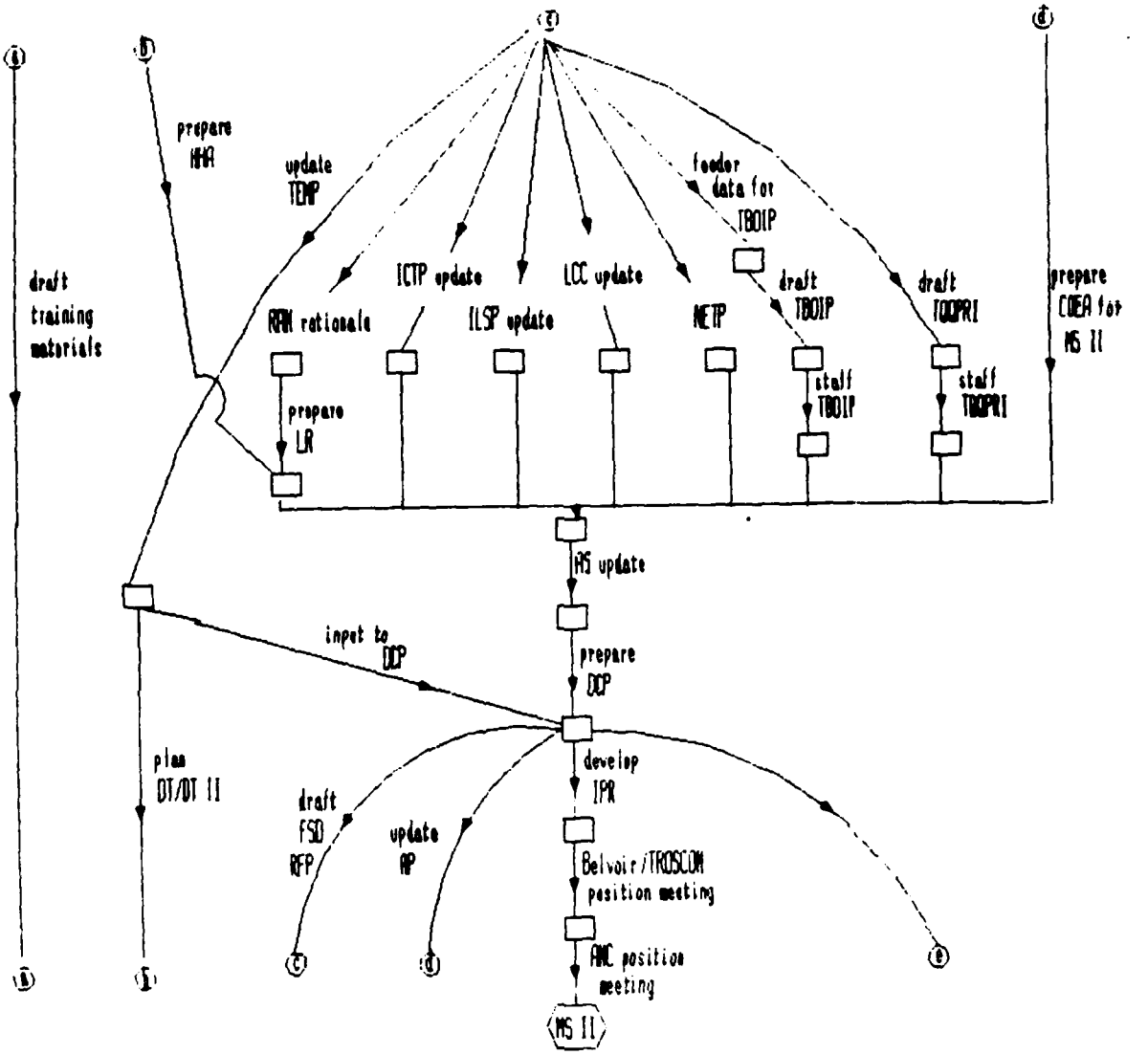


DOCUMENTATION:

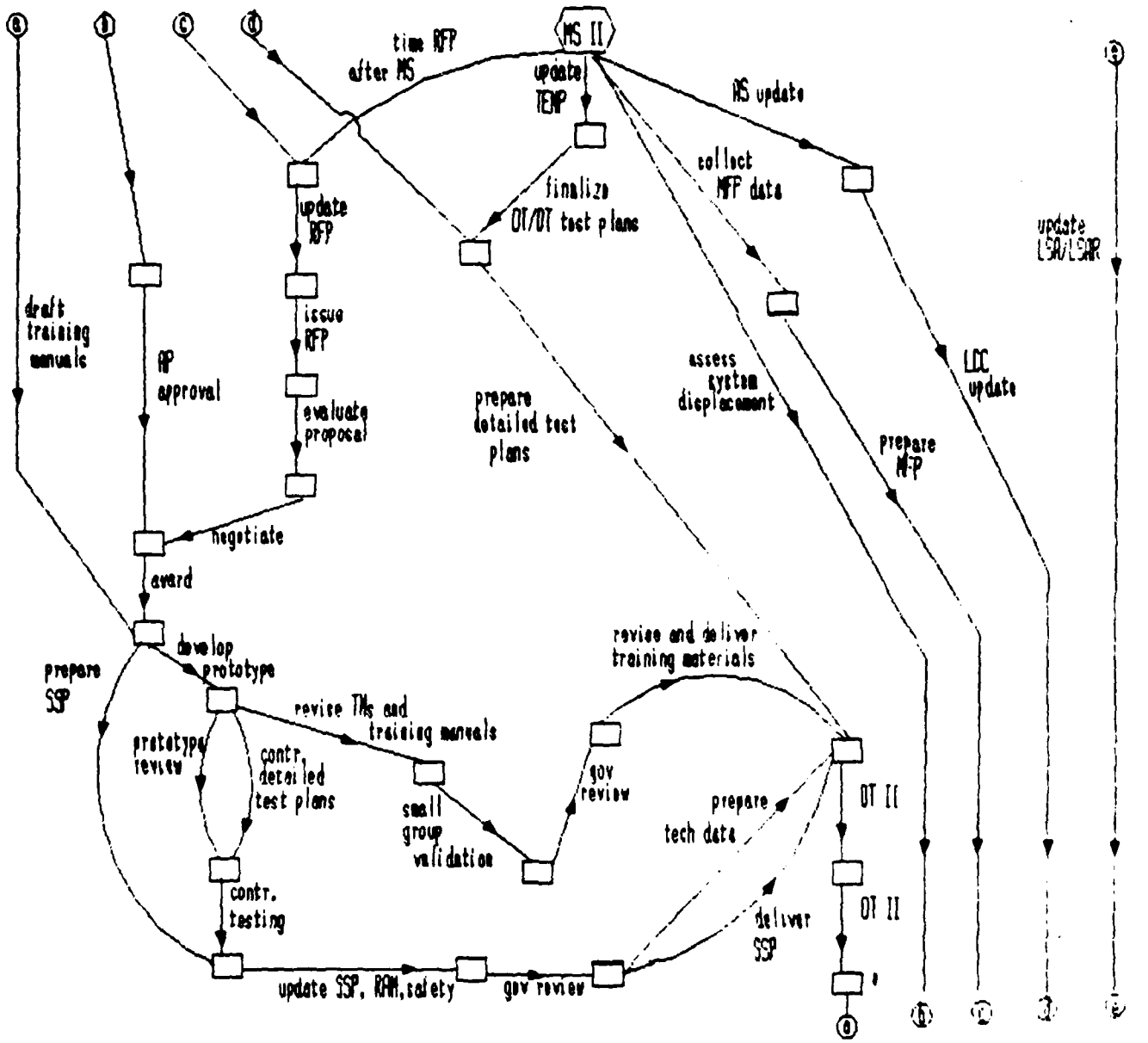
- TBOIP
- TQQPRI
- LR
- DCP
- NETP
- SAFETY RELEASE
- TEST REPORTS
- IER

UPDATE:

- O&O PLAN
- AS
- COEA
- AP
- ILSP
- TEMP
- LCC
- ICTP

ACQUISITION LIFE CYCLE MANAGEMENT MODEL

PHASE III FULL SCALE DEVELOPMENT



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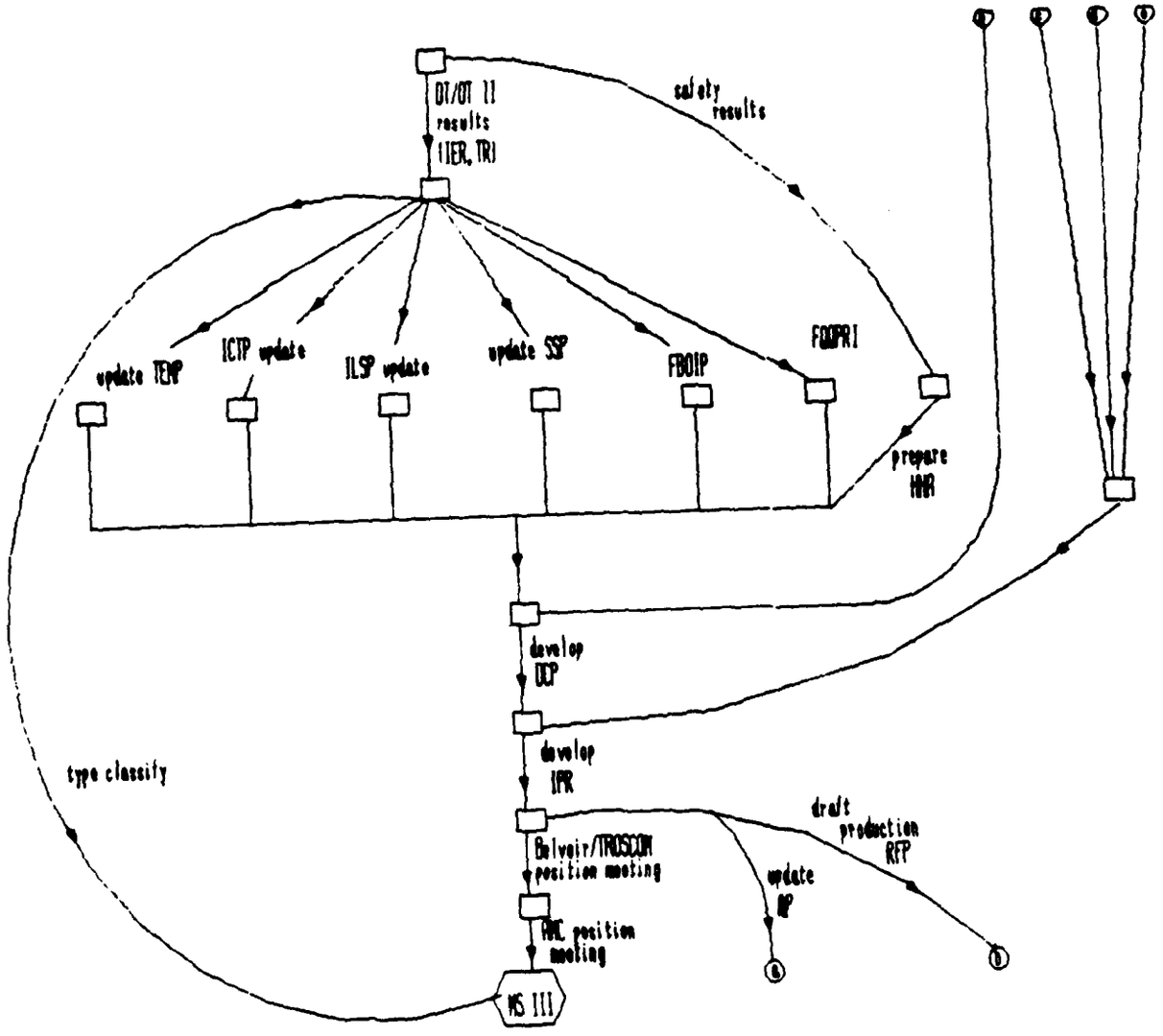

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- AS
- COEA
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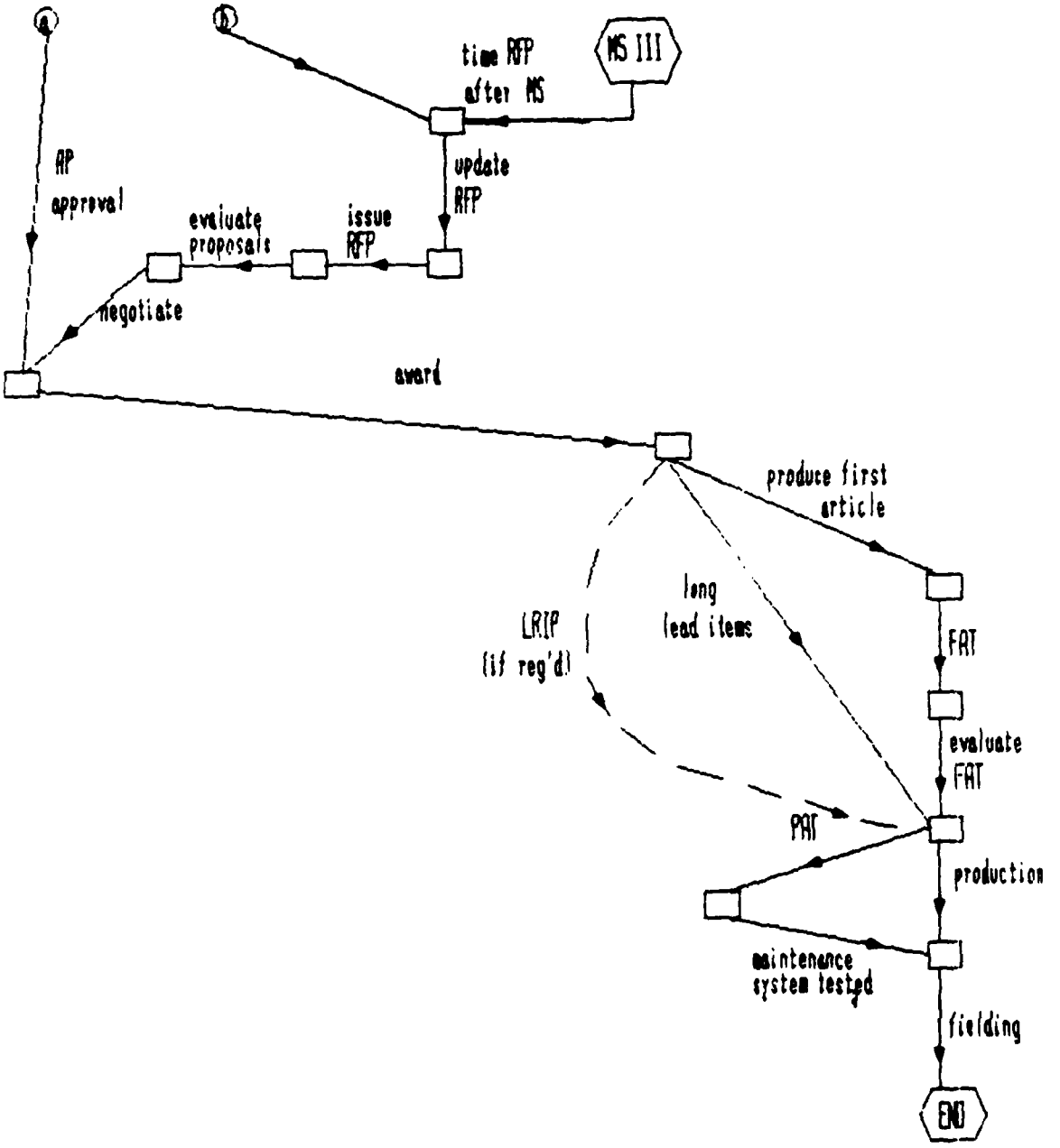
- SSP

ACQUISITION LIFE CYCLE MANAGEMENT MODEL

PHASE IV PRODUCTION AND DEPLOYMENT



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GLOSSARY OF ACRONYMS AND TERMS

AD	Advanced Development
AMC	Army Materiel Command
AP	Acquisition Plan
AS	Acquisition Strategy
BOIP	Basis of Issus Plan
BTA	Best Technical Approach
COEA	Cost and Operational Effectiveness Analysis
DCP	Decision Coordinating Paper
DT	Development Test
FAT	First Article Test
FBOIP	Final Basis of Issue Plan
FQQPRI	Final Quantitative and Qualitative Personnel Requirements Info
HF	Human Factors
HHA	Health, Hazard Analysis
ICTP	Individual and Collective Test Plan
IER	Independent Evaluation Report
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
IPR	In Process Review
LCC	Life Cycle Cost
LOA	Letter of Agreement
LR	Letter Requirement
LRIP	Low Rate Initial Production
LSA/LSAR	Logistic Support Analysis/Logistic Support Analysis Record
MAA	Mission Area Analysis
MFP	Materiel Fielding Plan
MS	Milestone
NETP	New Equipment Training Plan
OICTP	Outline Individual and Collective Training Plan
O & O	Operational and Organizational
OT	Operational Test
OTP	Outline Test Plan
PAT	Production Acceptance Test
QQPRI	Quantitative and Qualitative Personnel Requirements Information
RAM	Reliability, Availability, Maintainability
RCM	Reliability Centered Maintenance
RFP	Request for Proposal
RSI	Rationalization, Standardization, and Interoperability

SSP	System Support Package
TBOIP	Temporary Basis of Issue Plan
T & E	Test and Evaluation
TEMP	Test and Evalualtion Master Plan
TIWG	Test Integration Working Group
TM	Technical Manual
TOA	Trade Off Analysis
TOD	Trade Off Determination
TPD	Test Plan Design
TQQPRI	Temporary Quantitative and Qualitative Personnel Requirements
TR	Test Report
TROSCOM	Troop Support Command
VE	Value Engineering

ACQUISITION LIFE CYCLE MANAGEMENT MODEL

APPENDIX B

PROGRAM MANAGEMENT DOCUMENTATION

12 October 1985

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DESCRIPTION OF PROGRAM DOCUMENTATION

In this section, the individual program management documents are described with additional supporting information. Outlined below are points of explanation describing the background and conventions used in developing each PMD description.

- Commands and agencies that have responsibility for materiel acquisition documentation are set forth in each section. Note that proponent agencies frequently write or accept input from other organizations, or may contract out specific analysis and documentation responsibilities. Where possible, the level at which the analysis and documentation must actually be accomplished is stated. Definition of proponent responsibilities is at Annex A.

- In general, and in addition to agencies shown in each PMD description, development of each major item of PMD should be coordinated prior to IPRs with some or all of the following organizations:

  HQ AMC
  Appropiate AMC Materiel Proponent
  HQ TRADOC
  Army Logistics Center
  Combined Arms Center
  Soldier Support Center
  Logistics Evaluation Agency

- Basic requirements for each item of PMD are provided; however, much more detail is often required depending on the specific program.

PRE-MILESTONE 0 (M-0) (MISSION AREA ANALYSIS PHASE) DOCUMENTATION

- **OPERATIONAL AND ORGANIZATIONAL (O&O) PLAN**

  Type: Requirements Document

  Responsibility: TRADOC Approval: TRADOC

  Coordination: AMC, Trainer, Logistician Inputs:

  Updates: Update at Pre-M-I, Pre-M-II, Pre-M-III. Living document, update based on changes in threat, technology or doctrine.

  References: AR 71-9; Chap. 3 of AMC/TRADOC Pam 70-2.

  Summary: Describe system integration, deployment, operation, support, in peacetime and wartime. Addresses system as integral part of an organization, based on functional and organizational concepts. Normally 10 pages or less. Sections are: Purpose, Threat/Deficiency, Operational Plan, Organizational Plan, Personnel Impact, Training Impact, Logistics Impact.

  Necessity: Mandatory to initiate the materiel acquisition process.

PRE-MILESTONE I (M-I) (CONCEPT EXPLORATION PHASE) DOCUMENTATION

- LETTER OF AGREEMENT (LOA)

  Type: Requirements Document

  Responsibility: TRADOC and AMC jointly (TRADOC Program Planner and AMC Representative)

  Approval: TRADOC and AMC jointly

  Coordination: Inputs:

  Updates: None

  References: AR 1000-1, AR 71-9, Chap. 5 of AMC/TRADOC Pam 70-2.

  Summary: Outlines agreement between AMC and TRADOC for investigation of potential materiel system. Should incorporate desired operational requirement (including operational mode summary and expected threat); system support concept; manpower, personnel, training; RAM characteristics desired; and logistical parameters. Should not exceed four pages, excluding Annexes.

  Necessity: Mandatory

- CONCEPT FORMULATION PACKAGE (CFP)

  Type: Program Document

  Responsibility: TRADOC (and AMC jointly for TOA and BTA) Approval: TRADOC

  Coordination: Input: AMC (for TOD)

  Updates: None

  References: AR 71-9, Chap. 11 of AMC/TRADOC Pam 70-2.

  Summary: Summarizes Concept Exploration phase. It establishes the technical and economic specifications for a proposed system. Consists of Trade-off Determination (TOD), Trade-off Analysis (TOA), Best Technical Approach (BTA), and Cost and Operational Effectiveness Analysis (COEA)(M-I Version).

  Necessity: Mandatory

- SYSTEM CONCEPT PAPER (SCP)

  Type: Decision Document

  Responsibility: AMC Approval: AMC

  Coordination: Inputs: TRADOC

  Updates: None

  References: AR 1000-1; AR 70-1; Chap 17 of AMC/TRADOC Pam 70-2.

  Summary: Supports M-I decision and documents results of Concept Exploration phase. Format includes: Description of System, History, Mission Area and Role, Threat Assessment, Shortfalls of Existing System, Alternatives Considered, Selected Alternative, Technological Risks of Selected Alternative, Acquisition Strategy, Known Issues, and Decisions Needed. Annexes include: Program Structure, Thresholds, Resources - Cost Track Summary and - Funding Profile, Summary of Life Cycle Costs of Alternatives, and Acquisition Strategy. Normally six pages or less, excluding Annexes.

  Necessity: Mandatory

- ACQUISITION STRATEGY (AS)

  Type: Program Document

  Responsibility: AMC Materiel Proponent Approval: AMC

  Coordination: TRADOC Program Planner Inputs:

  Updates: Initially prepared as part of the SCP, later updated as part of the DCP. Reviewed and updated based on changes approved by the IPR Review Panel.

  References: AR 1000-1, AR 70-1; Chap 9 AMC/TRADOC Pam 70-2.

  Summary: Establishes broad concepts to guide overall program development effort. Becomes Annex F to SCP and DCP. Normally includes the following elements: Program Structure, Contracting Strategy, Tailoring the Acquisition Process, Supportability, Manufacturing and Production, Test and Evaluation, Cost Growth and Drivers, Technical Risk, Safety and Health, Soldier-Machine Interface, RSI, Endurance and Survivability, and Short-Term Issues.

  Necessity: Mandatory

- ACQUISITION PLAN (AP)

  Type: Program Document

  Responsibility: AMC

  Approval: AMC

  Coordination:

  Inputs:

  Updates: Prior to each milestone review and as required

  References: Defense Acquisition Regulation (DAR) 1-2100; Chap 12 of AMC/TRADOC Pam 70-2.

  Summary: Summarizes acquisition background and related functional planning, with emphasis on contractual issues and milestone charting.

  Necessity: Frequently not required, depending on program size and scope.

- INTEGRATED LOGISTICS SUPPORT PLAN (ILSP)

  Type: Program Document

  Responsibility: AMC Representative

  Approval: AMC Materiel Proponent

  Coordination: TRADOC, Logistician, Trainer, USALEA, AMC Subordinate Commands & Agencies.

  Inputs: TRADOC ILS Program Planner

  Updates: Prior to each milestone review and as required

  References: AR 700-127; AR 700-129; Chap 13 of AMC/TRADOC Pam 70-2.

  Summary: Describes the overall ILS program for current phase and projects ILS for succeeding phases. Serves as source document for ILS input to other program documentation. Must remain current throughout life of the acquisition program.

  Necessity: Mandatory

- TEST AND EVALUATION MASTER PLAN (TEMP)

  Type: Program Document

  Responsibility: TRADOC Program Planner in coordination with AMC Representative **Approval:** TRADOC and AMC jointly

  Coordination: Operational Tester/ Developmental Tester **Inputs:**

  Updates: At each milestone and as changes occur.

  References: Department of Defense Directive (DoDD) 5000.3; AR 70-10; DA Pam 70-21;Chap 14 of AMC/TRADOC Pam 70-2.

  Summary: Relates test objectives to system characteristics and critical issues. Describes integration needs for all test and evaluation to be accomplished. Identifies required testing and test personnel and organizations, materiel, facilities, troop support, logistic support, and funds for implementing test programs.

  Necessity: Essential for programs that involve testing of prototypes.

- OUTLINE INDIVIDUAL AND COLLECTIVE TRAINING PLAN (OICTP)

  Type: Program Document

  Responsibility: TRADOC ILS Program Planner **Approval:**

  Coordination: AMC ILS Representative **Inputs:**

  Updates: PRE-M-III

  References: AR 350-35

  Summary: Plan that identifies training concept, strategy, and requirements for the developing system from initial qualification through sustainment and follow-on training for all MOS levels.

  Necessity: May be postponed until PRE-M-III, or may be completely waived.

M-I DOCUMENTATION REVIEW

Review Documents: SCP, TEMP, COEA (M-I Version)
Supporting Requirements Documents: LOA
Updates: O&O Plan

PRE-M-II (DEMONSTRATION AND VALIDATION PHASE) DOCUMENTATION

- REQUIRED OPERATIONAL CAPABILITY (ROC)

  Type: Requirements Document

  Responsibility: TRADOC and AMC Approval: HQ DA

  Coordination: Inputs:

  Updates: None Required

  References: AR 1000-1, AR 71-9, Chap 6 of AMC/TRADOC Pam 70-2.

  Summary: Concisely states minimum essential operational, technical, logistic, and cost information to initiate system FSD or procurement. Basic document should not exceed four pages. Contents include: Title, Need/Threat, Timeframe and IOC, O&O Plan, Essential Characteristics, Technical Assessment, Logistic Support Plan, Training Assessment, Manpower/Force Structure Assessment, Standardization and Interoperability, Life Cycle Cost Assessment, and Milestone Schedule. Appendices and Annexes normally include: Life Cycle Cost Assessment, Coordination, Operational Mode Summary/Mission Profile, COEA, Rationale, RAM Rationale, and Training Devices.

  Necessity: Mandatory, however a Letter Requirement may be used in lieu of the ROC for low dollar-value items.

- LETTER REQUIREMENT (LR)

  Type: Requirements Document

  Responsibility: TRADOC and AMC Approval: TRADOC and AMC jointly

  Coordination: Inputs:

  Updates: None Required

  References: AR AR 71-9, Chap 7 of AMC/TRADOC Pam 70-2.

  Summary: Provides the same information as the ROC, above, but in an abbreviated format, for acquisition of low-value or commercial items where cost will not exceed $6M RDTE, and $12M procurement for one year, or $50M RDTE and procurement for 5 years (FY80 dollars).

  Necessity: Mandatory (unless ROC is used)

- COST AND OPERATIONAL EFFECTIVENESS ANALYSIS (COEA)(M-II)

  Type: Program Document

  Responsibility: TRADOC Approval:

  Coordination: Inputs:

  Updates: Pre-M-III, on an exception basis only

  References: ?

  Summary: The M-II COEA documents investigation of comparative effectiveness of alternative means of meeting the materiel requirements, validity of requirements in an approved scenario, and cost assessment of each alternative. The Cost and Training Effectiveness Analysis (CTEA) is an integral part.

  Necessity: Mandatory for major programs.

- TENTATIVE BASIS OF ISSUE PLAN (TBOIP)

  Preliminary version of the BOIP. For more details on the BOIP, required for M-III, see below.

- TENTATIVE QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION (TQQPRI)

  Preliminary version of the QQPRI. For more details on the QQPRI, required for M-III, see below.

- DECISION COORDINATING PAPER (DCP)

  Type: Decision Document

  Responsibility: AMC Approval: Materiel Developer

  Coordination: Inputs:

  Updates: Update for M-III

  References: AR 1000-1, AR 70-1, Chap 17 of AMC/TRADOC Pam 70-2.

  Summary: Summarizes the program at Milestones II and III.

  Necessity: Mandatory

- **SAFETY RELEASE**

  Type: Program Document

  Responsibility: AMC or TRADOC Command/ Agency responsible for the test.

  Approval: Same

  Coordination:

  Inputs:

  Updates: N/A, must be accomplished prior to Operational Testing (OT).

  References: AR 385-16 and AR 71-3

  Summary: Documents safety procedures to be taken by the operational tester to avoid system damage and personal injury based on Developmental Testing (DT) and/or a Safety Assessment Report.

  Necessity: Mandatory prior to any OT.

- TEST REPORT

  Type: Program Document

  Responsibility: Command/Agency responsible for testing

  Approval: Same

  Coordination:

  Inputs:

  Updates: None required.

  References: AR 70-10, AR 71-3, and Chap 14 of AMC/TRADOC Pam 70-2.

  Summary: Contains data obtained from testing. Describes conditions which actually prevailed during test execution and data collection.

  Necessity: Mandatory if test and evaluation is conducted.

- INDEPENDENT EVALUATION REPORT (IER)

  Type: Program Document

  Responsibility: Command/Agency responsible for the evaluation.

  Approval: Same

  Coordination:

  Inputs:

  Updates: None required. New report is prepared after each required evaluation.

  References: AR 70-10, AR 71-3, and Chap 14 of AMC/TRADOC Pam 70-2.

  Summary: Assessment of systems operational effectiveness and suitability, military utility, and completeness of development, including adequacy of testing to that point in the system development. Also assess compatability with fielded equipment.

  Necessity: May be waivable.

M-II DOCUMENTATION REVIEW

Review Documents: DCP, TEMP, COEA (M-II version)
Supporting Requirements Documents: ROC
Updates: O&O Plan, AS, AP, ILSP

PRE-M-III (FULL-SCALE DEVELOPMENT PHASE) DOCUMENTATION

- BASIS OF ISSUE PLAN (BOIP)

  Type: Program Document

  Responsibility: TRADOC Approval: ODCSOPS

  Coordination: Inputs:

  Updates: Normally developed as TBOIP prior to M-II, and updated as Final BOIP prior to M-III.

  References: AR 71-2 and Chap 15 of AMC/TRADOC Pam 70-2.

  Summary: Lists required quantity for each organizational element and other personnel and equipment changes resulting from introduction of a new materiel item.

  Necessity: Mandatory

- QUALITATIVE AND QUANTITATIVE PERSONNEL REQUIREMENTS INFORMATION (QQPRI)

  Type: Program Document

  Responsibility: AMC Approval: ODCSOPS

  Coordination: TRADOC Input:

  Updates: Normally developed as TQQPRI prior to M-II, and updated as Final QQPRI prior to M-III.

  References: AR 71-2, AR 70-61, and Chap 15 of AMC/TRADOC Pam 70-2.

  Summary: Compilation of specified organizational, doctrinal, training, and personnel information for a new or modified materiel item.

  Necessity: May be waivable.

- MATERIEL FIELDING PLAN (MFP)

  Type: Program Document

  Responsibility: AMC — Approval: AMC and Gaining MACOM

  Coordination: MACOMs, Logistician, Others — Input:

  Updates: As changes occur

  References: AR 700-120, AR 700-127, AR 700-129, DRAFT DA PAM 700-XX.

  Summary: Serves as principal document around which coordination and agreement on deployment of new system is accomplished. Provides sufficient advance information to insure gaining command, can budget for necessary resources and plan for receipt of equipment.

  Necessity: Normally mandatory.

- TYPE CLASSIFICATION (TC)

  Type: Decision Document

  Responsibility: AMC — Approval: AMC

  Coordination: — Input: TRADOC

  Updates: None.

  References: AR 70-61, Chap. 21 of AMC/TRADOC Pam 70-2.

  Summary: Method of identifying the acceptability of a materiel item for its intended mission. Signifies that item is acceptable for Army requirements.

  Necessity: Mandatory

M-III DOCUMENTATION REVIEW

Review Documents: DCP, TEMP, TC. (COEA on an exception basis only)
Supporting Requirements Documents: None
Updates: O&O Plan, AS, AP, ILSP, ICTP

DOCUMENTATION FREQUENTLY WAIVABLE

Environmental Assessment (EA) and Environmental Impact Statement (EIS)
Safety and Health Hazard Assessment
Electromagnetic Spectrum Allocation Request
Standardization Plan
Production Readiness Plan
Product Assurance Plan
International Military Rationalization, Standardization and Internationalization (RSI) Plan
System Safety Program Plan
Computer Resource Management Plan (CRMP)
Configuration Management Plan (CMP)
Human Factors Engineering Analysis (HFEA)

ANNEX A
DEFINITION OF TERMS AND ABBREVIATIONS

RESPONSIBILITY DEFINITIONS

- AMC Materiel Proponent - Command or agency subordinate to AMC that is assigned acquisition responsibility.
- TRADOC Mission Area/System Proponent - TRADOC organization (normally school) assigned primary responsibility for combat development functions relating to materiel acquisition in an assigned mission area.
- AMC Representative (ILS, Test, Training, Manpower, or other funcational area) - individual appointed by materiel proponent to provide assistance in his or her functional area to the combat developer during the Concept Exploration Phase.
- AMC Manager (ILS, Test, Trainging, etc.) - individual appointed to materiel developer who exercises overall management responsibility for his or her functional area after Milestone (MS) I.
- TRADOC Program Planner (ILS, Test, Training, etc.) - the TRADOC action officer responsible for planning and coordination in his or her functional area before MS I or until designation of a Project Manager.
- TRADOC Point of Contact (POC) (ILS, Test, Training, etc.) - TRADOC action officer responsible for providing TRADOC management and assistance to the AMC functional area manager after MS I. When practical, the TRADOC POC is normally from the staff of the TRADOC System Manager (TSM) or the System Staff officer from the TRADOC proponent school/center.

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