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STRUCTURED ANALYSIS/DESIGN

LSA TASK 303

EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

SUBTASK 303.2.2

TRADE-OFF BETWEEN SUPPORT SYSTEM ALTERNATIVES AND SYSTEM/EQUIPMENT ALTERNATIVES

APJ 966-039

APJ

MILITARY & SCIENTIFIC RESEARCH

AMERICAN POWER JET CO. RIDGEFIELD N.J.

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This report consolidates the Structured Analysis and Structured Design for the Logistic Support Analysis (LSA) Task. Included are the Data Flow Diagrams (DFDs) for the LSA Subtask 303.2.2, "Trade-Off Between Support System Alternatives and System/Equipment Alternatives", and the corresponding descriptions of the processes, data flows, data stores, and external enties identified on each DFD. The DFDs are further developed into procedures which identifies how to use the data to carry out the processes and accomplish the LSA Subtask. Venture Evaluation Review Technique (VERT) Batch Input files are also provided to assist as tools, giving both technical and managerial aspects of a task.

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APJ 966-239

STRUCTURED ANALYSIS/DESIGN

LSA TASK 303

EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

SUBTASK 303.2.2

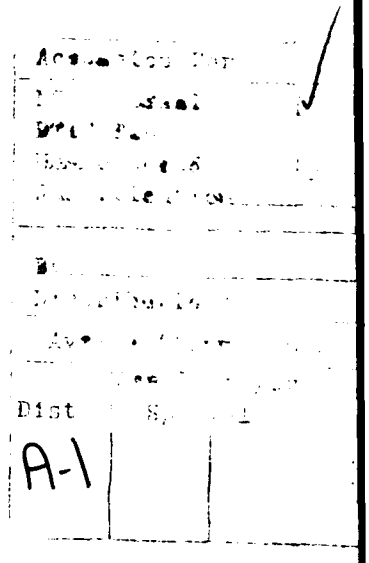
TRADE-OFF BETWEEN SUPPORT SYSTEM ALTERNATIVES AND SYSTEM/EQUIPMENT ALTERNATIVES

under

CONTRACT DAAA21-86-D-0025

for

HQ US AMCCOM
INTEGRATED LOGISTIC SUPPORT OFFICE
AMSMC-LSP
ROCK ISLAND, IL



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AMERICAN POWER JET COMPANY

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EXECUTIVE SUMMARY

LSA SUBTASK 303.2.2
TRADE-OFF BETWEEN SUPPORT SYSTEM ALTERNATIVES AND SYSTEM/EQUIPMENT ALTERNATIVES

The American Power Jet Company (APJ) is under contract to the Army Armament Munitions and Chemical Command (AMCCOM) to provide "how to" procedures for selected ILS and LSA tasks. Accordingly, this effort requires the formalization of processes frequently ill defined and producing diverse and varied outputs. The results of this effort are a series of Structured System Analysis and Structured System Design reports which set forth a generic approach to each task which may be tailored to specific weapon system characteristics and life cycle stage.

The intent of this work is to be compatible with CALS, LOGPARS, and other similar efforts to enhance performance, training, and automation. Our basic structure facilitates the downstream application of Artificial Intelligence and streamlining of these critical functions.

STRUCTURED SYSTEM ANALYSIS

Excelerator, a Computer Aided Software Engineering (CASE) tool, was used to prepare the Structured System Analysis. Each LSA Task is modeled by a series of Data Flow Diagrams (DFDs), depicting activities and accompanying data flows needed to produce intermediate or final products. Complex activities are "broken down" or "exploded" into lower level data flow diagrams.

Each DFD can contain four types of objects:

- **Processes** or activities
- **Data Flows** - inputs to a process or data output generated from a process
- **Data Stores** - identifies sources for the data
- **External Entities** - indicates who to contact for guidance.

Each object is described either by developing detailed procedures or identifying its data content. The object descriptions are placed in a Data Dictionary which is built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

STRUCTURED SYSTEM DESIGN

The Structured Design amplifies the processes and data flows developed in the Structured Analysis into procedures used to accomplish the LSA Tasks and Subtasks. The Analysis provides the method and the Design implements it.

In addition to the narrative portions of the Structured Design, "Input Screens" are developed for each process or set of processes. The charts structure and organize the data needed to perform a LSA task and make decisions on Weapon System supportability. By formalizing the data requirements in this manner, a standard set of output reports can be specified.

AUTOMATION

The Structured Design material can of course be used in a manual fashion. However, automation of the task achieves several objectives:

The analyst performing the LSA Task is taken through a series of automated steps leading to a successful result. Help is available at every step to guide the analyst through the task.

Information is organized, so that productivity improves because more time is spent gathering, analyzing, and interpreting the data instead of tedious record keeping. This structure allows the data to be easily retrieved, edited, and added to.

Output reports are standardized through a report generation facility using preprogrammed report formats.

A significant volume of data will be captured and stored over a period of time, creating a large "knowledge base". This knowledge base provides a body of procedures, sources, data, and lessons learned for an analyst to query and apply against a new or update analysis effort. This available information forms the of basis an Artificial Intelligence (AI) expert system.

Automation of selected LSA subtasks is being prototyped to demonstrate the principles involved and gain user experience. Although fully general, all prototypes are designed for ready development and adaptation to specific weapon systems.

LSA Subtask 303.2.2 Description

To place this LSA Subtask in context, it is one of 13 subtasks of LSA Task 303, "Evaluation of Alternatives and Trade-off Analysis", which deal with a support concept that provides the best system readiness and sustainability at the lowest life cycle cost. Input for this subtask comes from LSA Tasks 205 and 302.

This Subtask concerns the evaluations and trade-offs (either internal, external or internal/external) between the support system alternative identified for each system/equipment alternative. Any new or critical logistic support resource requirement shall be identified and documented. Such trade-off analysis concerns the determination of optimum values between performance, design, operations and logistic support with part of the trade-off analysis covering cost effective analysis of the support system. The analysis is needed to provide the optimum mix between design, mission performance, logistic support and dollars expended for such support equipment.

FOREWORD

APJ, under contract to HQs, AMCCOM, has initiated the automation of the LSA Tasks (MIL-STD-1388-1) and the assessment of the ILS elements (AR 700-127). A major goal is to unify military and contractor approach to the performance of ILS and LSA.

Detailed to meet all requirements of ILS and LSA, the automated process will continue to provide the flexibility in selecting tasks and elements to be addressed at each life cycle stage. A major advantage of this approach is to insure that the application of each task element is consistent with prescribed Army policies and procedures.

This report consolidates the Structured Analysis and Structured Design under one cover for the respective LSA Task. Structured Analysis provides a logical model of the method to perform and LSA Task. This logical model facilitates the development of a Structured Design that provides the detailed procedures to perform the analysis. Both the logical model and detailed procedures are used to develop the application software programs which will be provided to Government and contractor personnel to assist in the performance of the LSA Task.

Included in this report are the Data Flow Diagrams (DFDs) for LSA Subtask 303.2.2, "Trade-Off Between Support System Alternatives and System/Equipment Alternatives" and the corresponding descriptions of the processes, data flows, data stores, and external entities identified on each DFD (Annex B). In addition, the DFDs are further developed into step-by-step procedures (Annex C) which identify how to use the data to carry out the processes which ultimately lead to accomplishing the LSA Subtask.

To assist managers in planning and controlling this task, Venture Evaluation Review Technique (VERT) Batch Input files are provided (Annex D). These VERT tools provide government agencies with complete packages to give contractors that cover both technical and managerial aspects of a task. This approach establishes a standardized form of communication and management between contractors performing the task and government personnel reviewing the task.

To view this work in context, this report also presents a brief overview of Structured Analysis and its place in the overall systems development process. Additionally, Annex E provides a brief working description of Structured Systems Analysis fundamentals. The overview and certain portions of the introductory text are repeated verbatim in every report in this series so that each report is free standing.

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INTRODUCTION

PURPOSE:

The purpose of this report series is to present the results of the APJ Structured Analysis/Design under Contract DAAA21-86-D-0025 for coordination with the AMCCOM Program Manager prior to in-depth programming of ILS and LSA functions and processes. LSA Task 303 "Evaluation of Alternatives and Trade-Off Analysis", (LSA Subtask 303.2.2 "Trade-off Between Support System Alternatives and System/ Equipment Alternatives") is addressed in this report.

BACKGROUND:

The Department of the Army has a requirement for management control over contractor and Government agency response to the requirements of AR 700-127, "Integrated Logistic Support ", and MIL-STD-1388-1, "Logistic Support Analysis". HQs AMCCOM has initiated action to structure each of the LSA tasks, the assessment of each ILS element, the form of the results, and the detailed processes to insure consistency with current Army policies, procedures, and techniques.

This approach (undertaken by AMCCOM and APJ) will insure uniformity in efforts and products, reproducibility of analyses, and a well-defined structure which can be coordinated among all participants in the logistic process to arrive at common understanding and procedures.

SCOPE:

This report summarizes the results of the Structured Analysis of the identification of LSA Task 303 "Evaluation of Alternatives and Trade-Off Analysis", LSA Subtask 303.2.2, "Trade-Off Between Support System Alternatives and System/Equipment Alternatives", and presents the associated Data Flow Diagrams (DFDs) developed from the Structured Analysis and the corresponding procedures developed in the Structured Design. The portions of the Data Dictionary relating to the DFDs for this LSA Subtask include the labels, names, descriptions, processes, data flows, data stores, and external entities. (The Data Dictionary is a "living document" that evolves through the analysis and design process).

The Data Dictionaries developed for each of the individual LSA Subtasks are integrated together into a Master Data Dictionary. Integration of the individual Data dictionary involves the combination of similar Data Flows, Data Stores, and External Entities. The resulting Master Data Dictionary may well contain some minor differences from the definitions that appear in this report. All processes, and of course, the content of the Structured Design will remain identical.

The Structured Design portion of this report develops the processes and data flows developed in the DFDs into procedures which are used to accomplish the LSA Tasks. The DFDs provide the method and the Design implements it, by formulating a guide for programmers to write software applications.

This report presents a brief overview of Structured Analysis and its place in the overall systems design process to assist the reader who may not be fully briefed on the symbols and conventions used. It is supported by Annex E, which defines each element in Structured Analysis.

LSA SUBTASK 303.2.2 - DESCRIPTION:

LSA Subtask 303.2.2 concerns the evaluations and trade-offs (either internal, external or internal/external) between the support system alternative identified for each system/equipment alternative (Task 302). Any new or critical logistic support resource requirement shall be identified and documented. Such trade-off analysis concerns the determination of optimum values between performance, design, operations and logistic support with part of the trade-off analysis covering cost effective analysis of the support system. The analysis is needed to provide the optimum mix between design, mission performance, logistic support and dollars expended for such support equipment.

Trade-off studies covered in this report are between alternative support system for each alternative system/equipment addressed in Task 302. Design operations and support alternatives determined by trade-off analyses which reduces or simplifies functions requiring logistic support resources are covered by LSA Task 303.2.3 "System Trade-offs".

NOTE: Trade-offs are quantitative measures of implications of changes in performance or program parameters; as the term implies, an improvement in one respect is usually accompanied by a degradation in another. However, in a more general sense, trade-offs are functional relations between performance or program elements.

Task output comprises the preferred support system for each specific system/equipment alternative to satisfy the need with the best balance/trade-off between cost, schedule, performance, readiness, supportability and effectiveness for the support systems being considered. New and critical logistic resource requirements will be identified and documented.

The LSA Task Description with associated task inputs and outputs is extracted from MIL-STD-1388-1A and is included as Annex A.

APPROACH:

The APJ approach to Structured Analysis and Structured Design of an LSA Subtask is:

1. Scope the Subtask defined in MIL-STD-1388-1A with the overall task and determine its relationship with other LSA Tasks.

2. Review all pertinent documentation (e.g., ARs, MIL-STDs, etc.) applicable to the specific topic.

3. Prepare the Top Level DFDs in context of the Subtask, and develop lower level DFDs to further quantify any complex process identified in the top level DFD.

4. Complete the Data Dictionary portion of the Analysis by describing all processes, data flows, data stores and external entities.

5. Apply staff experience in logistic support analysis to assure that the topic has been exhaustively addressed.

6. From the completed DFDs, prepare the step-by-step procedures that form the structured design.

7. Review Data Item Description and other applicable material to develop output reports.

8. If required, revise DFDs and Data Dictionary based on preparation of detailed procedures.

9. Validate results in discussions with Army activities and personnel directly involved in the applicable or related LSA tasks.

NOTE: Structured Analysis and preparation of Data Flow Diagrams (DFDs) was further assisted by the application of Structured Analysis software. Licensed by Index Technology Corporation, Excelerator provides for automated tracking of names, labels, descriptions, multiple levels of detail in the data flow diagrams, and industry standards in symbols and diagramming practices.

LSA SUBTASK 303.2.2 - TRADE-OFF BETWEEN SUPPORT SYSTEM ALTERNATIVES AND SYSTEM/EQUIPMENT ALTERNATIVES:

The Data Flow Diagram is a tool that shows the flow of data, (i.e., data flows from sources) and is processed by activities to produce intermediate or final products.

The DFD provides a useful and meaningful partitioning of a system from the viewpoint of identification and separation of all functions, actions, or processes so that each can be introduced, changed, added, or deleted with minimal disruption of the overall program, i.e., it emphasizes the underlying concept of modularity and identifiable transformations of data into actionable products.

A series of six (6) DFDs have been developed to structure the LSA Subtask relative to operations and other support functions:

1.	303.2.2	Top Level
2.	303.2.2.4A	Perform Trade-off Analysis
3.	303.2.2.4A1B	Select Trade-off Analysis Supportability
4.	303.2.2.4A2B	Perform Supportability Trade-off Analysis, Cost, Performance and SRO Criteria
5.	303.2.2.4A4B	Perform SRO Trade-off Analysis
6.	303.2.2.4A5B	Optimize Support system Alternatives for each System/Equipment Alternative.

Each DFD is keyed to the specific task through the identification number assigned in the lower right hand box. The Alpha codes indicate the level of indenture or explosion below the top level, i.e.,:

Top Level.....LSA DFD 303.2.2
First Indenture.....LSA DFD 303.2.2.4A
Second Indenture.....LSA DFD 303.2.2.4A1B

Each DFD makes reference to the basic LSA task it addresses, as well as the level of indenture (explosion) of the DFD. For example, the first or top level DFD, "303.2.2", refers to the section in MIL-STD-1388-1A which describes the review items. One of the processes (bubbles) on the top level diagram (303.2.2) is expanded and identified as "303.2.2.4A", a second level of "303.2.2" (Alpha "A" indicates the second level).

Four standard symbols are used in the drawing of a DFD (see Annex E - Figure 1).

A copy of each DFD is presented in Annex B, accompanied by the Data Dictionary process elements. Each entry made in the DFDs has a corresponding entry in the Data Dictionary.

This presents only those Data Dictionary entries necessary for the coordination of the overall concept and details of the processes. To facilitate review of the diagrams, data flow identifications, process, an data store descriptions are provided.

As noted above, they will continue to evolve and be expanded in the System Design phase.

VERT DIAGRAMS:

The Venture Evaluation Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows systematic planning and control of programs and enables managers to find solutions to real life managerial problems. The VERT Diagrams and Input Files for this task can be found in Annex D. In order to understand how these Input Files were developed, a brief discussion of the methodology used is provided. The same explanation is repeated verbatim in every report.

ANNEX A

LSA TASK 303

EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

ANNEX A
LSA TASK 303
EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS 1/

303.1 PURPOSE: To determine the preferred support system alternative(s) for each system/equipment alternative and to participate in alternative system trade-offs to determine the best approach (support, design, and operation) which satisfies the need with the best balance between cost, schedule, performance, readiness, and supportability.

303.2.2 TASK DESCRIPTION:

303.2.2 Conduct evaluations and trade-offs between the support system alternatives identified for each system/equipment alternative (Task 302). For the selected support system alternative(s), identify and document any new or critical logistic support resource requirements. Any restructured personnel job classification shall be identified as a new resource.

303.3 TASK INPUT

303.3.1 Delivery identification of any data item required.

303.3.2 Method of review and approval of identified evaluations and trade-offs to be performed, evaluation criteria, analytical relationships and models to be used, analysis results, and the sensitivity analyses to be performed.

303.3.3 Specific evaluations, trade-offs, or sensitivity analyses to be performed, if applicable.

303.3.4 Specific analytical relationships or models to be used, if applicable.

303.3.5 Any limits (numbers or skills) to operator or support personnel for the new system/equipment.

303.3.6 Manpower and personnel costs for use in appropriate trade-offs and evaluations which include costs related to recruitment, training, retention, development, and washout rates.

303.3.7 Support alternatives for the new system/equipment from task 302.

303.3.8 Description of system/equipment alternatives under consideration.

303.3.9 Supportability and supportability related design objectives, goals and thresholds, and constraints for the new system/equipment from Task 205.

303.3.10 Historical CER/PER that exist which are applicable to the new system/equipment.

303.3.11 Job and task inventory for applicable personnel job classifications.

303.4 TASK OUTPUT

303.4.1 For each evaluation and trade-off performed under this task:

a. Identification of the evaluation criteria, analytical relationships and models used, selected alternative(s), appropriate sensitivity analysis results, evaluation and trade-off results, and any risks involved.
b. Trade-off and evaluation updates, as applicable.

303.4.2 Recommended support system alternative(s) for each system/equipment alternative and identification of new or critical logistic support resource requirements. (303.2.2)

1/ Abstracted verbatim from MIL-STD-1388-1a, April 11, 1983, pages 36 thru 39.

ANNEX B

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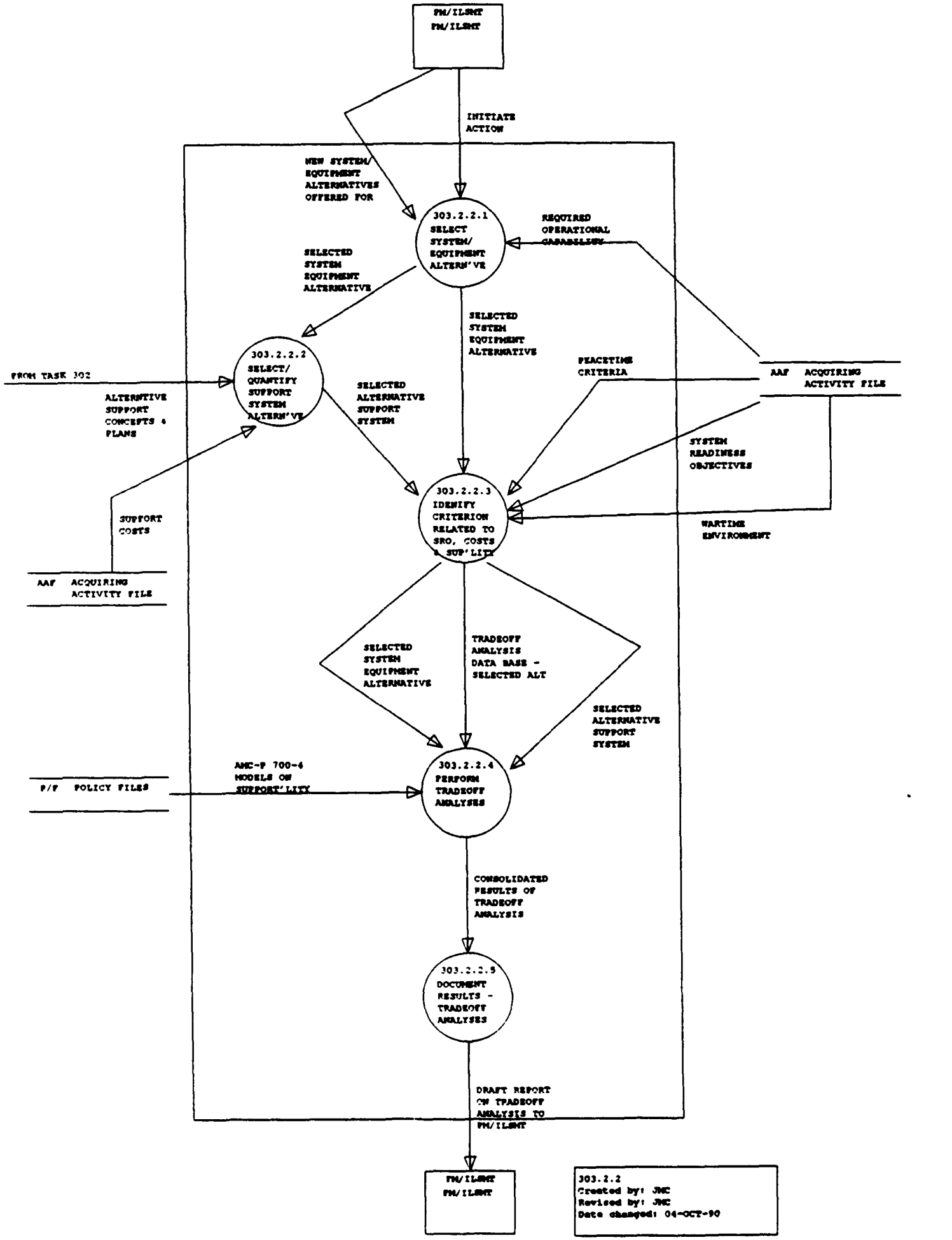
SUBTASK 303.2.2
IMPACT OF RESOURCE SHORTFALLS, DATA FLOW DIAGRAMS AND PROCESS DATA DICTIONARY


PM/ILSMT
PM/ILSMT
INITIATE ACTION
NEW SYSTEM/ EQUIPMENT ALTERNATIVES OFFERED FOR
303.2.2.1 SELECT SYSTEM/ EQUIPMENT ALTERN'VE
REQUIRED OPERATIONAL CAPABILITIES
SELECTED SYSTEM EQUIPMENT ALTERNATIVE
SELECTED SYSTEM EQUIPMENT ALTERNATIVE
303.2.2.2 SELECT/ QUANTIFY SUPPORT SYSTEM ALTERN'VE
FROM TASK 302
ALTERNTIVE SUPPORT CONCEPTS & PLANS
SELECTED ALTERNATIVE SUPPORT SYSTEM
PEACETIME CRITERIA
AAF ACQUIRING ACTIVITY FILE
SYSTEM READINESS OBJECTIVES
303.2.2.3 IDENIFY CRITERION RELATED TO SRO, COSTS & SUP'LITY
WARTIME ENVIRONMENT
SUPPORT COSTS
AAF ACQUIRING ACTIVITY FILE
SELECTED SYSTEM EQUIPMENT ALTERNATIVE
TRADEOFF ANALYSIS DATA BASE - SELECTED ALT
SELECTED ALTERNATIVE SUPPORT SYSTEM
AMC-P 700-4 MODELS ON SUPPORT'LITY
P/F POLICY FILES
303.2.2.4 PERFORM TRADEOFF ANALYSES
CONSOLIDATED RESULTS OF TRADEOFF ANALYSIS
303.2.2.5 DOCUMENT RESULTS - TRADEOFF ANALYSES
DRAFT REPORT ON TRADEOFF ANALYSIS TO PM/ILSMT
PM/ILSMT
PM/ILSMT
303.2.2
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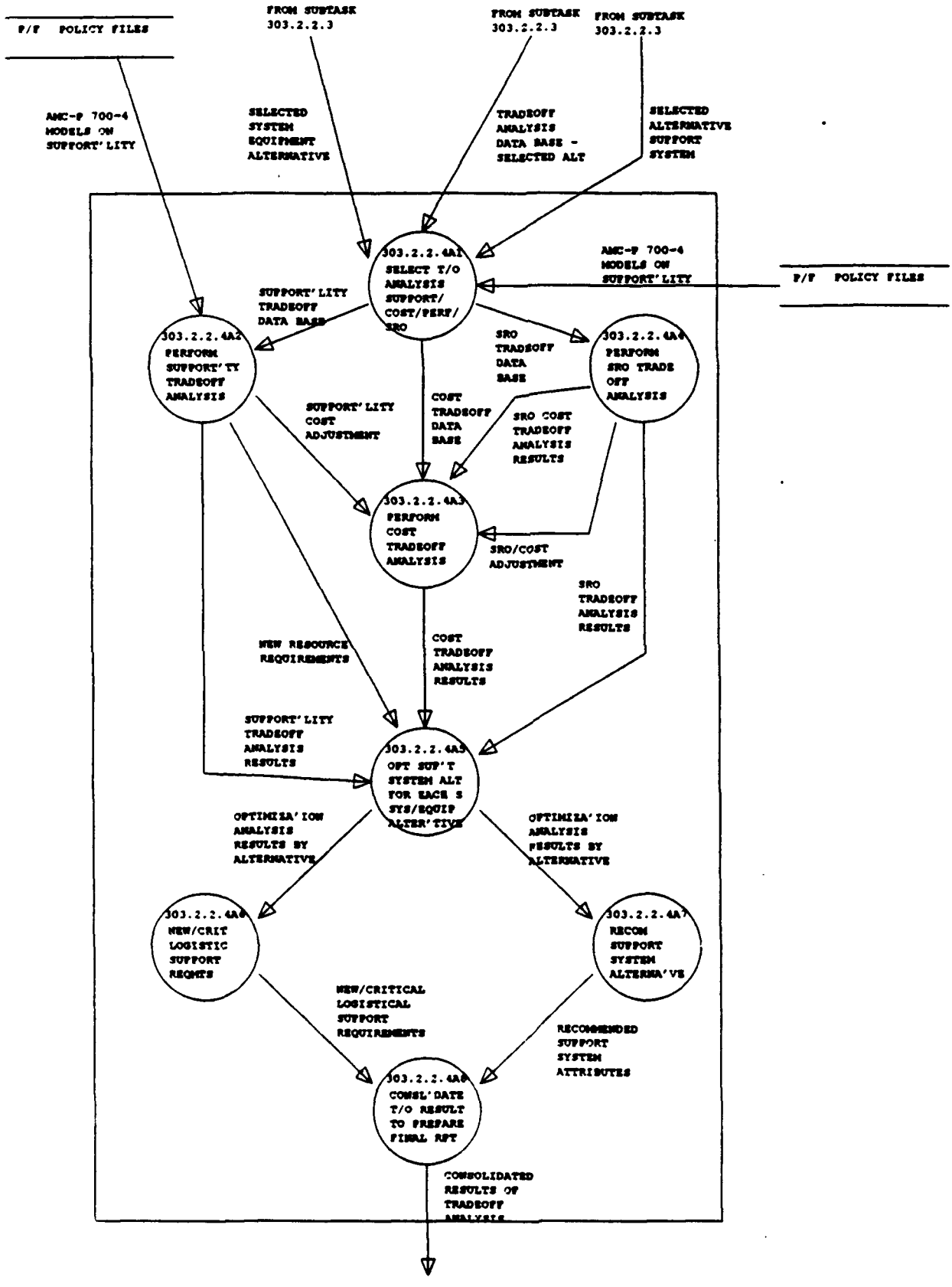
Revised by: JMC
Date changed: 04-OCT-90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FROM SUBTASK 303.2.2.3
FROM SUBTASK 303.2.2.3
FROM SUBTASK 303.2.2.3
AMC-P 700-4 MODELS ON SUPPORT'LITY
SELECTED SYSTEM EQUIPMENT ALTERNATIVE
TRADEOFF ANALYSIS DATA BASE - SELECTED ALT
SELECTED ALTERNATIVE SUPPORT SYSTEM
303.2.2.4A1 SELECT T/O ANALYSIS SUPPORT/ COST/PERF/ SRO
AMC-P 700-4 MODELS ON SUPPORT'LITY
P/F POLICY FILES
SUPPORT'LITY TRADEOFF DATA BASE
303.2.2.4A2 PERFORM SUPPORT'TY TRADEOFF ANALYSIS
SRO TRADEOFF DATA BASE
303.2.2.4A4 PERFORM SRO TRADE OFF ANALYSIS
SUPPORT'LITY COST ADJUSTMENT
COST TRADEOFF DATA BASE
SRO COST TRADEOFF ANALYSIS RESULTS
303.2.2.4A3 PERFORM COST TRADEOFF ANALYSIS
SRO/COST ADJUSTMENT
SRO TRADEOFF ANALYSIS RESULTS
NEW RESOURCE REQUIREMENTS
COST TRADEOFF ANALYSIS RESULTS
SUPPORT'LITY TRADEOFF ANALYSIS RESULTS
303.2.2.4A5 OPT SUP'T SYSTEM ALT FOR EACH S SYS/EQUIP ALTER'TIVE
OPTIMIZA'ION ANALYSIS RESULTS BY ALTERNATIVE
OPTIMIZA'ION ANALYSIS RESULTS BY ALTERNATIVE
303.2.2.4A6 NEW/CRIT LOGISTIC SUPPORT REQMTS
303.2.2.4A7 RECOM SUPPORT SYSTEM ALTERNA'VE
NEW/CRITICAL LOGISTICAL SUPPORT REQUIREMENTS
RECOMMENDED SUPPORT SYSTEM ATTRIBUTES
303.2.2.4A8 CONSL'DATE T/O RESULT TO PREPARE FINAL RPT
CONSOLIDATED RESULTS OF TRADEOFF ANALYSIS
TO SUBTASK 303.2.2.5
303.2.2.4A
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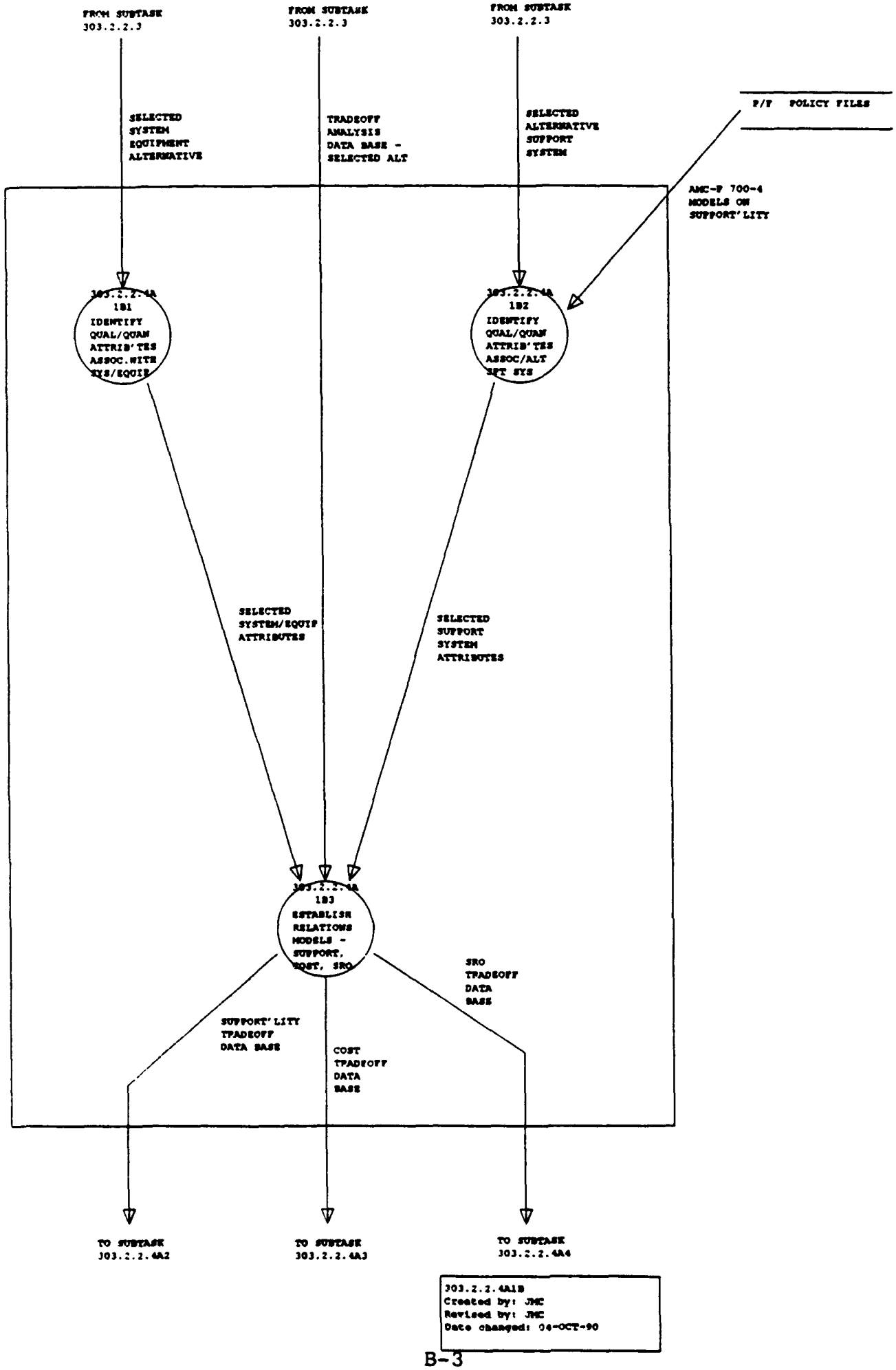
Revised by: JMC
Date changed: 04-OCT-90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ALTERNATIVE
TRADEOFF
ANALYSIS
DATA BASE -
SELECTED ALT
SELECTED
ALTERNATIVE
SUPPORT
SYSTEM
P/F POLICY FILES
AMC-P 700-4
MODELS ON
SUPPORT'LITY
303.2.2.4A
1B1
IDENTIFY
QUAL/QUAN
ATTRIB'TES
ASSOC.WITH
SYS/EQUIP
303.2.2.4A
1B2
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QUAL/QUAN
ATTRIB'TES
ASSOC/ALT
SPT SYS
SELECTED
SYSTEM/EQUIP
ATTRIBUTES
SELECTED
SUPPORT
SYSTEM
ATTRIBUTES
303.2.2.4A
1B3
ESTABLISH
RELATIONS
MODELS -
SUPPORT,
COST, SRO
SRO
TRADEOFF
DATA
BASE
SUPPORT'LITY
TRADEOFF
DATA BASE
COST
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DATA
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TO SUBTASK
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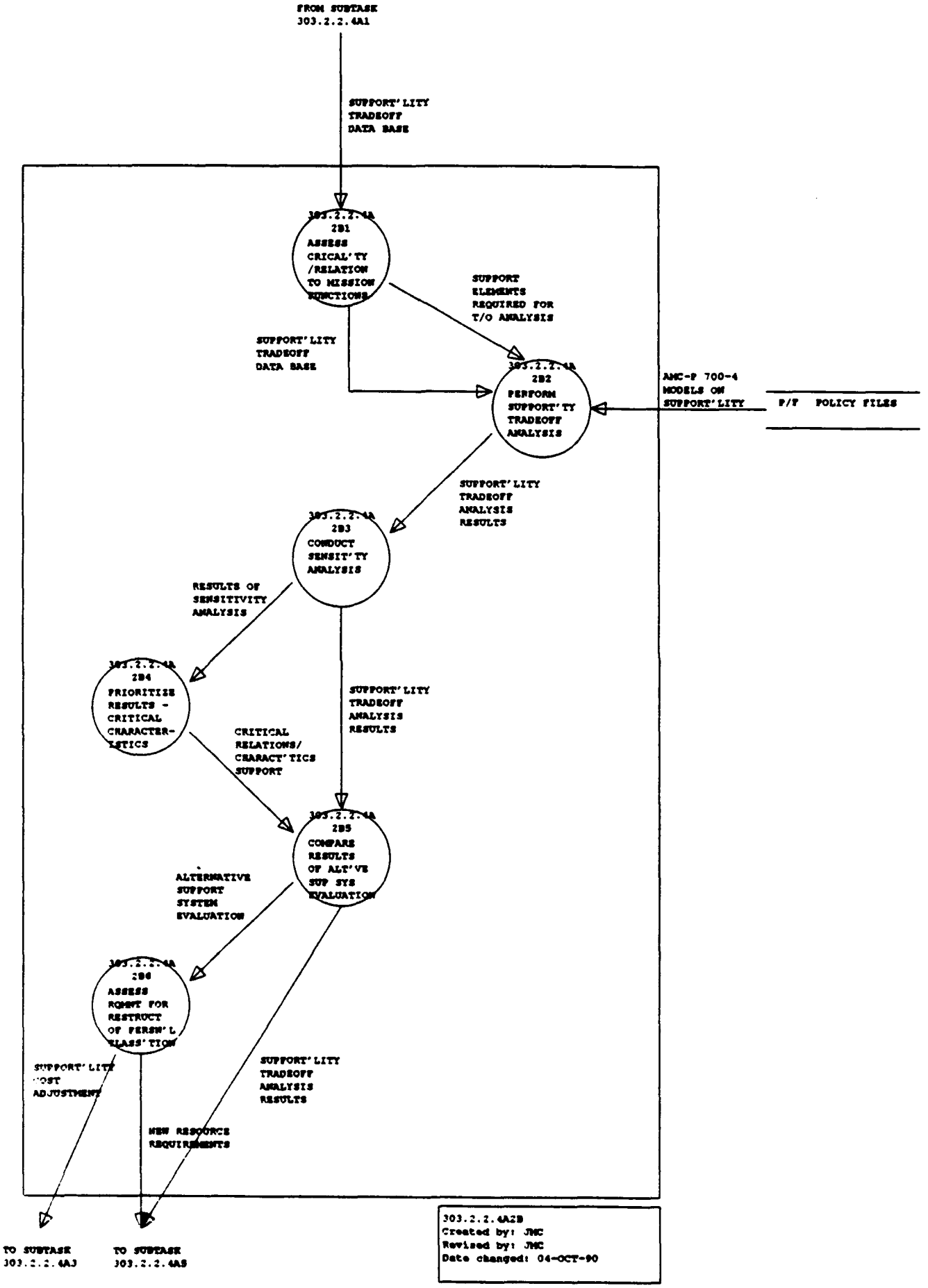
Date changed: 04-OCT-90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SUPPORT'LITY
TRADEOFF
DATA BASE
303.2.2.4A
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ASSESS
CRICAL'TY
/RELATION
TO MISSION
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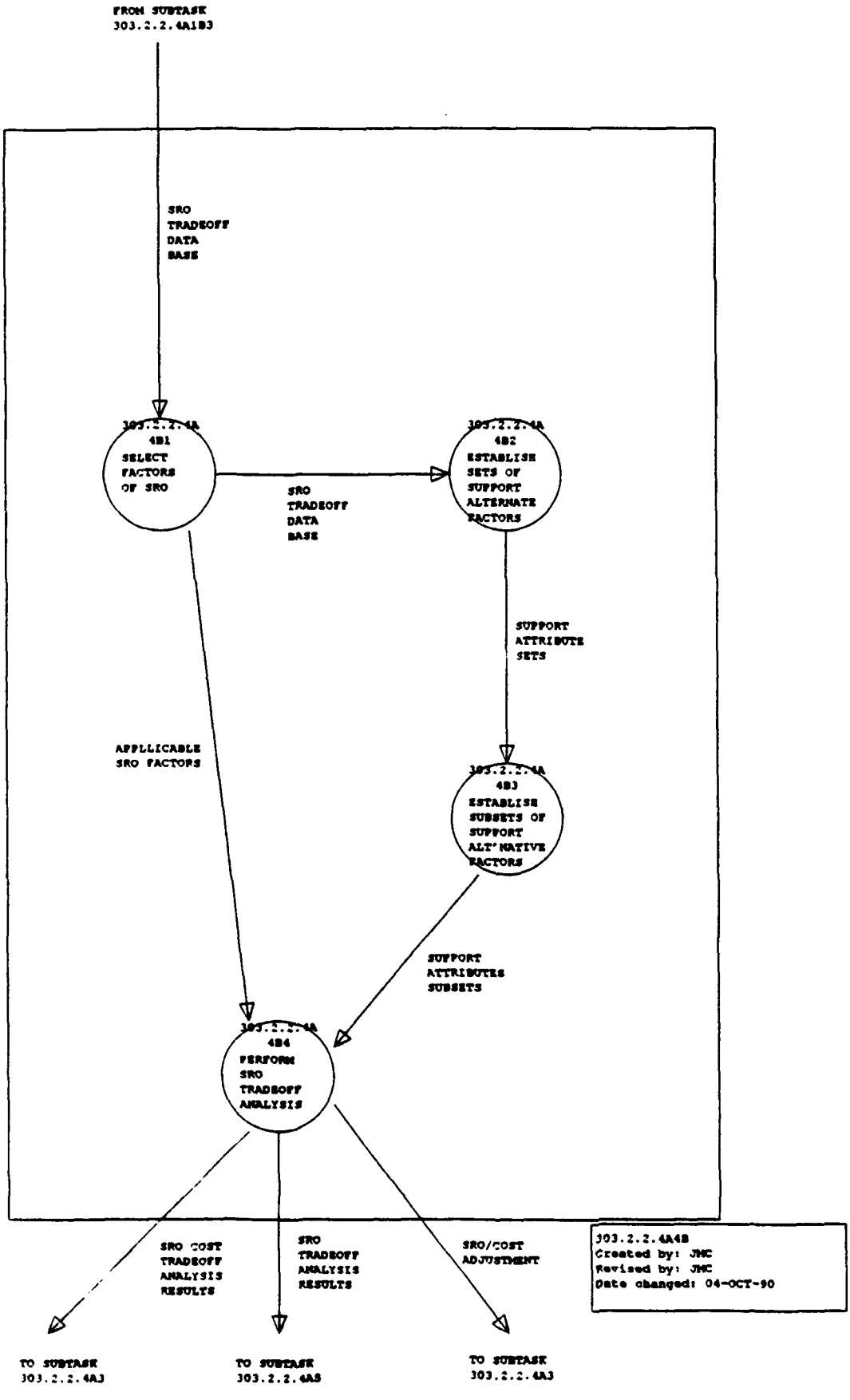
303.2.2.4A5
303.2.2.4A2B
Created by: JMC
Revised by: JMC
Date changed: 04-OCT-90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303.2.2.4A1B3
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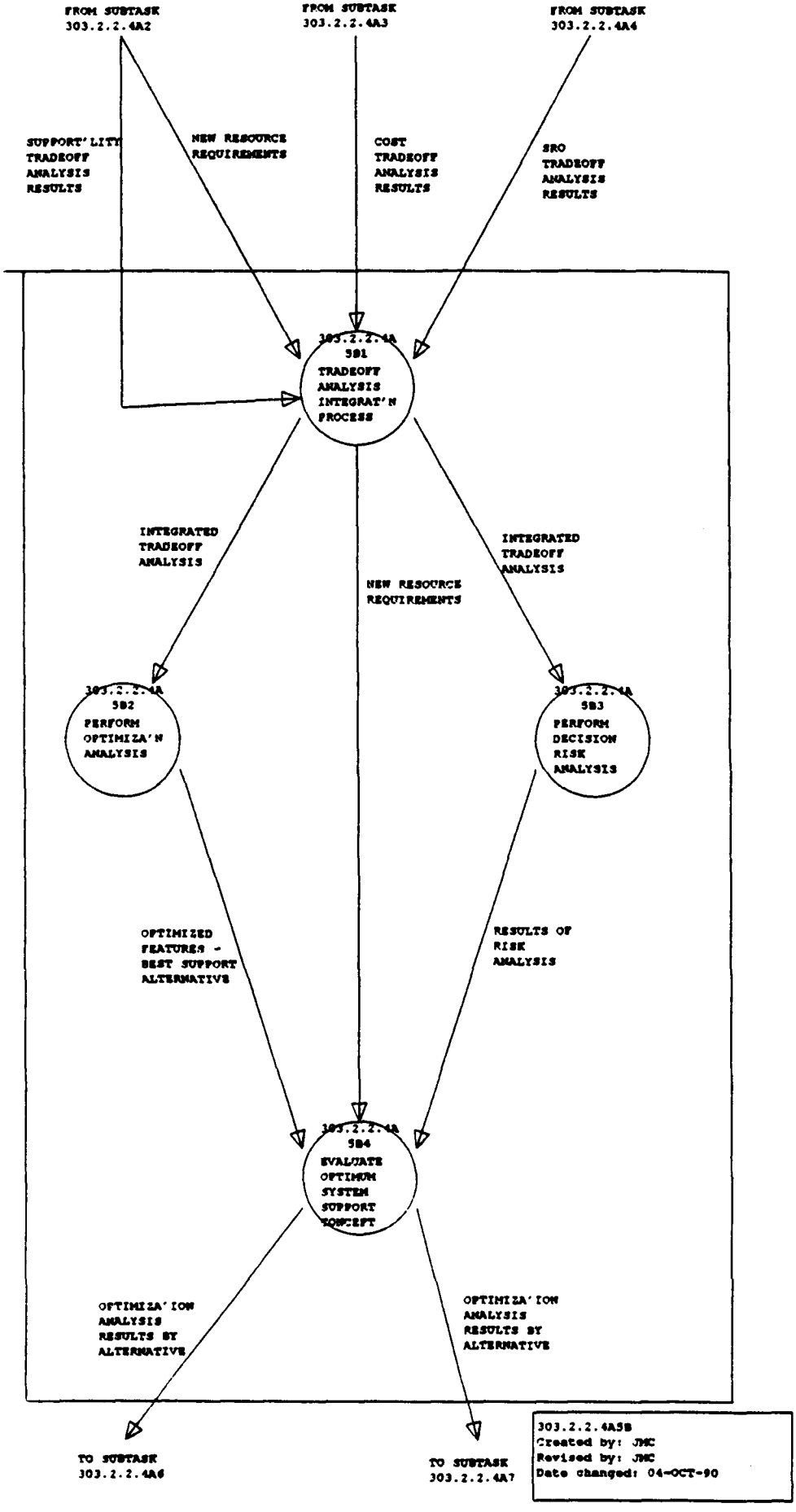
303.2.2.4A4B
Created by: JMC
Revised by: JMC
Date changed: 04-OCT-90
TO SUBTASK
303.2.2.4A3
TO SUBTASK
303.2.2.4A5
TO SUBTASK
303.2.2.4A3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303.2.2.4A3
FROM SUBTASK
303.2.2.4A4
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ALTERNATIVE
TO SUBTASK
303.2.2.4A6
TO SUBTASK
303.2.2.4A7
303.2.2.4A5B
Created by: JMC
Revised by: JMC
Date changed: 04-OCT-90

Name	Label	Description
303.2.2.1	SELECT SYSTEM/ EQUIPMENT ALTERN'VE	PURPOSE: FOR EACH ITERATION, SELECT ONE SYSTEM/EQUIPMENT ALTERNATIVE FOR WHICH EACH ALTERNATIVE SUPPORT CONCEPT DEVELOPED IN LSA TASK 302 WILL BE EVALUATED TO DETERMINE THE PREFERRED METHOD OF SUPPORT. SOURCE OF DATA: 1: PROGRAM MANAGERS OR ILSMT INITIATE ACTION AND UPDATE REQUIREMENTS: 2: LSA TASK 302 (SYSTEM/EQUIPMENT ALTERNATIVES UNDER CONSIDERATION).
303.2.2.2	SELECT/ QUANTIFY SUPPORT SYSTEM ALTERN'VE	PURPOSE: SELECT AND QUANTIFY THE ALTERNATIVE SUPPORT CONCEPTS APPLICABLE TO EACH NEW SYHSTEM/EQUIPMENT SELECTED AT SUBTSK 303.2.1. THE CONCEPT SHOULD ADDRESS EACH ASPECT OF SUPPORT FOR THE NEW SYSTEM/EQUIPMENT COVERING ALL LEVELS OF MAINTENANCE AND ALL OPERATION AND MAINTENANCE TASKS (HARDWARE AND SOFTWARE). IDENTIFY COST ASSOCIATED WITH THE SUPPORTABILITY ELEMENTS DESCRIBED IN THE ALTERNATIVE SUPPORT CONCEPT DEVELOPMENT PROCESS. SOURCE OF DATA: 1. SUBTASK 303.2.2.1 (SELECTED NEW SYSTEM/EQUIPMENT ALTERNATIVE) 2. LSA TASK 302 (ALTERNATIVE SUPPORT CONCEPTS/PLANS). 3. SUPPORT COSTS FROM ACQUIRING ACTIVITY FILES (AAF).
303.2.2.3	IDENIFY CRITERION RELATED TO SRO, COSTS & SUP'LITY	PURPOSE: IDENTIFY CRITERION RELATED TO THE SRO, COSTS & SUPPORTABILITY. BASED ON A FIXED LEVEL OF EFFECTIVENESS (THRESHOLD CAPABILITY) ESTABLISHED IN THE SYSTEM READINESS OBJECTIVES (SRO), THESE COSTS MAY BE OBTAINED FROM THE APPLICABLE ACTIVITY. FOR EXAMPLE: MANPOWER AND PERSONNEL COST RELATIVE TO THE SUPPORT ELELENTS IDENTIFIED FOR THE NEW SYSTEM/EQUIPMENT MAY BE OBTAINED FROM THE U.S. ARMY TRAINING AND DOCTRINE COMMAND (TRADOC). SOURCE OF DATA: SRO DATA WHICH INCLUDES PEACETIME AND WARTIME ELEMENTS
303.2.2.4	PERFORM TRADEOFF ANALYSES	PURPOSE: FOR THE SYSTEM/EQUIPMENT SELECTED FOR ANALYSIS, EVALUATE EACH ALTERNATIVE SUPPORT CONCEPT SELECTED AND DETERMINE THE CONCEPT THAT MEETS THE SUPPORT READINESS REQUIREMENTS WITH THE BEST BALANCE AMONG COST, SCHEDULE, PERFORMANCE, READINESS, AND SUPPORTABILITY. SOURCE OF DATA: 1. 303.2.2.1 SELECTED SYSTEM/EQUIPMENT ALTERNATIVE 2. 303.2.2.2 SELECT/QUANTIFY SUPPORT SYSTEM ALTERNATIVES 3. 303.2.2.3 IDENTIFY CRITERION RELATED TO SRO (WARTIME AND PEACETIME), COSTS, AND SUPPORTABILITY

Name	Label	Description
303.2.2.4A1	SELECT T/O ANALYSIS SUPPORT/ COST/PERF/ SRO	PURPOSE: SELECT A TRADEOFF MODEL TO COMPARE AND DETERMINE THE BEST SUPPORT PARAMETERS FROM A SET OF ALTERNATE SUPPORT CONCEPTS. THIS TRADEOFF WILL COMPARE ALL COSTS, AND THE SUPPORTABILITY MEASURES, TOWARDS MEETING THE ESTABLISHED SYSTEM PERFORMANCE AND READINESS OBJECTIVES. SOURCE OF DATA: 1. 303.2.2.3 IDENTIFY CRITERION RELATED TO SRO, COSTS, AND SUPPORTABILITY 2. AMC-P 700-4 LOGISTICS SUPPORT ANALYSIS TECHNIQUES GUIDE
303.2.2.4A1B1	IDENTIFY QUAL/QUAN ATTRIB'TES ASSOC.WITH SYS/EQUIP	PURPOSE: IDENTIFY THOSE QUALITATIVE AND QUANTITATIVE CHARACTERISTICS ASSOCIATED WITH THE SYSTEM/EQUIPMENT. THIS DATA WILL BE USED IN DETERMINING SUPPORT CAPABILITIES OF EACH SUPPORT CONCEPT AND THE ASSOCIATED COSTS. SOURCE OF DATA: SUSBTASK 303.2.2.2 - SELECT/QUANTIFY SUPPORT SYSTEM ALTERNATIVES
303.2.2.4A1B2	IDENTIFY QUAL/QUAN ATTRIB'TES ASSOC/ALT SPT SYS	PURPOSE: IDENTIFY ALL QUANTITATIVE AND QUALITATIVE OPERATIONAL ATTRIBUTES OF EACH ALTERNATIVE SUPPORT SYSTEM CONCEPT. THIS DATA WILL BE USED FOR DETERMINING IF THE SUPPORT SYSTEM ATTRIBUTES (PARAMENTERS) ARE CAPABLE OF MEETING THE PHYSICAL AND OPERATIONAL ATTRIBUTES IDENTIFIED FROM SUBTASK 303.2.2.3. SOURCE OF DATA: SUBTASK 303.2.2.3 - IDENTIFY CRITERION RELATED TO SRO, COSTS, AND SUPPORTABILITY.
303.2.2.4A1B3	ESTABLISH RELATIONS MODELS - SUPPORT, COST, SRO	PURPOSE: CONSTRUCT THE ANALYTICAL RELATIONSHIPS CONCERNING SUPPORTABILITY, COSTS, AND SYSTEM READINESS OBJECTIVES. USING HISTORICAL DATA BASES FROM LOGISTICALLY SIMILAR SYSTEM/EQUIPMENTS, DEVELOP THE MODELING PREDICTION FOR EACH SUPPORT SYSTEM CONCEPT IDENTIFIED AT SUBTASK 303.2.2.2. SOURCE OF DATA: 1. SUBTASK 303.2.2.3 - IDENTIFY CRITERION RELATED TO SRO, COST, & SUPPORTYABILITY 2. SUBTASK 303.2.2.4A1B1 - IDENTIFY QUALITATIVE AND QUANTITATIVE ATTRIBUTES ASSOCIATED WITH NEW SYSTEM/EQUIPMENT 3. SUBTASK 303.2.2.4A1B2 - IDENTIFY QUALITATIVE AND QUANTITATIVE ATTRIBUTES ASSOCIATED WITH ALTERNATIVE SUPPORT SYSTEMS. 4. WARTIME ENVIRONMENT DATA 5. PEACETIME CRITERIA

Name	Label	Description
303.2.2.4A2	PERFORM SUPPORT'TY TRADEOFF ANALYSIS	PURPOSE: DETERMINE THE ALTERNATE SUPPORT CONCEPT WHOSE SUPPORT ELEMENTS HAVE THE BEST INFLUENCE ON RELIABILITY, MAINTAINABILITY, SAFETY, HUMAN FACTORS, TRANSPORTATION AND HANDLING, STORAGE, PRESERVATION AND PACKAGING, FUNDING, DATA MANAGEMENT, AND MAINTENANCE ENGINEERING CHARACTERISTICS. THIS CAN BE DONE BY ESTABLISHING A RELATIONAL MATRIX. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A1 SELECT TRADEOFF ANALYSIS 2. AMC-P 700-4 LOGISTIC SUPPORT ANALYSIS TECHNIQUE GUIDE
303.2.2.4A2B1	ASSESS CRICAL'TY /RELATION TO MISSION FUNCTIONS	PURPOSE: IDENTIFY THOSE SUPPORT ELEMENTS WHICH ARE CRITICAL AND HAVE THE LARGEST EFFECT ON THE SELECTED SYSTEM/EQUIPMENT SUPPORT AND READINESS VALUES AS RELATED TO MISSION FUNCTIONS. THE EFFECTS ARE RELATED TO THE IDENTIFIED RISKS INVOLVED DUE TO NEW TECHNOLOGY, NEW EQUIPMENT, NEW THREATS AND/OR NEW OPERATIONS. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A2 - PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 2. AMC-PAM 400-4 - LOGISTIC SUPPORT ANALYSIS TECHNIQUE GUIDE
303.2.2.4A2B2	PERFORM SUPPORT'TY TRADEOFF ANALYSIS	PURPOSE: CONDUCT THE TRADEOFF ANALYSIS OF THE SELECTED ALTERNATE SUJPPORT CONCEPT UNDER EVALUATION. USE EXISTING MODELS FROM ANC-P 700-4. "LOGISTICAL SUPPORT ANALYSIS TECHNIQUE GUIDE" OR ANY MODEL DEVELOPED AT THIS TIME TO SATISFY THIS PROCESS. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A2B1 - ASSESS CRITICALITY OF RELATIONSHIP TO MISSION FUNCTIONS 2. AMC-P 700-4 LOGISTIC SUPPORT ANALYSIS TECHNIQUE GUIDE.
303.2.2.4A2B3	CONDUCT SENSIT'TY ANALYSIS	PURPOSE: CONDUCT A SENSITIVITY ANALYSIS TO IDENTIFY THOSE SUPPORT PARAMETERS THAT CAN BE INFLUENCED BY VARIATIONS IN FUNCITONAL REQUIREMENTS RELATED TO RELIABILITY, MAINTAINABILITY, SAFETY, HUMAN FACTORS, TRANSPORTATION, ETC. AND DETERMINE THE RISKS INVOLVED WITH EACH SUPPORT ELEMENT. THIS IDENTIFIES THOSE AREA WHERE CHANGES IN SYSTEM READINESS OBJECTIVES CAN BE INFLUENCED BY SOME/ALL OF THE SUPPORT ELEMENTS. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A2B1 ASSESS CRITICALITY OF RELATION TO MISSION FUNCTION 2. SUBTASK 303.2.2.4A2B2 PERFORM SUPPORTABILITY TRADEOFF ANALYSIS
303.2.2.4A2B4	PRIORITIZE RESULTS - CRITICAL CHARACTER-ISTICS	PURPOSE: PRIORITIZE THE RESULTS OF THE SENSITIVITY ANALYSIS AND IDENTIFY THOSE CRITICAL RELATIONSHIPS AND/OR CHARACTERISTICS WHICH A MULTIVARIATE ANALYSIS AND OTHER MODEL RESULTS HAVE SELECTD FOR EACH OF THE ALTERNA-TIVE SUPPORT SYSTEMS EVALUATED. SOURCE OF DATA: SUBTASK 303.2.2.4A2B3 - SENSITIVITY ANALYSIS RESULTS

Name	Label	Description
303.2.2.4A2B5	COMPARE RESULTS OF ALT'VE SUP SYS EVALUATION	PURPOSE: REVIEW THE SUPPORT SYSTEMS TRADEOFF ANALYSIS STUDIES AND COMPARE THE DATA FOR EACH SUPPORT CONCEPT ANALYZED. PARTICULAR ATTENTION MUST BE GIVEN TO HIGH RISK VARIABLES AND ASSUMPTIONS USED IN THE TRADEOFF ANALYSIS. SOURCE OF DATA 1. SUBTASK 303.2.2.4A2B2 - PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 2. SUBTASK 303.2.2.4A3 - CONDUCT TRADEOFF ANALYSIS 3. SUBTASK 303.2.2.4A5B3 - PERFORM DECISION RISK ANALYSIS
303.2.2.4A2B6	ASSESS RQMNT FOR RESTRUCT OF PERSN'L CLASS'TION	PURPOSE: ASSESS THE REQUIREMENT FOR THE RESTRUCTURING OF PERSONNEL AS WELL AS PERSONNEL RECLASSIFICATION TO PROVIDE THE SUPPORT AND SKILLS REQUIRED FOR SUPPORTING, MAINTAINING, AND OPERATION OF THE ALTERNATE SYSTEM/ EQUIPMENT. SOURCE OF DATA: 1. SUBTASK 303.2.2.2 - SELECT/QUANTIFY SUPPORT SYSTEM ALTERNATIVES. 2. SUBTASK 303.2.2.4A5 - OPTIMUM SUPPORT SYSTEM ALTERNATIVE FOR EACH SYSTEM/EQUIPMENT ALTERNATIVE.
303.2.2.4A3	PERFORM COST TRADEOFF ANALYSIS	PURPOSE: ESTABLISH A RELATIONSHIP MATRIX OF THE COST (DOLLAR VALUE) FOR EACH SUPPORT ELEMENT VERSES THE SUPOPORT ELEMENTS AND THEIR COMPONENTS FOR THE SUPPORT CONCEPT UNDER ANALYSIS. DETERMINE THE SUPPORT SYTEM CONCEPT HAVING THE BEST DOLLAR VALUE OF RESOURCES EXPENDED. SOURCE OF DATA: SUBTASK 303.2.2.4A1 SELECT TRADEOFF ANALYSIS SUPPORT/COST/ PERFORMANCE/SRO.
303.2.2.4A4	PERFORM SRO TRADE OFF ANALYSIS	PURPOSE: DEVELOP OR USE AN EXISTING EFFECTIVENESS MODEL TO EVALUATE THE EFFECTIVENESS OF THE SYSTEM/EQUIPMENT SELECTED. THIS MODEL IS BASED ON THE VARIABLE AND FIXED FACTORS TO BE CONSIDERED, SUCH AS FAILUJRE AND REPAIR, DISTRIBUTIONS, AND DESIGN INTEGRATION. THIS PROCESS IDENTIFIES THOSE RESOURCES THAT BEST MEET THE SYSTEM READINESS OBJECTIVES (SRO). SOURCE OF DATA: 1. SUBTASK 303.2.2.4A1 SELECTED TRADEOFF ANALYSIS SUPPORT/COST/PERFORMANCE/SRO
303.2.2.4A4B1	SELECT FACTORS OF SRO	PURPOSE: SELECT AND LIST EACH OF THE SYSTEM READINESS OBJECTIVES (SRO) AS SPECIFIED FOR THE ALTERNATIVE SYSTEM/EQUIPMENT SELECTED FOR USE IN THE TRADEOFF ANALYSIS - DETERMINE THE ALTERNATE SUPPORT SYSTEM THAT COMES CLOSEST TO ACHIEVING THE REQUIRED SRO.
303.2.2.4A4B2	ESTABLISH SETS OF SUPPORT ALTERNATE FACTORS	FOR EACH SUPPORT ALTERNATIVE, ESTABLISH A LIST OF ALL FACTORS THAT MAY IMPACT THE SRO. FACTORS CAN INCLUDE RELIABILITY, MAINTAINABILITY, MANPOWER, MAINTENANCE CONCEPTS, TMDE REQUIREMENTS, STORAGE LEVELS, TRAINING, MANUALS AND TECH DATA, ETC..

Name	Label	Description
303.2.2.4A4B3	ESTABLISH SUBSETS OF SUPPORT ALT'NATIVE FACTORS	PURPOSE: FOR EACH SET OF SUPPORT ALTERNATIVE FACTORS, THERE WILL BE SUBSETS IDENTIFIED IN TERMS OF VARIABLE, FIXED AND BASELINE ATTRIBUTES APPLICABLE TO THE SPECIFIC TRADEOFF ANALYSIS BEING PERFORMED. EXAMPLE 1: FOR ONE SUPPORT ALTERNATIVE FACTOR, THE MAINTAINABILITY SUBSET REQUIREMENT COULD REMAIN FIXED WHILE RELIABILITY SUBSET REQUIREMENTS ARE VARIED TO DETERMINE IMPACT ON COST FOR THE SPECIFIC SET OF SUPPORT REQUIREMENTS. EXAMPLE 2: FOR EACH SET OF SUPPORT ALTERNATIVE FACTORS IN THE BASELINE CONFIGURATION, VARIABLES IN SUBSET FACTORS SUCH AS RELIABILITY, TRAINING, MANPOWER REQUIREMENTS, ETC., SHOULD BE COMPARED WITH SIMILAR SUBSETS OF THE SELECTED SYSTEM/EQUIPMENT FOR A SPECIFIC SET OF SUPPORT ALTERNATIVES. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A2 - PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 2. SUBTASK 303.2.2.4A5 - OPTIMUM SUPPORT SYSTEM ALTERNATIVES FOR EACH SYSTEM/EQUIPMENT ALTERNATIVE.
303.2.2.4A4B4	PERFORM SRO TRADEOFF ANALYSIS	PURPOSE: USING THE RESULTS OF SUBTASK 303.2.2.3 AND CONSIDERING THE SETS OF FACTORS PRODUCED FROM SUBTASK 303.2.2.4A4B2 AND THE SUBSETS DEVELOPED FROM SUBTASK 303.2.2.4A4B3, PERFORM APPLICABLE TRADEOFF ANALYSES AGAINST THE LIST OF SRO FACTORS FROM SUBTASK 303.2.2.4A4B1. SOURCE OF DATA: 1. SUBTASK 303.2.2.3 - IDENTIFY CRITERION RELATED TO SRO, COST AND SUPPORTABILITY 2. SUBTASK 303.2.2.4A4B2 - ESTABLISH SETS OF SUPPORT ALTERNATIVE FACTORS 3. SUBTASK 303.2.2.4A4B3 - ESTABLISH SUBSETS OF SUPPORT ALTERNATIVE FACTORS.
303.2.2.4A5	OPT SUP'T SYSTEM ALT FOR EACH S SYS/EQUIP ALTER'TIVE	PURPOSE: THIS PROCESS INTEGRATES THE SEPERATE SUPPORTABILITY, COST, AND EFFECTIVENESS TRADEOFF RESULTS INTO A SINGLE COST-EFFECTIVE (OPTIMIZED) MODEL. THIS INVOLVES SUCH TECHNIQUES AS MATHEMATICAL PROGRAMMING, PROBABILITY, STATISTICS, ECONOMETRICS, AND SIMULATION. THIS MODEL PROVIDES THE BASIS FOR DECISIONS IN SELECTING THE BEST ALTERNATIVE SUPPORT SYSTEM CONCEPT. SOUIRCE OF DATA: 1. SUBTASK 303.2.2.4A2 PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 2. SUBTASK 303.2.2.4A3 PERFORM COST TRADEOFF ANALYSIS 3. SUBTASK 303.2.2.4A4 PERFORM SRO TRADEOFF ANALYSIS

	Name	Label	Description
	303.2.2.4A5B1	TRADEOFF ANALYSIS INTEGRAT'N PROCESS	PURPOSE: DEVELOP A MATRIX TO RANK SUPPORTABILITY, COST, SRO DATA, NEW RESOURCES AND TRAINING REQUIREMENTS. THIS MATRIX WILL IDENTIFY THE IMPACT OF CONTRACTOR VS. ORGANIC SUPPORT THAT WOULD BE REQUIRED IN SUPPORT, SRO, NEW RESOURCES AND TRAINING AREA. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A2 PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 2. SUBTASK 303.2.2.4A3 PERFORM COST TRADEOFF ANALYSIS 3. SUBTASK 303.2.2.4A4 PERFORM SRO TRADEOFF ANALYSIS 4. SUBTASK 303.2.2.4A2B6 ASSESS REQUIREMENT FOR RESTRUCTURING OF PERSONNEL CLASSIFICATION
	303.2.2.4A5B2	PERFORM OPTIMIZA'N ANALYSIS	PURPOSE: PERFORM OPTIMIZATION ANALYSIS TO INCORPORATE THE BEST FEATURES OF EACH SUPPORT ALTERNATIVE ANALYZED TO PRODUCE AN OPTIMUM SUPPORT CONCEPT PLAN. THIS PROCESS MUST INCLUDE CONSIDERATION OF CONTRACTOR LOGISTIC SUPPORT (CLS), INTERIM CLS AND PARTIAL ORGAINIC/PARTIAL CONTRACTOR SUPPORT AS WELL AS CROSS SERVICE/COMMERCIAL SUPPORT (OFF THE SHELF). SOURCE OF DATA: 1. SUBTASK 303.2.2.4A5B1 TRADEOFF ANALYSIS INTEGRATION PROCESS 2. SUBTASD 303.2.2.4A2 PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 3. SUBTASK 303.2.2.4A3 PERFORM COST TRADEOFF ANALYSIS 4. SUBTASK 303.2.2.4A4 PERFORM SRO TRADEOFF ANALYSIS
	303.2.2.4A5B3	PERFORM DECISION RISK ANALYSIS	PURPOSE: THE DECISION RISK ANALYSIS IDENTIFIES RISK LEVELS FOR ANY OF THE SYSTEM SUPPORT ALTERNATIVES. THE HIGH RISK VARIABLES ARE COLLECTED FROM THE VARIOUS TRADEOFF ANALYSIS PERFORMED. THIS ANALYSIS IDENTIFIES REASONS FOR THE SELECTION OR REJECTION OF THE COMPETING SYSTEMS/EQUIPMENTS BASED ON THE VARIOUS SYSTEM SUPPORT CONCEPTS USED AND THEIR RISKS. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A5B1 TRADEOFF ANALYSIS INTEGRATION PROCESS 2. SUBTASK 303.2.2.4A2 PERFORM SUPPORTABILITY TRADEOFF ANALYSIS 3. SUBTASK 303.2.2.4A3 PERFORM COST TRADEOFF ANALYSIS. 4. SUBTASK 303.2.2.4A4 PERFORM SRO TRADEOFF ANALYSIS.
	303.2.2.4A5B4	EVALUATE OPTIMUM SYSTEM SUPPORT CONCEPT	PURPOSE: THIS EVALUATION CONSIDERS ALL RISKS AND OPTIMIZAION ANALYSIS RESULTS. IT IDENTIFIES ALL ITEMS OF SUPPORT ASSOCIATED WITH THE SELECTED ALTERNATE SUPORT CONCEPT THAT HAS THE BEST BALANCE AMONG COST, PERFORMANCE, READINESS AND SUPPORTABILITY. THIS INCLUDES THE DATA DEVELOPED BY THE MATRIX SHOWN IN SUBTASK 303.2.2.4A5B1 ON THE SUPPORT SYSTEM EFFECTIVENESS DATA INCLUDING CONTRACTOR AND ORGANIC SUPPORT COSTS. SOURCE OF DATA: 1. SUBTASK 303.2.2.4A5B2 PERFORM OPTIMIZATION ANALYSIS. 2. SUBTASK 303.2.2.4A5B3 PERFORM DECISION RISK ANALYSIS. 3. SUBTASK 303.2.2.4A2 PERFORM SUPPORTABILITY TRADEOFF ANALYSIS. 4. SUBTASK 303.2.2.4A3 PERFORM COST TRADEOFF ANALYSIS 5. SUBTASK 303.2.2.4A4 PERFORM SRO TRADEOFF ANALYSIS

	Name	Label	Description
	303.2.2.4A6	NEW/CRIT LOGISTIC SUPPORT REQMTS	PURPOSE: IDENTIFY THE REQUIREMENTS FOR THE NEW OR CRITICAL RESOURCES GENERATED BY THE SELECTION OF AN ALTERNATE SUPPORT CONCEPT. THE AVAILABILITY OF SCARCE RESOURCES REQUIRED TO SUPPORT A NEW SYSTEM IS A DRIVING FACTOR IN THE SELECTION OF THE MOST VIABLE SUPPORT ALTERNATIVE. SOURCE OF DATA: SUBTASK 303.2.2.4A5B2 PERFORM OPTIMIZATION ANALYSIS
	303.2.2.4A7	RECOM SUPPORT SYSTEM ALTERNA'VE	PURPOSE: IDENTIFY THE RECOMMENDED ALTERNATIVE SUPPORT SYSTEM CONCEPT AND LIST ALL ASSOCIATED QUALITATIVE AND QUANTITATIVE PARAMETERS. SOURCE OF DATA: SUBTASK 303.2.2.4A5B2 PERFORM OPTIMIZATION ANALYSIS
	303.2.2.4A8	CONSL'DATE T/O RESULT TO PREPARE FINAL RPT	PURPOSE: CONSOLIDATE TRADEOFF RESULTS AND DOCUMENT DATA IDENTIFYING ALL ITEMS ASSOCIATED WITH THE SELECTED ALTERNATE SUPPORT CONCEPT HAVING THE BEST BALANCE AMONG COST, SCHEDULE, PERFORMANCE, READINESS, AND SUPPORTABILITY.
	303.2.2.5	DOCUMENT RESULTS - TRADEOFF ANALYSES	PURPOSE: DOCUMENT THE RESULTS OF EACH OF THE TRADEOFF STUDIES AND ECOMMENDED SUPPORT SYSTEM SELECTED. THIS SHOULD INCLUDE DOCUMENTATION OF THE SUPPORT SYSTEM EFFECTIVENSS DATA AND ALL ASSOCIATED COST DATA. SOURCE OF DATA: 1. 303.2.2.4 PERFORM TRADEOFF ANALYSIS NOTE: WHEN PM/ILSMT APPROVES THE RECOMMENDED SUPPORT SYSTEM, UPDATES TO THE FOLOWING PROCESSES MAY BE REQUIRED: 303.2.4, 303.2.5, 303.2.6, 303.2.2.7, 302.2.2, AND 204.2.1.

	Name	Label	Label	Description
	AAF	ACQUIRING ACTIVITY FILE	ACQUIRING ACTIVITY FILE	CONTAINS THOSE RECORDS, DOCUMENTS, DECISION PAPERS, SCHEDULES THAT WE PREPARED AS PART OF THE ACQUISITION INITIATION, JUSTIFICATION, AND PLANNING PRIOR TO THE ASSIGNMENT OF A PROGRAM MANAGER. THE ITEMS IN THIS DATA STORE INCLUDE: A. REQUIRED OPERATIONAL CHARACTERISTICS B. O&O PLAN C. DESIRED R&M PARAMETERS D. THREAT ANALYSIS DATA E. READINESS OBJECTIVES DATA F. FUNTIONAL REQUIREMENTS DATA G. PROJECTED SCHEDULE DATA H. LOGISTICS RESOURCES DATA I. TOA J. TOD K. COST & OPERATIONAL EFFECTIVENESS ANALYSIS (COEA) DATA L. PROJECTED COST DATA M. JUSTIFICATION OF MAJOR SYSTEM NEW START (JMSNS) DATA N. DESIGN SPECIFICATIONS

Name	Label	Label	Description
P/F	POLICY FILES	POLICY FILES	CONTAINS THOSE MILITARY PUBLICATIONS, DECISION PAPERS, MISSIONS & FUNCTIONS, etc, WHICH ARE NEEDED TO ESTABLISH THE LOGISTICAL SUPPORT & REVIEW REQUIREMENTS OF THE ITEM/EQUIPMENT DEVELOPMENT PROGRAM. THIS DATA STORE INCLUDES: 1. AR 12-16, "MUTUAL LOGISTICS SUPPORT BETWEEN THE U.S. AND OTHER NORTH ATLANTIC TREATY ORGANIZATION FORCES" 1a. AR 70-1, "SYSTEMS ACQUISITION POLICY AND PROCEDURES" 1b. AR 70-2, "RESEARCH, DEVELOPMENT, & ACQUISITION MATERIEL STATUS RECORDING" 1c. AR 70-10, "R&D - TEST & EVALUATION DURING DEVELOPMENT AND ACQUISITION OF MATERIEL" 1d. "AR 570-9, "MANPOWER AND EQUIPMENT CONTROL - HOST NATION SUPPORT 2. AR 700-9, "POLICIES OF THE ARMY LOGISTIC SYSTEM" 3. AR 700-82, "JOINT REGULATION GOVERNING THE USE AND APPLICATION OF UNIFORM SOURCE MAINTENANCE AND RECOVERABILITY CODES 4. AR 700-127, "INTEGRATED LOGISTICS SUPPPORT" 5. AR 725-50, "REQUISITIONING, RECEIPT AND ISSUE SYSTEM" 6. AR 750-1, "MAINTENANCE OF SUPPLIES & EQUIPMENT - ARMY MATERIEL MAINTENANCE CONCEPTS & POLICIES" 7. AMC-R-700-27, "LEVEL OF REPAIR ANALYSIS (LORA) PROGRAM" 8. AMC-R-750-10, "DEPOT MAINTENANCE INTERSERVICE" 9. DA PAM 700-4 10. DA PAM 700-28, "INTEGRATED LOGISTIC SUPPORT PROGRAM ASSESSMENT ISSUES AND CRITERIA" 11. DA PAM 700-50, "INTEGRATED LOGISTIC SUPPORT - DEVELOPMENTAL SUPPORTABILITY TEST AND EVALUATION GUIDE" 12. DA PAM 700-55, "INSTRUCTIONS FOR PREPARING THE INTEGRATED LOGISTIC SUPPORT PLAN" 12a. DA PAM 738-750, "THE ARMY MAINTENANCE MANAGEMENT SYSTEMS (TAMMS) 13. DA PAM 750-21, "LOGISTIC SUPPORT MODELLING" 14. AMC PAM 700-4, "LOGISTICS SUPPORT ANALYSIS TECHNIQUES GUIDE (WITH PALMAN)" 14a. AMC PAM 700-11, "LOGISTICS SUPPORT ANALYSIS REVIEW TEAM GUIDE" 15. AMC PAM 750-2, "MAINTENANCE OF SUPPLIES AND EQUIPMENT GUIDE TO RELIABILITY CENTERED MAINTENANCE" 16. MIL-STD-152, "TECH REVIEW GUIDELINES" 17. MIL-STD-210A, "CLIMATIC EXTREMES FOR MILITARY EQUIPMENT" 18. MIL-STD-470, -471, "MAINTAINABILITY STANDARDS" 19. MIL-STD-756, "RELIABILITY MODELLING & PREDICTIONS" 20. MIL-STD-780, "MAINTENANCE ENGINEERING ANALYSIS CONTROL NUMBER (MEACNS) FOR AERONAUTICAL EQUIPMENT, UNIFORM NUMBERING SYSTEM 21. MIL-STD-781, "RELIABILITY DESIGN QUALIFICATION AND PRODUCTION ACCEPTANCE TESTS: EXPONENTIAL DISTRIBUTION 22. MIL-STD-785B, "RELIABILITY PROGRAM FOR SYSTEMS AND EQUIPMENT DEVELOPMENT & PRODUCTION" 23. MIL-STD-810, "ENVIRONMENTAL TEST METHODS & ENGINEERING GUIDELINES 24. MIL-STD-881, "WORK BREAKDOWN STRUCTURES FOR DEFENSE MATERIEL ITEM 25. MIL-STD-882, "SYSTEM SAFETY PROGRAM REQUIRMENTS" 26. MIL-STD-965, "PARTS CONTROL PROGRAM" 27. MIL-STD-1369A, "INTEGRATED LOGISTIC SUPPORT PROGRAM REQUIREMENTS" 28. MIL-STD-1388-1A, "LOGISTICS SUPPORT ANALYSIS" 29. MIL-STD-1388-2A, "LOGISTICS SUPPORT ANALYSIS RECORD" 30. MIL-STD-1629, "PROCEDURES FOR PERFORMING A FAILURE MODE, EFFECTS

Name	Label	Label	Description
			& CRITICALITY ANALYSIS"
			31. MIL-HDBK-472, "MAINTAINABILITY PREDICTION"
			32. MIL-M-24100B, "FUNCTIONALY ORIENTED MAINTENANCE MANUALS (FOMM) FOR EQUIPMENT & SYSTEMS"

	Name	Label	Description
	PM/ILSMT	PM/ILSMT	The Program Manager or those activities, agencies or authorities that are responsible for the initiation of the requirement for an ILS element assessment during a development program for a system and/or equipment in accordance with AR 700-127. The key action (output) required of this external entity is the directive, authority, or other documentation that initiates the requirement for the application of this ILS assessment to a specific system/equipment development program at a specified point in it's life cycle in accordance with AR 700-127.

ANNEX C

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LSA TASK 303
EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

ANNEX C

LSA SUBTASK 303.2.2
TRADE-OFF BETWEEN SUPPORT SYSTEM ALTERNATIVES
AND
SYSTEM/EQUIPMENT ALTERNATIVE

PROCESS 303.2.2 - CONDUCT EVALUATION AND TRADE-OFFS BETWEEN THE SUPPORT SYSTEM ALTERNATIVES IDENTIFIED FOR EACH SYSTEM/EQUIPMENT ALTERNATIVES

PURPOSE:

To conduct trade-off analysis and evaluations between support systems alternatives to select the best support systems for the selected end item (system/equipment).

NOTES:

1. Prior to presenting the structured design and screen instructions for the various processes, it is necessary to point out that this task is dynamic and applicable throughout the life cycle of the system/equipment. This task is constantly changing as data is processed and the support systems, i.e., test equipment, TMDE, fuel supply, vehicles, electronic test sets, etc., are updated and personnel job classifications and skills required are evaluated.

2. This task is an iterative process to provide the Program Manager the documented results of the trade-off analysis to arrive at a selected support alternative. It should be completed on all alternative system/equipments and their alternative support systems. The acquisition phases and how they relate to this task follows:

   a. Concept Exploration Phase

      (1) Design is only conceptual. Best opportunity for identifying alternatives, conducting trade-offs, performing evaluations, and influencing support system designs from a supportability standpoint.
      (2) In this phase, although all the data will not be available, it is essential to perform this task. It allows the Program Manager to select support systems for the selected end item by utilizing available supportability, cost and System Readiness Objective (SRO) data.

b. Demonstration and Validation

(1) Performance characteristics are more or less established. Actual design is still flexible. Debugging and major changes in construction are taking place.. Support alternatives, design, and operational alternatives are being traded off and may result in a prototype system/equipment.

(2) In this phase, more data is available and more realistic supportability trade-offs and evaluations can be done. The Program Manager is provided with information and recommendations for the selection of a prototype support system influenced by supportability, cost and System Readiness Objectives.

c. Full Scale Development Phase

(1) Results in a prototype. Design is concentrating on construction, parts selection and fine tuning of performance. No major design influence is made except those necessary to correct a deficiency. Design influence is limited to packaging, partitioning, testability, accessibility, etc.. Support systems are optimize.

(2) In this phase all the data required to perform final supportability, cost and SRO trade-offs and/or evaluations should be available. The results of the trade-offs/evaluations performed during this phase will be the ones used to field the support systems.

d. Production and Development Phase

(1) This phase is from production approval until the last system is delivered and accepted.

(2) In this phase all the supportability trade-offs are accomplished for the system/equipments. Further trade-offs would be generally applicable to design changes only.

PROCESS 303.2.2.1 - SELECT SYSTEM/EQUIPMENT ALTERNATIVES FOR ANALYSIS

PURPOSE:

To iteratively select an alternative system/equipment from those being considered by the PM/ILSMT for use in the trade-off process for selecting the best support plan/concept for each alternative system/equipment.

PROCEDURES:

1. To start the Support System Trade-Off Process, select from the PM and/or ILSMT one of the system/equipment alternatives that fulfills the mission/operational requirements as defined by the ROC (Required Operational Capability).

2. Obtain data from the acquiring activity files pertaining to mission/operational requirements for the selected system/equipment alternative such as:

   a. Reliability requirements

      (1) Minimum mean time-miles, cycles, etc., between operational mission failures.
      (2) Failure probability data.

   b. Maintainability requirements

      (1) Maintenance ratios; manhours per mile, cycles, etc.
      (2) Manhour per function.

   c. Operational availability (AO) requirements

      (1) Wartime AO
      (2) Peacetime AO
      (3) Training AO (if different or separately identified.

   d. Operational environmental impact considerations

      (1) Terrain i.e., sand, salt, mountains, marshes, etc.
      (2) Climatic; temperature ranges, humidity, combinations thereto
      (3) Other environmental conditions that may impact man or machine.

e. System/Equipment support and support equipment materials handling, storage, or facilities needs

(1) Storage facilities data, increased storage or materials handling needs
(2) Maintenance or handling equipment and/or facilities requirements
(3) Operations or maintenance/support skills required (M&P Data).

REFERENCES:

1. PM/ILSMT Direction
2. ARF Files

PROCESS 303.2.2.2 - SELECT & QUANTIFY SUPPORT SYSTEM ALTERNATIVES

PURPOSE:

To select from Task 302.2.1 alternative system support concepts and the support data covering the 12 major ILS element areas, applicable to the alternative system/equipment selected.

PROCEDURES:

1. Select from LSA Task 302 the support system alternatives (concepts and plans) that were considered to be fully or partially applicable for the alternative system/equipments selected in Process 303.2.2.1. Concepts and plans for Task 302 were to have considered options based on cost, manpower, facilities, training, etc., for each system/equipment alternative considered in the trade-off process.

2. Summarize the support data from Task 302.2.2, the applicable support concepts and plans for the alternative system/equipment selected in Process 303.2.2.1 above, covering all levels of maintenance and all operation and maintenance tasks (Hardware and Software).

REFERENCES:

1. Subtask 303.2.2.1 - Selected Alternative System/Equipment
2. LSA Task 302 - Alternative Support Concepts/Plans.

SCREEN ENTRY INSTRUCTIONS:

1. There are 12 screens available to document the identification and quantification of the process. Depending on the selected new alternative system/equipment requiring a support system trade-off, the analysis will dictate the number of screens used. It should be noted that these 12 screens are in sets. Each

set applies to a particular new alternative system/equipment and are controlled by the Support System Control Number (Field 2).

Example:

The logistician is conducting a support system trade-off on a new system/equipment manufactured by two different manufacturers. There could be up to 12 screens required to document Manufacturer "A" and another 12 screens required to document Manufacturer "B". (Refer to Logon Procedures as to how to display the desired screen for the desired manufacturer and Support System Control Number).

2. View/print screens from LSA Task 302.
Field 1:
Self explanatory.
Field 2:
Support System Control Number:

There are occasions when manufacturer "A" and Manufacturer "B" will have the same End Item Name and Nomenclature during the acquisition phase of concept Formulation and Demonstration and Validation. There are also occasions when Manufacturer "A" or "B" will have more than one support concept. In order to distinguish between the different support concepts, it is required to assign a unique control number to each support concept.

Subfields:
Filed 3:

The main attribute will be hand coded followed by subfields.

Subfields:

These fields are in narrative format. As the narrative is entered, the next sub-field will scroll downward on the screen. When the entry is completed for one sub-field, then go to the next sub-field and enter the required information. It is realized that the narrative for all the sub-fields will not fit on one screen. When this occurs the particular screen will scroll over to a continuation screen/screens. Some screens are known to not have space for all the sub-fields information. These screens will be continuation screens, machine generated, and identified as Part 1, Part 2, etc.. (See Logon procedures to display the desired screen).

Each sub-field should identify the appropriate cost and justification. These costs may be for organic, contractor, or a mix of each.

3. The screen and entry instructions follow:

Screen 1: Design Influence:

Screen is shown on page C-8. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para B-1.

Screen 2: Maintenance Planning:

Screen is shown on page C-9. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-2.

Screen 3: Manpower and Personnel:

Screen is shown on page C-10. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-3.

Screen 4: Supply Support:

Screen is shown on page C-11. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-4.

Screen 5: Support Equipment and Test Measurement and Diagnostic Equipment:

Screen is shown on page C-12. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-5.

Screen 6: Training and Training Devices:

Screen is shown on page C-13. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-6.

Screen 7: Technical Data:

Screen is shown on page C-14. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-7.

Screen 8: Computer Resources Support:

Screen is shown on page C-15. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-8.

Screen 9: Packaging Handling and Storage:

Screen is shown on page C-16. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-9.

Screen 10: Transportation and Transportability:

Screen is shown on page C-17. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-10.

Screen 11: Facilities:

Screen is shown on page C-18. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-11.

Screen 12: Standardization and Interoperability:

Screen is shown on page C-19. Entry Data Elements are contained on screens from LSA Task 302 and in AR 700-127, Appendix B, Para. B-12.

4. Pages C-8 through C-19 contains the 12 screens for this task.

PROCESS 303.2.2.3 - IDENTIFY CRITERION RELATED TO SRO AND SUPPORTABILITY

PURPOSE:

Identify the attributes of the system readiness objective (SRO) for each system/equipment under consideration.

PROCEDURES:

1. For each alternative system/equipment under consideration, determine the total number of new system/equipments to be supported in the field. Document results in field #2 of SRO worksheet.

2. Using the information from the SRO and the results of LSA Subtasks 302.2.1 and 302.2.2, document the required operational availability (Ao) for Wartime and Peacetime in field #3 of SRO worksheet.

3. Using the SRO, ROC, O&O Plan, and information from LSA Subtasks 302.2.1 and 302.2.2, document in field #4 of SRO worksheet the Operational (Mission) Capability.

Example:

(1) The average mission duration is considered to be 3.0 hours per mission.

(2) The number of operating days is considered to be 365/year, 24 hours/day.

(3) The average wartime annual miles driven are estimated to be 12,200 miles in both desert and non-desert environments.

(4) The total peacetime flight time, miles driven, etc..

(5) The system/equipment must be able to sustain operation in day/night and adverse weather conditions. It will typically operate in the Climatic Design Types (CDT) of basic and cold and will be called upon to also operate in hot and severe CDT.

(6) The system/equipment should also operate without degradation in the following conditions;

a. High/low humidity level
b. Heavy precipitation/rains
c. Sand and dust
d. Haze/fog
e. Fungus
f. Explosives
g. Lightning
h. Day/night (low ambient light levels)
i. Sleet/snow/ice
j. Nuclear, biological, and chemical
k. Electronic warfare
l. Salt
m. Smoke.

(7) The equipment shall comply with electromagnetic interference/electromagnetic compatibility requirements of Military Standard (MIL-STD-461). The equipment shall also operate when exposed to vibration and acceleration environment specified in MIL-STD-E-500.

4. Using the results of LSA Task 205 and system specifications, document in fields #5, 6, and 7 of SRO worksheet the quantitative reliability, maintainability and survivability requirements for the system/equipment under consideration.

5. Using the results of LSA Task 205, document in field #8 of the SRO worksheet how the system under analysis meets the supportability objectives of the development program. This analysis should include system readiness, O&S costs, and logistic resource requirements.

6. From LSA Subtask 302.2.1 and 302.2.2, (APJ Report 966-234 "Alternate Support System Concepts and Updated Alternative Support System Concept"), extract from the results of Process 302.2.1.5A10-1 the quantitative transportability requirements and capabilities for the system/equipment under consideration. Document results in field #9 of the SRO worksheet.

7. From LSA Subtask 302.2.1 and 302.2.2, (APJ Report 966-234 "Alternative Support System Concepts and Updated Alternative Support System Concepts"), extract manpower and personnel requirements from the results of Process 302.2.1.5A4. Document the total manpower and personnel requirements at each level of maintenance.

REFERENCES:

1. Process 303.2.2.1 - Selected Alternative System/Equipment
2. Process 303.2.2.2 - Select Support System Alternatives
3. APJ Report 966-234, Task 302.2.1 and 302.2.2, "Alternative Support System Concepts and Updated Alternative Support System Concepts"
4. SRO
5. Process 302.2.1.5A10-1, from APJ Report 966-234, "Alternative Support System Concepts and Updated Alternative Support System Concepts"
6. ROC
7. O&O Plan

PROCESS 303.2.2.4 - PERFORM TRADE-OFF ANALYSIS

PURPOSE:

To perform trade-off analysis on each alternative support concept selected to determine the best alternative support system that meets the support readiness requirements with the optimum/best balance between cost, schedule, performance, readiness, and supportability.

PROCEDURES:

1. A trade-off analysis constitutes a series of "WHAT IF...?" questions that are applied to a series of alternative methods of providing a service, product, or function. The relative cost of each alternative method is established and the expected degree to which it can satisfy the required service, product, or functional requirements is analyzed. The results of the trade-off

analysis provide data for each alternative that can be matched against all others (manually or statistically) and the relative benefits/penalties of each can be assessed. The optimum or most desirable alternative can be selected with a known cost/benefit/penalty relationship.

Under subtask 303.2.2.2 above, each applicable alternative support system concept was quantified in terms of materiel, functions, and costs, while in subtask 303.2.2.3, the SRO and supportability criterion were developed for each alternative support system concept as they related to the proposed new system/equipment.

In this trade-off analysis, these alternative support concepts are assessed to identify the degree to which each provides the life cycle logistical support required by the new system/equipment, the relative costs and an overall assessment of the impact of the support concept on the SRO, total program life cycle costs, and supportability.

An integral part of the trade-off analysis is a sensitivity analysis on those variables which have a high risk involved or which drive supportability, cost, or readiness for the new system/equipment. This sensitivity analysis should address the degree to which a change in the physical, economic, or functional characteristics of any alternative support concept may have on the overall cost and applicability of its use with the new system/equipment.

A series of subtasks have been used to structure the trade-off analysis:

a. 303.2.2.4A1 - Select Trade-Off Analysis Support/Cost/Performance/System Readiness Objectives (SRO)
b. 303.2.2.4A2 - Perform Supportability Trade-Off Analysis
c. 303.2.2.4A3 - Perform Cost Trade-Off Analysis
d. 303.2.2.4A4 - Perform SRO Trade-Off Analysis
e. 303.2.2.4A5 - Optimum Support System Alternative for each Selected System Alternative
f. 303.2.2.4A6 - New/Critical Logistic Support Requirements
g. 303.2.2.4A7 - Recommended Support System Alternatives
h. 303.2.2.4A8 - Consolidate Trade-Off Results to Prepare Final Report.

2. It would be desirable to select a standard Trade-Off Analysis model from publications as AMC-P 700-4, "Logistical Support Analysis Technique Guide". However, in the event that no model can be found applicable to the specific trade-off relationship, generate a model by answering the following questions associated with the basic process:

   a. Define the model objectives

      (1) What is the Problem?
      (2) What must be accomplished?
      (3) Who is the decision maker on model results?
      (4) What are the variables to be used?
      (5) What are the constraints and constants?

   b. Generate manual alternatives

      (1) What are the alternatives support concepts?
      (2) How will these alternatives operate under the conditions (constraints) of the problems?
      (3) How much do they cost?
      (4) What will they produce?
      (5) What are the risk levels for each variable used?

   c. Evaluate alternatives

      (1) What alternatives do I pick?
      (2) What are the factors affecting the worth of each alternative?

REFERENCES:

1. 303.2.2.1 - Select System/Equipment Alternative for Analysis
2. 303.2.2.2 - Select/Quantify Support System Alternatives
3. 303.2.2.3 - Identify Criterion Related to SRO Cost and Supportability.

PROCESS 303.2.2.4A1 - <u>Select Trade-Off (I/O) Models for Support/ Cost/Performance/System Readiness Objectives (SRO Analysis</u>

PURPOSE:

To select a trade-off model that will compare and determine the best support parameters for evaluation of a set of alternative support system concepts.

PROCESS 303.2.2.4A1B1 - Identify Qualitative and Quantitative Attributes Associated with System/ Equipment

PURPOSE:

To identify those qualitative and quantitative characteristics or attributes associated with the selected system/equipment.

PROCEDURES:

1. Review the QMR and ROC - identify and quantify the logistic requirements of the selected system/equipment relative to the operational, functional, and reliability requirements that must be achieved to meet the SRO goals.

2. Use this data to establish support and cost relationships in Process 303.2.2.4A1B3 below.

REFERENCES:

1. 303.2.2.3 - Identify Criterion Related to SRO, Cost, and supportability
2. AAF Acquiring Activity Files
3. Qualitative Materiel Requirements (QMR) Documents
4. Requirements Operational Capability (ROC)

PROCESS 303.2.2.4A1B2 - Identify Qualitative and Quantitative Attributes Associated with Alternative Support Systems

PURPOSE:

To identify all qualitative and quantitative operational and functional attributes of each alternative support system concept that will be used in determining if the support system selected is capable of meeting the physical and operational attributes for providing the required support.

PROCEDURES:

1. Review the QMR, ROC and any other applicable documents that describes the operational and functional requirements for the selected system/equipment and the associated logistic requirements of the support system concept.

2. Extract/tabulate all qualitative/quantitative logistic requirements of each alternative support concept. These data will be used to determine if the support system is capable of meeting the physical and operational characteristics identified in Process 303.2.2.3.

REFERENCES:

1. 303.2.2.3 - Identify Criterion related to SRO, Costs and Supportability
2. Qualitative materiel Requirements (QMR) Document
3. Requirements Operations Capability (ROC) Document.

PROCESS 303.2.2.2.4A1B3 - Establish Relations Models - Support, Costs and SRO

PURPOSE:

To construct the analytical relationships between cost, supportability and system readiness using historical data obtained from logistically similar support system/equipment in order to develop the model predictions associated with each alternative support system concept.

PROCEDURES:

1. Develop the Cost Effective Relationships (CER's) for each alternative system concept based on historical data of logistically similar end item systems.

2. This involves development of historical Cost Effectiveness Relationships (CER's) for actual support systems used for fielded or "Baseline" logistically equivalent end items.

NOTE: CER's could take the form of miles per gallon, $ per pound of structure, hours maintenance per operating hour or mile, number of people per crew, etc. Based on historical data, these CER's can then be applied to the new system/equipment in lieu of engineering estimates or early fielding experience.

REFERENCES:

1. AMC-P 700-4 "Logistical Support Analysis Technique Guide"
2. Historical files of Logistically Equivalent system/ equipments.

PROCESS 303.2.2.4A2 - <u>Perform Supportability Trade-Off Analysis</u>

PURPOSE:

To determine the alternative support concept whose support elements have the best influence on reliability, maintainability, safety, preservation, packaging, funding, data management, and maintenance engineering characteristics.

PROCESS 303.2.2.4A2B1 - Assess Criticality of Relation to Mission Functions

PURPOSE:

To identify support requirements which are critical and have the largest effect on the selected system/equipment support and readiness values.

PROCEDURES:

1. List all support requirements associated with the selected system/equipment that may have some effect on mission functionality.

2. Each of the support requirements should be assessed relative to their effect on the system/equipment and its readiness values relative to the previously established mission and functions. Specify the criticality of each support requirement in relation to the system/equipment achieving its mission objectives.

NOTE: The criticality of the support elements relative to mission functions should be measured as to the degree to which the mission/operational capabilities of the new system/equipment as defined by the ROC might be degraded or jeopardized if the support element were deficient or lacking.

REFERENCES:

1. Process 303.2.2.4A1 - Supportability Trade-Off Results
2. Required Operations Capability (ROC) document.
3. Process 303.2.2.4A5B5 - Evaluate Optimum Support Concept.

PROCESS 303.2.2.4A2B2 - Perform Supportability Trade-Off Analysis

PURPOSE:

To conduct the trade-off analysis of the selected alternative support concepts under evaluation by using existing models available in AMC-P 700-4, models available in industry, or develop relationships from historical data. The supportability Trade-Off will consider the logistic resources required for each support concept. The logistic resources will be manpower, support equipment, technical data, training courses, simulators, etc. required to operate and maintain the system.

PROCEDURES:

1. Review AMC-P 700-4 for models applicable to the trade-off analysis of alternative support concepts for the selected system/equipment. Select a model that generates a measure of "supportability" for a given support concept. The measure can be relative, Support Concept B is X% more effective then Support Concept A, or quantitative, Support Concept A is X on the supportability scale, while Support Concept B is Y on the scale.

2. Solicit potentially suitable models from industry associated with logistically equivalent system/equipment development. These models must also provide a measure of supportability either relative or on a scale.

3. If no model can be found in U.S. Army publications or from industry, a unique model must be developed. In this case, it is suggested that the procedures and guidelines set forth in Process 303.2.2.4 above be followed.

4. Regardless if an existing model or a new model is used, it must be applied to each alternative support concept. To perform the supportability trade-off analysis:

   a. Use the supportability criterion established in Process 303.2.2.3 to develop a threshold measure for supportability. If a model is not used, then use the supportability criteria as the maximum amount of logistics resources that are available for any given a support concept.

   b. Compare supportability measure derived for each support concept to the threshold values established from the supportability criteria. If a model was not used, then compare the logistic resource requirements of each support concept against the established supportability criteria.

   c. All the support concepts that do not exceed the threshold values should be labeled acceptable, those that do should be labeled unacceptable.

   d. Document reasons why support concepts are considered unacceptable. Specifically indicate the high drivers in terms of the need for logistic resources.

REFERENCES:

1. 303.2.2.4 - Perform Trade-off Analysis
2. 303.2.2.4A2B1 - Assess Criticality of Relationships to Mission Functions
3. AMC-P 700-4 "Logistical Support Analysis Technique Guide"

PROCESS 303.2.2.4A2B3 - Conduct Sensitivity Analysis

PURPOSE:

To conduct a sensitivity analysis that will identify the critical support attributes that (1) drive supportability, cost or readiness for the new system, (2) play a major role in establishing support and readiness characteristics of the new system/equipment or (3) are most influenced by variations in functional requirements related to reliability, maintainability, safety, human factors, transportation etc., resulting in the best state-of-the-art support system for the applicable alternative system/equipment being evaluated. This analysis permits concentration of logistical efforts in those areas of support which most seriously affects supportability and reliability of the overall system/equipment over its life cycle.

PROCEDURES:

1. A sensitivity analysis may be required in the performance of the trade-off analysis to determine how sensitive a recommended trade-off would be to support the system/equipment. Any of the several statistical models can be applied to the trade-off analyses to determine the sensitivity of each support and physical parameter used to quantify the alternative support concepts. For example, multivariate analysis techniques can be applied to the overall trade-off procedure with the sensitivity of each parameter provided as an output. The objective of this analysis is to determine where changes in system readiness objectives can be influenced by an effective trade-off in the support system characteristics and/or functions.

2. The analyst must first select the Essential Elements of Information (EEI's) relative to the alternative support concept under analysis which will be used in the specific sensitivity analysis. EEI's are items of information/data on "Baseline", fixed or variable attributes which may be used to describe physical characteristics, functions, capabilities, requirements, reliability, or supportability of the support concept.

3. The analyst must determine the level of effort that can be applied to the sensitivity analysis based on the availability of data to satisfy the EEI's and the confidence limits of the available data. The level of effort during concept formulation will be much less than it would be during production or fielding of the system/equipment.

4. There may be multiple iterations of this process as the alternative support systems for the applicable system/equipment progresses through its life cycle. When this occurs, a complete review of input and output data, will be necessary, because the amount of logistic resources required to support the system/equipment may change based on changes in the design.

PROCESS 303.2.2.4A2B4 - Prioritized Results - Critical Characteristics

PURPOSE:

To list the results of the sensitivity analysis and identify those critical relationships and/or characteristics that are the most sensitive for each alternative support system evaluated.

PROCEDURES:

1. List each of the EEI's used in the sensitivity analysis, and identify the sensitivity of the EEI for the applicable support system - those EEI's which drive supportability, cost or readiness of the new system/equipment.

2. For each EEI, quantify how sensitive the EEI is to a change in a particular logistic resource required or change in design, i.e., the degree of change in a critical parameter (cost, performance, responsiveness, etc.) for each unit change in the alternative support system EEI.

REFERENCES:

1. 303.2.2.4A2B1 - Assess Criticality of Relation to Mission Function
2. 303.2.2.4A2B2 - Perform Supportability Trade-Off Analysis
3. 303.2.2.4A2B3 - Conduct Sensitivity Analysis

PROCESS 303.2.2.4A2B5 - Compare Results of Alternative Support Evaluations

PURPOSE:

To review the alternative support system trade-off studies and compare results for each support system concept analyzed.

PROCEDURES:

1. List results of the trade-off analysis for each alternative support system evaluated.

2. Review the sensitivity analyses and identify the critical parameters (EEI that are high users of logistic resources) for each specific alternate support system.

3. Identify and list the risks associated with results of the trade-off analysis.

REFERENCES:

1. Process 3032.2.4A2B2 - Perform Trade-off Analysis with Existing Models
2. Process 303.2.2.4A2B3 - Conduct Sensitivity Analysis
3. Process 303.2.2.4A2 - Perform Supportability Trade-off Analysis

PROCESS 303.2.2.4A2B6 - Assess Requirements for Restructuring of Personnel Classifications.

PURPOSE:

To assess the potential requirements for restructuring of personnel as well as personnel reclassification to provide the support and skills required for support, maintenance and operations for each system/equipment.

PROCEDURES:

1. Evaluate each alternative support system concept for required types of skills and personnel to insure that the concept is compatible with present TO&E's and MOS's.

2. Based on historical data for a logistically equivalent system, identify those areas where changes or shortcomings exist in current support system operations when compared with the new support system concept.

3. Unique manpower and personnel classifications for the new support system must be developed and the following data provided if any changes occur:

   a. Number of people
   b. Skills
   c. Grade levels
   d. Unique requirements
   e. TO&E's
   f. MOS's

REFERENCES:

1. 303.2.2.2 - Selected Support System Alternatives
2. 303.2.2.4A5 - Optimum Support System Alternative for each Selected System Alternative
3. 402.2.2 - Sources of Manpower and Personnel Skills

PROCESS 303.2.2.4A3 - <u>Perform Cost Trade-Off Analysis</u>

PURPOSE:

To establish a cost (dollar value) relationship matrix for each support element versus the supportability and functional characteristics for each of the alternative support system concepts under analysis.

PROCEDURES:

1. The objective is to determine the support systems that do not exceed the dollar value established to support the system/equipment over its life cycle.

2. The logistic resource requirements for each support system are provided for this trade-off analysis by Process 303.2.2.4A2 - Perform Supportability Trade-Off Analysis.

3. The trade-off analysis may be accomplished by the use of models identified in AMC 700-4, such as:

   AMOS
   CORE
   DEPLCC
   LOGAM

4. In the event that none of the established models are suitable for the trade-off analysis, the procedures described under Process 303.2.2.4 may be applied. In general the procedure may be described as follows:

   a. Develop a two dimensional matrix that has the physical and operational attributes of a selected alternative support system (such as number of people by skills, environmental constraints, equipment requirements, etc.) on one leg of the matrix and the operational/functional capabilities (such as number of end items it can support) on the other leg of the matrix. For each cell of the matrix, develop the costs related to the entire life cycle the new system/equipment. This constitutes the baseline cost analysis.

b. On successive copies of the above matrix, for each cell, identify the effectiveness of the alternative support concept as related to reliability, availability performance, and/or any other parameter that can be used to quantify the functional capabilities of the concept as applied to the new system/equipment. This constitutes the effectiveness measurements of the baseline alternative support system concept as related to the cost factors developed in (a) above.

c. Select those physical/functional attributes which would appear to be the most critical to the alternative support concept costs/effectiveness. Very the amount of a specific logistic resource and reassess the affected cells. Equate the changes in costs to the changes in effectiveness. Tabulate results. This analysis constitutes the variations in costs/effectiveness for specified changes in the logistic resources of the alternative support system concepts. Thus, it also contains the basic data of the trade-off studies which can also be used to identify resources parameters and relative sensitivity of the resources to changes in the physical and/or functional characteristics of the support concept.

REFERENCES:

1. Process 303.2.2.4A1 - SRO Trade-Off Data
2. AMC-P 700-4 - Logistical Support Analysis Technique Guide

PROCESS 303.2.2.4A4 - <u>Perform SRO Trade-Off Analysis</u>

PURPOSE:

To develop or use an applicable effectiveness model that evaluates the effectiveness of the support system used on the selected system/equipment relative to the System Readiness Objectives.

PROCESS 303.2.2.4A4B1 - Select Factors of SRO

PURPOSE:

To select and list each of the System Readiness Objectives specified for the alternative system/equipment for use in trade-off analyses to determine the most effective alternative support system or systems that provides the supportability and reliability required to satisfy the requirements of the system/equipment SRO.

PROCEDURES:

1. From the AAF (Acquiring Activity Files), and the ROC (Requirements Objective Capability), select and list peacetime and wartime data that define the performance, reliability, maintainability, etc., requirements for the selected system/equipment that represents its SRO, which, in turn, will establish the criteria for selecting an effective support system.

NOTE: SRO data required to determine the relative effectiveness of a support system may include:

a. Sortie Generations per given time frame
b. Maximum administrative and logistic downtime
c. Maintenance downtime per operating hour
d. Readiness time (Preparation time to use) etc.

REFERENCES:

1. AAF documents
2. ROC document
3. Process 303.2.2.4A1 - Selected Trade-off Analysis Support/Cost/SRO
4. Process 303.2.2.4 - Perform Trade-off Analysis.

PROCESS 303.2.2.4A4B2 - Establish Sets of Support Alternative Factors

PURPOSE:

To establish a list of support factors for each set of support alternatives that would impact the System Readiness Objectives (SRO).

PROCEDURES:

1. Determine the SRO factors for each alternative support system concept based on those developed in Process 303.2.2.4A4B1.

NOTE: The list of SRO factors should include reliability, maintainability, performance requirements, etc. for each alternative support system.

2. Determine how the logistic resources for a given support system effect the SRO factors.

NOTE: Example of an effect that a support system concept could have on SRO factors: Assume an SRO requirement of 1.0 maintenance manhour per operating hour (MH/OH). Is it possible that the

Government Furnished Equipment, (GFE) described in the support system concept, for inspection of the new system/equipment can reduce the SRO?

REFERENCES:

1. Process 303.2.2.4A1 - Select trade-off analysis support/ cost/SRO
2. Process 303.2.2.4A4B1 - Select Factors of SRO.

PROCESS 303.2.2.4A4B3 - Establish Subsets of Support Alternative Factors

PURPOSE:

To determine the subsets identified in terms of variable, fixed and "Baseline" attributes for each support alternative that will be applicable to the specific trade-off analysis.

PROCEDURES:

1. For each set of SRO factors and logistic resources associated with a support system, identify subsets in terms of variable, fixed and "Baseline" factors/resources. These factors/resources must be identified and listed before any trade-off analysis is initiated.

2. The analyst, with the assistance of the system engineer, must place the subsets of factors/resources in a network or matrix. This list should contain all known factors that will be used in any trade-off analysis on the support system concept.

REFERENCES:

1. Process 303.2.2.3 - Identify Criterion Related to SRO, Cost and Supportability
2. Process 303.2.2.4A4B2 - Establish Subsets of Support Alternative Factors.

PROCESS 303.2.2.4A4B4 - Perform SRO Trade-Off Analysis

PURPOSE:

To perform applicable trade-off analysis against the list of SRO factors from Process 303.2.2.4A4B1.

PROCEDURES:

1. Select an existing effectiveness model to evaluate reliability, maintainability and performance of the logistic resources for each alternative support system concept. In the event that an adequate model cannot be found, follow the procedures outlined in Process 303.2.2.4 "Perform Trade-off Analysis" above.

2. The model or procedure should be based on the variable and fixed factors to be considered such as failure and repair distributions, environment and design integration.

3. Using the results of 303.2.2.3, and considering the sets produced form 303.2.2.4A4B2, and subsets developed from 303.2.2.4A4B3, measure the resulting SRO factors for each support concept against the list of SRO factors from 303.2.2.4A4B1.

4. Categorize the support concepts that achieve the required SRO as acceptable and those that don't as unacceptable.

NOTE: The essence of any trade-off analysis is the choosing of alternative support system subset values based on the advantages gained by variations in the variable attributes. However, the trade-off analysis may require further analysis involving the sensitivity and risks involved in the changes resulting from the analysis.

REFERENCES:

1. Process 303.2.2.3 - Identify Criterion Related to SRO, Cost and Supportability.
2. 303.2.2.4A4B1 - Select Factors of SRO
3. Subset 303.2.2.4A4B2 - Establish sets of Support Alternative Factors
4. 303.2.2.4A4B3 - Establish Subsets of Support Alternative Factors.

PROCESS 303.2.2.4A5 - <u>Optimum Support System Alternative for each System/Equipment Alternatives</u>

PURPOSE:

To evaluate the separate supportability, cost and SRO trade-off results and select a single support system concept.

PROCESS 303.2.2.4A5B1 - Trade-Off Analysis Integration Process

PURPOSE:

To develop a matrix that integrates the results of the three trade-off analyses (supportability, cost and SRO) for (1) Contractor vs. Organic support, (2) New resource requirements, and, (3) New support system training required for each alternative support system required.

PROCEDURES:

1. Data for this matrix comes from the following trade-off analyses:

   a. 303.2.2.4A2 - Perform Supportability Trade-off Analysis. This data includes supportability elements such as reliability, maintainability, safety, human factors, transportation and handling, storage, preservation, packaging, etc.

   b. 303.2.2.4A3 - Perform Cost Trade-off Analysis. The cost input to the matrix is described in this process and determines the support system concept having the best dollar value of resources and contractor vs organic support required by the new system/equipment.

   c. 303.2.2.4A4 - Perform System Readiness Objective (SRO) Trade-off Analysis. The contribution to the matrix is based on the fixed and variable logistic resources that effect SRO objectives such as failure and repair ratios, maintenance downtime, maintenance manhours per operating hour, etc.

2. Based on the data obtained from the trade-off analyses, determine which elements would require Contractor, Organic Support or a combination of each and/or requires new resources and training.

REFERENCES:

1. 303.2.2.4A2 - Perform Supportability Trade-off Analysis
2. 303.2.2.4A3 - Perform Cost Trade-off Analysis
3. 303.2.2.4A4 - Perform SRO Trade-off Analysis

PROCESS 303.2.2.4A5B2 - Perform Optimization Analysis

PURPOSE:

To perform optimization analysis to incorporate the best features of each alternative support system analyzed and produce an optimum support concept plan.

PROCEDURES:

1. Based on the information provided in the matrix developed in 303.2.2.4A5B1 and considering the impact of organic vs. contractor support, or a combination of both, perform a comparative analysis that highlights the best features of the various support system concepts for the new alternative system/equipment. Use this composite support system as another alternative and a possible candidate in further analysis.

   NOTE: Be careful in developing a composite support concept since certain pieces of the alternatives considered may be mutually exclusive.

2. Form the composites by selecting that aspect of the alternative support concept whose logistic resource requirements have the best influence on one or more of the following areas: reliability, maintainability, safety, human factors, transportation and handling, storage, preservation and packaging, funding, data management maintenance engineering characteristics. This information will come from the matrix established in Process 303.2.2.4A2 - Perform Supportability Trade-off Analysis and Process 303.2.2.4A5B1 -Trade-off Analysis Integration Process.

REFERENCES:

1. 303.2.2.4A5B1 - Trade-off Analysis Integration Process
2. 303.2.2.4A2 - Perform Supportability Trade-off Analysis
3. 303.2.2.4A3 - Perform Cost Trade-off Analysis
4. 303.2.2.4A4 - Perform SRO Trade-off Analysis

PROCESS 303.2.2.4A5B2 - Perform Decision Risk Analysis

PURPOSE:

To identify and describe, risk levels for the alternative support systems.

PROCEDURES:

1. Estimate the risk or probability that the assessment of the impact of the alternate support system on existing and/or planned weapons system, supply, maintenance, logistics and transportation is incorrect.

2. A review of the optimization analysis performed in Process 303.2.2.4A5B2 - Perform Optimization Analysis, will provide additional logistic resource requirements for which risk analysis may be required to establish the degree to which the trade-off analysis results are invalid and not applicable.

3. Other important risk areas to assess in total life cycle support are those features that causes changes to reliability, maintainability, safety, human factors, data management, support management and other logistic elements.

NOTE: A risk is defined as the probability that the conclusion reached is incorrect. (See MIL-STD-1388-1).

REFERENCES:

1. 303.2.2.4A5B1 - Trade-off Analysis Integration Process
2. 303.2.2.4A2 - Perform Supportability Trade-off Analysis
3. 303.2.2.4A3 - Perform Cost Trade-off Analysis
4. 303.2.2.4A4 - Perform SRO Trade-off Analysis.

PROCESS 303.2.2.4A5B3 - Evaluate Optimum System Support Concept

PURPOSE:

To evaluate all alternative system support concepts considering all risks and items of support that effects performance, readiness, cost and supportability. Then to identify the alternative support concept that provides the best balance between cost, performance, readiness and supportability. This includes the data developed by the matrix in 303.2.2.4A5B1.

PROCEDURES:

1. Based on the results of the Trade-off Analysis Integration Process (303.2.2.4A5B1), the Optimization Analysis (303.2.2.4A5B2) and the Risk Analysis (303.2.2.4A5B3) select the optimum support system concept.

2. The results of the trade-off analysis on supportability, cost and SRO provide insight into the optimum combination of system support elements.

3. The final selection must have the best balance between cost, performance, readiness and supportability.

NOTE: The results of the individual supportability, costs, and SRO Trade-Offs may results in different sets of acceptable support system concepts. In deciding which support system concept to select, one must prioritize those features that are most important. In some cases, one might be willing to choose a support system concept that maximize SRO but has a higher cost then desired or requires more resources (greater supportability) then desired. It is important to remember that ILS Objectives are goals and can not always be reached since they conflict.

REFERENCES:

1. 303.2.2.4A2 - Perform Supportability Trade-off Analysis
2. 303.2.2.4A3 - Perform Cost Trade-off Analysis
3. 303.2.2.4A4 - Perform SRO Trade-off Analysis
4. 303.2.2.4A5B2 - Perform Optimization Analysis
5. 303.2.2.4A5B3 - Perform Decision Risk Analysis.

PROCESS 303.2.2.4A6 - <u>New/Critical Logistic Support Requirements</u>

PURPOSE:

To identify the requirements for the new and/or critical resources generated by the selection of an alternate support concept.

PROCEDURES:

1. The qualitative and quantitative attributes associated with the system/equipment were identified in Process 303.2.2.4A1B1.

2. The qualitative and quantitative attributes associated with the support system concepts were identified in Process 303.2.2.4A1B2.

3. Using the results of 303.2.2.4A5B1 and the integration of the separate supportability, cost and effectiveness trade-offs, identify the need for new/critical resources for the selected support system(s). New resources are considered required items of support not found in the

Army inventory. Critical resources are those that either are in short supply or are constraint by Army Policy, Doctrine or Funding.

REFERENCES:

1. 303.2.2.4A5 - Optimum Support System Alternatives for each System Alternative
2. 303.2.2.4A1B1 - Identify Qualitative and Quantitative Attributes Associated with System/Equipment.
3. 303.2.2.4A1B2 - Identify Qualitative and Quantitative Attributes Associated with Support Systems
4. 303.2.2.4AB3 - Establish Relations Models - Support, Cost, SRO
5. 303.2.2.4A5B1 - Trade-off Analysis Integration Process.

PROCESS 303.2.2.4A7 - Recommended Support System Alternative

PURPOSE:

To identify the recommended alternative support system concept and list all associated qualitative and quantitative logistic resource requirements.

PROCEDURES:

1. Select from Process 303.2.2.4A5B2, the support system considered the optimum for the selected system/equipment.

2. From Process 303.2.2.2, identify key qualitative and quantitative requirements of the optimum support system concept.

REFERENCES:

1. 303.2.2.2 - Select/Quantify Support System Alternatives
2. 303.2.2.4A5B2 - Perform Optimization Analysis.

PROCESS 303.2.2.4A8 - Consolidate Trade-Off Results to Prepare Final Report

PURPOSE:

To summarize the results of the supportability, cost and system readiness objectives (SRO) trade-off analysis to show the trade-offs applicable to the selected support system and how such trade-offs improves the performance, cost and readiness of the selected support system.

PROCEDURES:

1. List results of the trade-off analysis applicable to the selected support system or systems.

2. List for each trade-off how that trade-off improves the performance, cost and readiness of the selected support system.

3. Describe the level of risk and critical areas associated with the selected support system.

REFERENCES:

1. 303.2.2.4A5 - Optimum Support System Alternate for each System Alternative
2. 303.2.2.4A2 - Perform Supportability Trade-off Analysis
3. 303.2.2.4A3 - Perform Cost Trade-off Analysis
4. 303.2.2.4A4 - Perform System Readiness Objectives (SRO) Trade-off Analysis.

Screen Entry Instructions:

1. The purpose of this process is to document the optimum support concepts. To perform this task, three trade-off analysis must be performed:

    a. Supportability Trade-off Analysis
    b. SRO Trade-off Analysis
    c. Cost Trade-off Analysis.

2. These trade-offs are accomplished using the SRO as a flexible "Baseline" and the various support system alternatives as a means to compare to the SRO to achieve as close as possible the requirements of the SRO. The trade-offs will be performed by the analyst with the assistance of a logistician and aided by mathematical models.

3. The SRO is referred to as flexible, as it is initially prepared in the concept acquisition phase and reflects the performance/capability desired by the user. After the logistic analysis and mathematical modeling, it may require changes due to limits of the state-of-the-art, cost, manpower and personnel restrictions, etc.

NOTE: It is important that when a mathematical model is used to assist the logistician in evaluating an attribute, the same model should be used in evaluating the same attributes on all of the support systems alternatives. There are no models hardcoded in this system. The models will have to be chosen and run off line with their results documented in subfield "C" of each of the

attributes. The same applies to the matrixes referenced in Process 303.2.2.4A2 and 303.2.2.4A5B1. Due to the large quantity of sub attributes to be considered, a screen matrix cannot be provided. These matrixes, if applied, will be compiled off-line and identified to this trade-off and filed for future reference.

4. The support system alternatives are highly flexible and their attributes maybe changed, mixed between different alternatives or new information added by the analyst or logistician to provide the best support at the least cost to meet the SRO requirements.

View or Print Screen 303.2.2.3. This screen contains the SRO requirements and as stated above will be the flexible "Baseline" to compare to the various support alternatives. View or print one of the sets of Screen 303.2.2.2 by its Support System Control Number, i.e., manufacturer "A".

Consolidate the trade-off analyses and prepare the final report.

Field 1. Self explanatory

Field 2. Enter the support System control Number extracted from Screen 303.2.2.2. There may be more that one Support System Control Number for this new system/ equipment. Each has its unique Support System Control Number. Each of these support system alternatives will be subject to trade in this process which will create a screen for each support system alternative. In the very likely event that the trade-offs produce a mix of attributes between support system alternatives, as provided from Task 302, then another screen or screens will be completed using a pseudo Support System control Number. this pseudo Control Number should not be entered in Process 303.2.2.2. The main attribute will be hardcoded followed by subfields.

Subfields:

These fields are in narrative format. As the narrative is entered the next subfield will scroll downward on the screen. When the entry is completed for one subfield then go to the next subfield and enter the required information. It is realized that the narrative for all the subfields will not fit on one screen. When this occurs the particular screen will scroll over to a continuation screen/screens. Some screens are known to not have space for all the subfields information. These screens will be continuation screens, machine generated and identified as Part I, Part 2, etc. See Logon procedures to display the desired screen.

Field 3. Design Influence

3a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4 Table 2-2 or enter "Manual".

3b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2 or, the results of the mathematical model.

3c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 4. Maintenance Planning

4a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

4b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

4c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 5. Manpower and Personnel

5a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

5b. Enter the entire cost of this attribute as extracted from Screen 303.3.3.2, or, the results of the mathematical model.

5c. Discuss this attribute as to previous experience with like type system/equipment and the results of the modeling technique.

Field 6. Supply Support

6a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

6b. Enter the entire cost of this attribute as results of the mathematical model.

6c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 7. Support Equipment and TMDE

7a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

7b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

7c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 8. Training and Training Devices

8a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

8b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

8c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 9. Technical Data

9a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

9b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

9c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 10. Computer Resources Support

10a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

10b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

10c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 11. Packaging, Handling and Storage

11a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.

11b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

11c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 12. Transportation and Transportability

12a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.
12b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.
12c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 13. Facilities

13a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.
13b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.
13c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 14. Standardization and Interoperability

14a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-2.
14b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.
14c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 15. Reliability

15a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-3.
15b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.
15c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 16. Survivability

16a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-3.

16b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

16c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 17. Availability

17a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-3.

17b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

17c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 18. Risks

18a. Enter the modeling technique used for this attribute. For this attribute reference AMC-P 700-4, Table 2-3.

18b. Enter the entire cost of this attribute as extracted from Screen 303.2.2.2, or, the results of the mathematical model.

18c. Discuss this attribute as to previous experience with like type system/equipments and the results of the modeling technique.

Field 19. Total Cost

Enter the sum of subfield 3b for fields 3 through 18 or run the mathematical model contained in ACM-P 700-4, Table 2-3, Life Cycle Cost. If a different model is used state which model was used.

PROCESS 303.2.2.5 - DOCUMENT RESULTS - TRADE-OFF ANALYSIS

PURPOSE:

To document the results of the trade-off analysis, risks analysis, sensitivity analysis, optimization analysis and results of models used in determining the optimum support system.

PROCEDURES:

1. A report should be prepared in a standard report format with the following subject outline as a minimum:

a. Identification/Description of new system/equipment
b. Purpose of Report
c. Selected Support System Control Numbers
d. Discussion
   (1) A brief description of each selected support concept
   (2) For each support system, the reason why it was selected
   (3) Documentation of the selected support systems effectiveness and associated cost data and why it is more effective than the other support systems.
e. Recommendations

NOTE: If the recommendations determine that the SRO needs to be changed and the Combat Developer agrees, the SRO will have to be changed.

REFERENCES:

1. Data will be selected from each of the above listed tasks and subtasks.
2. When PM/ILSMT approves the recommended support system, updates to the following processes may be required; 303.2.4, 303.2.5, 303.2.6, 303.2.7, 302.2.1, 204.2.1 and 303.2.2.3.

Screen Entry Instructions:

Field 1. Self Explanatory

Field 2. Develop and enter narrative of purpose of report

Field 3. View/Print all the sets of the trade-off analysis (Screens 303.2.2.4). Select up to three of the best support system trade-offs and enter their Support System Control Numbers in subfields a, b, and c.

Field 4. Discuss the various trade-offs contained in Field 3 indicating their benefits and risks and reasons why.

Field 5. Recommend one of the Support System Control Numbers as the best trade-off with justification including reasons why the other Control Numbers were not considered best. Print this screen and the three Support System Control Numbers contained in Field 3 from Process 303.2.2.4. Attach the outputs of the three System Support control Numbers to the output of this screen and present to the PM/ILSMT.

SCREEN 1

SELECT SUPPORT SYSTEM ALTERNATIVE
DESIGN INFLUENCE
(303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected new system/equipment

Field 2. Selected alternative support system control number:

Field 3. Design Influence:

a. MANPRINT
Narrative:

b. Energy efficiency
c. Hazardous materiels usage or disposal
d. LCC
e. Human factors engineering
f. Safety
g. BITE
h. Source selection or weighing
i. Testing feedback or corrections
j. Contractor incentives
k. RAM-driven support costs
l. Preplanned product improvement (AR 70-15)
m. Transportability
n. Facility limitations
o. Nuclear hardening requirements
p. Packaging/handling constraints
q. Design for discard/testability
r. System Readiness Objective
s. Selected tracking of parts/components/end items by serial number
t. Use of metric measurements
u. Embedded training

Programmer Note: The narrative appears after each subfield and is required for all screens.

SCREEN 2

SELECTED SUPPORT SYSTEM ALTERNATIVE
MAINTENANCE PLANNING
(303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Maintenance Planning:

a. Maintenance concept
b. Maintenance facilities
c. Maintenance tasks
d. Maintenance organization
e. Expenditure limits
f. Maintenance standards
g. Provisioning Plan
h. Operational readiness float
i. Repair cycle float
j. Contractor support
k. Requirements to restore or sustain equipment serviceability
l. Host nation support (AR 570-9)
m. Interservice support agreement
n. Depot maintenance support
o. Intermediate maintenance (IM)/TDA maintenance support
p. Battlefield damage assessment and repair
q. Direct exchange
r. MANPRINT considerations
s. Nuclear hardness maintenance requirements.

SCREEN 3

SELECTED SUPPORT SYSTEM ALTERNATIVE MANPOWER & PERSONNEL (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Manpower and personnel:

a. Numbers, skills, and grades

b. MANPRINT considerations

c. Retention constraints

d. Recruitment or literacy requirements

e. QQPRI

f. Special skill requirement

g. Hazardous skill requirements

h. Human factors considerations

i. Security clearance requirements.

SCREEN 4

SELECTED SUPPORT SYSTEM ALTERNATIVE SUPPLY SUPPORT

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Supply Support:

a. Initial provisioning
b. Spare or repair parts
c. Support facilities (fixed, mobile)
d. Basic sustainment materiel (POL), ammunition, consumable, etc.
e. Handling equipment
f. Source, maintenance and recoverability (SMR)/item management code (IMC) coding
g. DLA/GSA/ARMY/other Service items
h. POMCUS stocks
i. War reserves (AR 11-11 and AR 710-1)
j. Basic issue items/on board spares
k. Major or secondary items
l. Cataloging (national stock number assignments, etc.)
m. Metric measurements
n. Sets, kits, outfits
o. Post=provisioning assessments or reviews
p. Physical dimensions, to include weight, height, cube
q. Container requirements
r. Storage space
s. Administrative support storage
t. Decontamination equipment/precautions
u. Precautions for explosive/radioactive materiel
v. Parts/components/end item serial number tracking
w. Security requirements (system, parts, manuals, etc.)
x. Nuclear hardness critical items
y. Parts/components/end item serial number tracking.

SCREEN 5

SELECTED SUPPORT SYSTEM ALTERNATIVE
SUPPORT SYSTEM & TMDE
(303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Support equipment and TMDE:

a. Test, measurement and diagnostic equipment (common and peculiar)
b. Calibration equipment and procedures
c. Automatic test equipment
d. Support and handling equipment
e. Electric generators
f. POL and ammunition vehicles
g. Tools and tool kits
h. System major item components
i. BIOP (AR 71-2)
j. Associated support items of equipment
k. Recovery or evacuation equipment
l. IMI mobile maintenance facilities (components)
m. Test program sets
n. MANPRINT considerations
o. Installation units (communication, weapons, chemical detection, smoke, etc.)
p. Depot maintenance plant equipment.

SCREEN 6

SELECTED SUPPORT SYSTEM ALTERNATIVE DESIGN INFLUENCE (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Training and Training Devices:

a. Factory training
b. Instructor and key personnel training
c. New equipment training plan
d. New equipment training team requirements
e. System training plan (replaces individual and collective training plan)
f. Resident school training
g. Army training and evaluation program
h. Training materials, aids, and devices
i. Training ammunition
j. Joint Service training
k. displaced equipment training plan
l. Training equipment
m. Extension course training
n. Student training requirements
o. Field manuals
p. Soldier manuals
q. Skill levels and skill specialties
r. Skill qualification test
s. Training instructions
t. Materials and lessons
u. Joint service training agreements
v. Training device support
w. Depot training/training devices
x. Explosive ordnance disposal training
y. MANPRINT considerations.

SCREEN 7

SELECTED SUPPORT SYSTEM ALTERNATIVE TECHNICAL DATA (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Technical Data:

a. Technical manuals
b. Technical bulletins
c. Transportability guidance technical manuals
d. Identification lists
e. Component lists
f. Repair parts and special tools list
g. Maintenance allocation chart
h. Lubrication instructions
i. Supply bulletins
j. Provisioning technical documentation
k. Calibration procedure
l. Drawings and specifications
m. Test results
n. Software documentation
o. Skill and task analysis
p. Facilities utilization
q. Packaging procedures and materials
r. Depot maintenance work requirements
s. Logistic support analysis record
t. Verification and validation
u. ILS planning documentation and associated contractor deliverables
v. Demilitarization and explosive ordnance disposal procedures
w. MANPRINT database.

SCREEN 8

SELECTED SUPPORT SYSTEM ALTERNATIVE COMPUTER RESOURCES SUPPORT (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Computer resources support:

a. System operational hardware

b. ATE operational software

c. Computer resource management plan

d. Post deployment software support (PDSS) cells

e. PDSS product improvement

f. PDSS test verification process

g. Software storage, security requirements.

SCREEN 9

SELECTED SUPPORT SYSTEM ALTERNATIVE PACKAGING, HANDLING AND STORAGE (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Packaging, Handling and Storage:

a. Handling equipment
b. Source, maintenance, and recoverability (SMR)/item management code (IMC)
c. Security requirements (system, parts, manuals, etc.)
d. Disposal/demilitarization
e. Sets, kits, outfits
f. Post-provisioning assessments or reviews
g. Physical dimensions, to include weight, height, cube
h. Container requirements
i. Storage space
j. Administrative support storage
k. Preservation/packaging/handling/requirements (AR 700-15)
l. Pallet/hardstand requirements, air delivery
m. Decontamination equipment/precautions
n. Precautions for explosive/radioactive materiel
o. Handling constraints
p. Lifting and tiedown requirements.

SCREEN 10

SELECTED SUPPORT SYSTEM ALTERNATIVE TRANSPORTATION AND TRANSPORTABILITY (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Transportation and Transportability

a. Rail, highway, water, air-weight and dimensional limits

b. Width and height constraints

c. Customs requirements

d. Airdrop and helicopter requirements

e. Transportation configuration preparation/loading requirements

f. Special precautions

g. Transportability report/approval

h. Unit mobility impacts

i. container compatibility

j. Lifting/tie-down provisions

k. Mobile maintenance and supply van configuration

l. TMDE and special tools transport requirements

m. Support equipment transport requirements

n. Testing

SCREEN 11

SELECTED SUPPORT SYSTEM ALTERNATIVE FACILITIES (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Facilities:

a. Training facilities requirements

b. Depot maintenance facilities requirements

c. Mobile maintenance facilities

d. Fixed IM/TDA maintenance facilities

e. Fixed and mobile storage facilities, including ammunition and special weapons storage

f. Testing and operational facilities

g. Facility physical security requirements

h. Facility utilities (such as common or unique organic/commercial power)

i. Special facility requirements

j. Facility design requirements, leadtime, description, costs, housing and dining facilities

k. Training ranges, targets, scoring equipment, safety fans, etc.

SCREEN 12

SELECTED SUPPORT SYSTEM ALTERNATIVE STANDARDIZATION AND INTEROPERABILITY (303.2.2.2)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Selected alternative support system control number

Field 3. Standardization and Interoperability:

a. System family approach

b. Interoperable systems

c. Proven components and subsystems

d. Other services, NATO allies interface (AR 12-16)

e. Standardization components, subsystems, frequencies, etc.

f. Use of metric measurements.

SCREEN 13

SYSTEM READINESS OBJECTIVES (SRO) WORKSHEET (303.2.2.3)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify selected alternative new system/equipment

Field 2. Number of selected alternative new system/equipment to be supported

Field 3. Availability

Field 4. Operational (Mission Capability)

Field 5. Reliability

Field 6. Maintainability

Field 7. Survivability

Field 8. Supportability

Field 9. Transportability

Field 10. Manpower/Personnel.

SCREEN 14

TRADE-OFF ANALYSIS SUMMARY RESULTS
(303.2.2.4A8)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify new system/equipment

Field 2. Support System Control Number

Field 3. Design Influence:

a. Modeling technique used
b. Total cost
c. Discussion

Field 4. Maintenance Planning:

a. Modeling technique used
b. Total cost
c. Discussion

Field 5. Manpower and Personnel:

a. Modeling technique used
b. Total cost
c. Discussion

Field 6. Supply Support:

a. Modeling technique used
b. Total cost
c. Discussion

Field 7. Support Equipment and TMDE:

a. Modeling technique used
b. Total cost
c. Discussion

SCREEN 14

TRADE-OFF ANALYSIS SUMMARY RESULTS
(303.2.2.4A8)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 8. Training and Training Devices:

a. Modeling technique used
b. Total cost
c. Discussion

Field 9. Technical Data:

a. Modeling technique used
b. Total cost
c. Discussion

Field 10. Computer Resources Support:

a. Modeling technique used
b. Total cost
c. Discussion

Field 11. Package, Handling and Storage:

a. Modeling technique used
b. Total cost
c. Discussion

Field 12. Transportation and Transportability:

a. Modeling technique used
b. Total cost
c. Discussion

Field 13. Facilities:

a. Modeling technique used
b. Total cost
c. Discussion

SCREEN 14

TRADE-OFF ANALYSIS SUMMARY RESULTS (303.2.2.4A8)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 14. Standardization and Interoperability:

a. Modeling technique used
b. Total cost
c. Discussion

Field 15. Reliability:

a. Modeling technique used
b. Total cost
c. Discussion

Field 16. Survivability:

a. Modeling technique used
b. Total cost
c. Discussion

Field 17. Availability:

a. Modeling technique used
b. Total cost
c. Discussion

Field 18. Risks:

a. Modeling technique used
b. Total cost
c. Discussion

Field 19. Total Cost

SCREEN 15

DOCUMENT RESULTS
(303.2.2.5)

END ITEM NAME:
NOMENCLATURE:
PART NUMBER:

Field 1. Identify new system/equipment

Field 2. Purpose

Field 3. Support System Control Number:

a.
b.
c.

Field 4. Discussion

Field 5. Recommendations

ANNEX D

—

LSA SUBTASK 303.2.2
VERT BATCH INPUT FILES

VERT APPLICATION METHODOLOGY

BACKGROUND:

Venture Evaluation and Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows a systematic planning and control of programs and enables managers to find solutions to real life managerial problems.

The terms of the APJ contract require the provision of batch files for each of the VERT networks associated with the various Data Flow Diagrams in the APJ 966 projects.

APJ has been successful in adopting a method for the creation of these networks using the existing EXCELERATOR software package and establishing a naming convention compatible with that used in the Data Flow Diagrams. To do this APJ has made use of the PC model of VERT. A Structured Analysis project was used for this purpose. The prototype VERT network structure was made for one top level and one lower level data flow diagram.

The PC model of VERT has certain limitations built into it. To overcome some of these limitations, certain conventions were used to create the input files. To maintain full generality a set of "dummy" default values were established. The model allows the user to alter the default values of time, cost, and performance to satisfy their specific requirements.

METHODOLOGY:

The basic symbols used to structure the network are :

(i) **SQUARES** - to indicate NODES. These are decision points in the project, or points beyond which the project cannot proceed unless certain criteria are met. There are two types of nodes, one which supports input operations and, the second type which supports output operations.

(ii) **LINES** - to indicate ARCS which are activities that have time, cost, and performance criteria associated with them.

In practice, however, both the arcs and nodes are similar, in that both have time, cost, and performance criteria associated with them. The arcs have a primary and a cumulative set of time, cost, and performance criteria whereas the nodes have only a single cumulative set.

(iii) **NAMING CONVENTIONS** - Efforts have been made to keep the naming convention as compatible as possible to the Data Flow Diagrams. The naming convention used is displayed below.

NODES - All nodes are prefixed with the letter **N**. The individual Nodes are identified by a number and a letter. The number refers to the number of the node within the diagram and the letter refers to the diagram number in the project. In the event that a node has been referenced in an earlier diagram they also carry the number of the node in the earlier diagram as a prefix to the individual node number.

N2.4A

N - All nodes are prefixed with the letter **N**

2 - Gives the number of the node it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case it refers to node **N2** of the top level diagram.

4 - Gives the number of the node in the present data flow diagram.

A - The nodes in each subsequent explosion are allotted an alphabetical suffix indicating the number of the explosion diagram in the particular project. In this case, it is the first lower level diagram within the project.

ARCS - All arcs are prefixed with either the letter **C** or **E**. The individual Arcs are identified by two numbers. The first number refers to the number of the arc within the diagram and the second number refers to the number of the diagram within the project. In the event that an arc has been referenced in an earlier diagram they also carry the number of the arc in the earlier diagram as a prefix to the individual arc number. The arcs which are identified by the letter **E** have direct reference to a process in the corresponding data flow diagram and as such are named the same as the process itself.

C3.3.8.4 **E12.1A2**

C - All arcs are prefixed with the letter **C**. In some cases, however, arcs carry a prefix of **E**. These particular arcs correspond to a process within the data flow diagram and are thus named the same as the process itself.

3.3 - Gives the number of the arc it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case, it refers to arc number 3 in lower level diagram #3 within the project.

8.4 - Indicates that this particular arc is the #8 arc in the #4 lower level diagram of the project.

BATCH FILES

INPUT FILES - The input file names are given the extension *.IN.
OUTPUT FILES - The simulation output files are given the extension *.OU.
PRINT FILES - The print files have been given the extension *.PR.

(This would allow subsequent updates of the input files to be numbered as IN1...,OU1...,PR1... etc.)

DEFAULT SETTINGS:

Control Record:

(i) The output option selected is "0" which provides a detailed listing, and high level of summary information.

(ii) The input record listing option selected is "0" which prints all input records.

(iii) The composite terminal node output option selected is "16" which assumes family mode and intrafamily transfer of histogram data.

(iv) The number of iterations used are "10" in the demonstration model to facilitate operation in the debug mode if required.

(v) The composite node name and the network name are left as blanks.

(vi) In the run identification the name of the corresponding Data Flow Diagram is used as identification for the network description.

Arc Records:

(i) For each of the arcs the following records are provided:
(a) Master Arc Record
(b) Time Distribution Satellite
(c) Cost Distribution Satellite
(d) Performance Distribution Satellite

(ii) The Distribution Satellite Records are created to provide a uniform statistical distribution.

(iii) The default values used for the minimum and maximum in each criteria are:

TIME	10.0	20.0
COST	10.0	100.0
PERFORMANCE	10.0	50.0

Node Records:

(i) Input Logic - The input logic for the nodes are either "INITIAL" or "AND".

(ii) Output Logic - The output logic has been defaulted to "AND" or "TERMINAL".

(iii) The output option indicator and the storage option indicator are defaulted to read "0".

(iv) The node description has also been left blank.

(It is again noted that the user can change the default values to desired values as identified by the particular requirement and applications.)

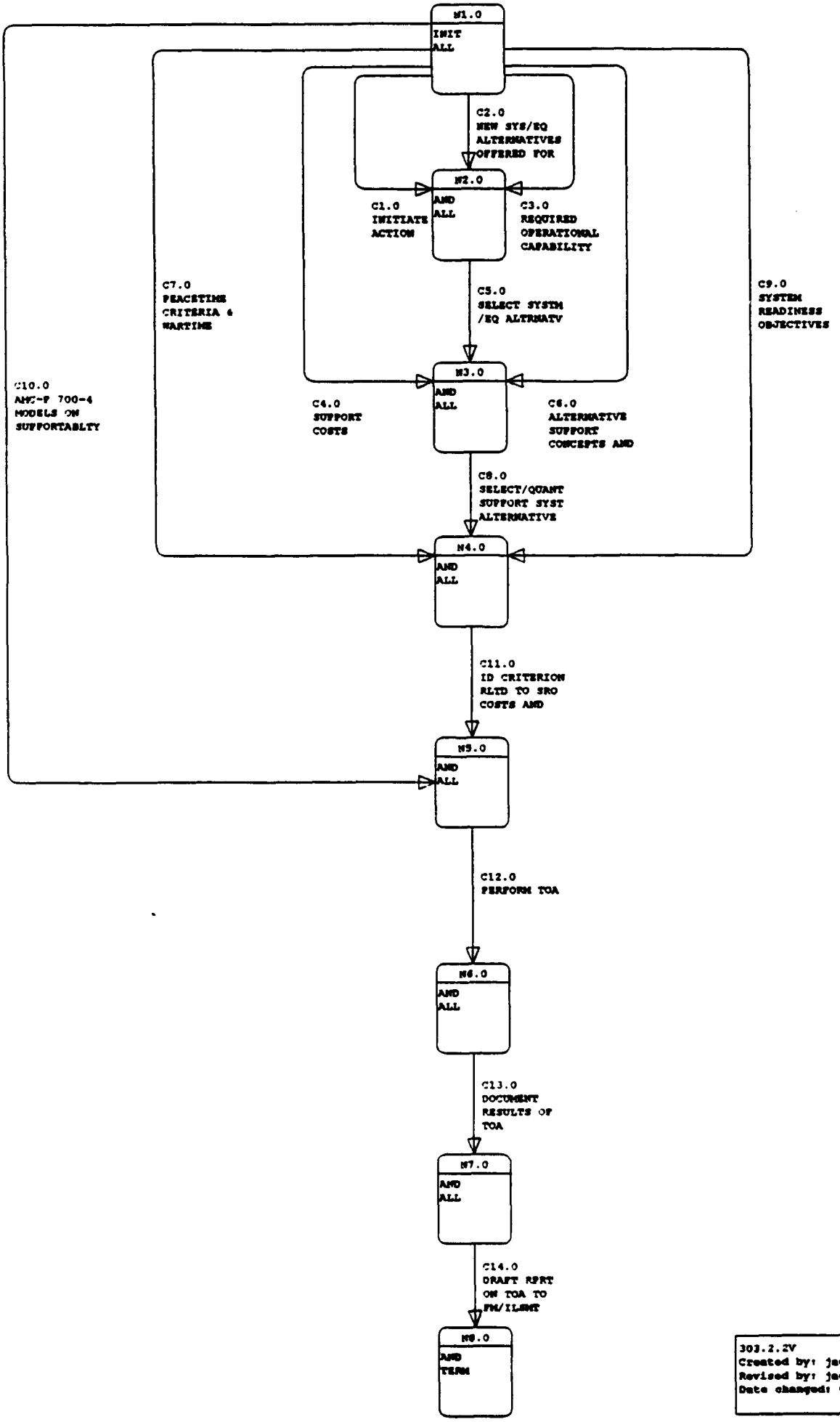
DOCUMENTATION:

With every project report APJ will be providing the following documents relating to the VERT:

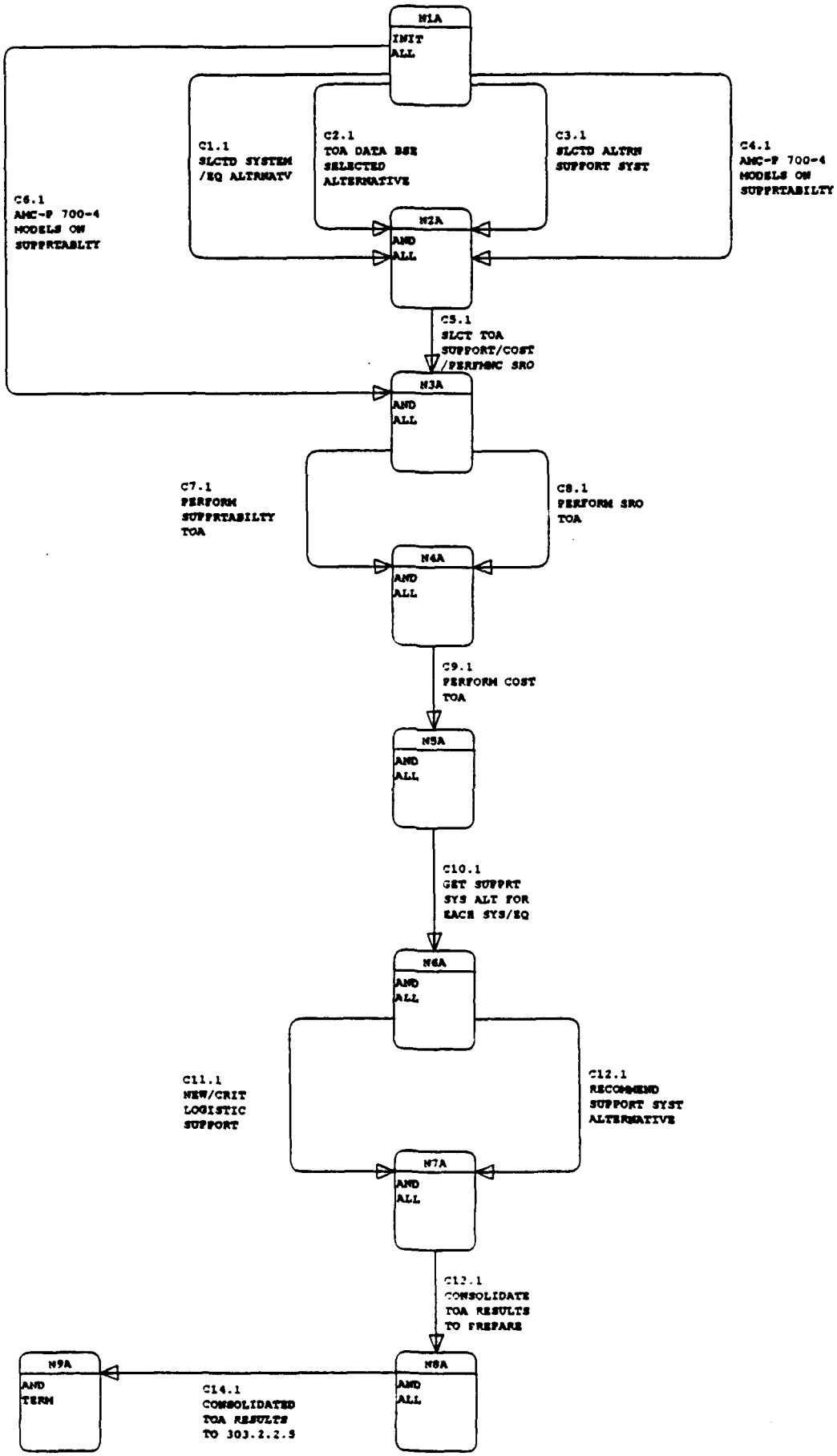
(i) A VERT network diagram corresponding to a particular data flow diagram.

(ii) A print out of the VERT network inputs for the particular data flow diagrams.

(iii) A floppy disc containing sample input, print, and the simulation output files for the default VERT network.


N1.0
INIT
ALL
C2.0
NEW SYS/EQ
ALTERNATIVES
OFFERED FOR
N2.0
AND
ALL
C1.0
INITIATE
ACTION
C3.0
REQUIRED
OPERATIONAL
CAPABILITY
C7.0
PEACETIME
CRITERIA &
WARTIME
C5.0
SELECT SYSTM
/EQ ALTRNATV
C9.0
SYSTEM
READINESS
OBJECTIVES
C10.0
AMC-P 700-4
MODELS ON
SUPPORTABLTY
N3.0
AND
ALL
C4.0
SUPPORT
COSTS
C6.0
ALTERNATIVE
SUPPORT
CONCEPTS AND
C8.0
SELECT/QUANT
SUPPORT SYST
ALTERNATIVE
N4.0
AND
ALL
C11.0
ID CRITERION
RLTD TO SRO
COSTS AND
N5.0
AND
ALL
C12.0
PERFORM TOA
N6.0
AND
ALL
C13.0
DOCUMENT
RESULTS OF
TOA
N7.0
AND
ALL
C14.0
DRAFT RPRT
ON TOA TO
PM/ILSMT
N8.0
AND
TERM
303.2.2V
Created by: jack
Revised by: jack
Date changed: 06-NOV-90

```
1'      N E W   N E T W O R K              PAGE  1
              1         2         3         4         5         6         7         8
     12345678901234567890123456789012345678901234567890123456789012345678901234567890
  1. 0016  10                 SUPPORTABILITY ALTERNATIVE TRADE-OFF ANALYSIS
              +         +         +         +         +         +         +         +
  2. C1.0    N1.0    N2.0     1.0 INITIATE ACTION
  3. C1.0    DTIME 1         2      10.0      20.0
  4. C1.0    DCOST 1         2      10.0     100.0
  5. C1.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  6. C2.0    N1.0    N2.0     1.0 NEW SYSTEM/EQUIP ALTERNATIVES OFFERED FOR ANALYSIS
  7. C2.0    DTIME 1         2      10.0      20.0
  8. C2.0    DCOST 1         2      10.0     100.0
  9. C2.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 10. C3.0    N1.0    N2.0     1.0 REQUIRED OPERATIONAL CAPABILITY
 11. C3.0    DTIME 1         2      10.0      20.0
 12. C3.0    DCOST 1         2      10.0     100.0
 13. C3.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 14. C4.0    N1.0    N3.0     1.0 SUPPORTABILITY COSTS
 15. C4.0    DTIME 1         2      10.0      20.0
 16. C4.0    DCOST 1         2      10.0     100.0
 17. C4.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 18. C5.0    N2.0    N3.0     1.0 SELECT SYSTEM/EQUIPMENT ALTERNATIVE
 19. C5.0    DTIME 1         2      10.0      20.0
 20. C5.0    DCOST 1         2      10.0     100.0
 21. C5.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 22. C6.0    N1.0    N3.0     1.0 ALTERNATIVE SUPPORT CONCEPTS AND PLANS
 23. C6.0    DTIME 1         2      10.0      20.0
 24. C6.0    DCOST 1         2      10.0     100.0
 25. C6.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 26. C7.0    N1.0    N4.0     1.0 GET PEACETIME CRITERIA AND WARTIME ENVIRONMENT DATA
 27. C7.0    DTIME 1         2      10.0      20.0
 28. C7.0    DCOST 1         2      10.0     100.0
 29. C7.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 30. C8.0    N3.0    N4.0     1.0 SELECT & QUANTIFY SUPPORTABILITY SYSTEM ALTERNATIVE
 31. C8.0    DTIME 1         2      10.0      20.0
 32. C8.0    DCOST 1         2      10.0     100.0
 33. C8.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 34. C9.0    N1.0    N4.0     1.0 GET SYSTEM READINESS OBJECTIVES
 35. C9.0    DTIME 1         2      10.0      20.0
 36. C9.0    DCOST 1         2      10.0     100.0
 37. C9.0    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 38. C10.0   N1.0    N5.0     1.0 GET DATA FROM AMC-P 700-4, MODELS ON SUPPORTABILITY
 39. C10.0   DTIME 1         2      10.0      20.0
 40. C10.0   DCOST 1         2      10.0     100.0
 41. C10.0   DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
 42. C11.0   N4.0    N5.0     1.0 IDNTFY CRITERION RLTD TO SRO COSTS & SUPPORTABILITY
 43. C11.0   DTIME 1         2      10.0      20.0
 44. C11.0   DCOST 1         2      10.0     100.0
 45. C11.0   DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
```



303.2.2.4AV
Created by: jack
Revised by: jack
Date changed: 07-NOV-90

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          1        2        3        4        5        6        7        8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
1       N E W   N E T W O R K                PAGE  2
          1        2        3        4        5        6        7        8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
   46. C12.0   N5.0    N6.0     1.0 PERFORM TRADE-OFF ANALYSIS
   47. C12.0   DTIME 1         2      10.0      20.0
   48. C12.0   DCOST 1         2      10.0     100.0
   49. C12.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   50. C13.0   N6.0    N7.0     1.0 DOCUMENT RESULTS OF TRADE-OFF ANALYSIS
   51. C13.0   DTIME 1         2      10.0      20.0
   52. C13.0   DCOST 1         2      10.0     100.0
   53. C13.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   54. C14.0   N7.0    N8.0     1.0 SEND DRAFT REPORT ON TRADE-OFF ANALYSIS TO PM/ILSMT
   55. C14.0   DTIME 1         2      10.0      20.0
   56. C14.0   DCOST 1         2      10.0     100.0
   57. C14.0   DPERF 1         2      10.0      50.0
               +        +        +        +        +        +        +        +
   58. ENDARC
               +        +        +        +        +        +        +        +
   59. N1.0    1  2 0 0
               +        +        +        +        +        +        +        +
   60. N2.0    2  2 0 0
               +        +        +        +        +        +        +        +
   61. N3.0    2  2 0 0
               +        +        +        +        +        +        +        +
   62. N4.0    2  2 0 0
               +        +        +        +        +        +        +        +
   63. N5.0    2  2 0 0
               +        +        +        +        +        +        +        +
   64. N6.0    2  2 0 0
               +        +        +        +        +        +        +        +
   65. N7.0    2  2 0 0
               +        +        +        +        +        +        +        +
   66. N8.0    2  1 0 0
               +        +        +        +        +        +        +        +
   67. ENDNODE
          1        2        3        4        5        6        7        8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
```

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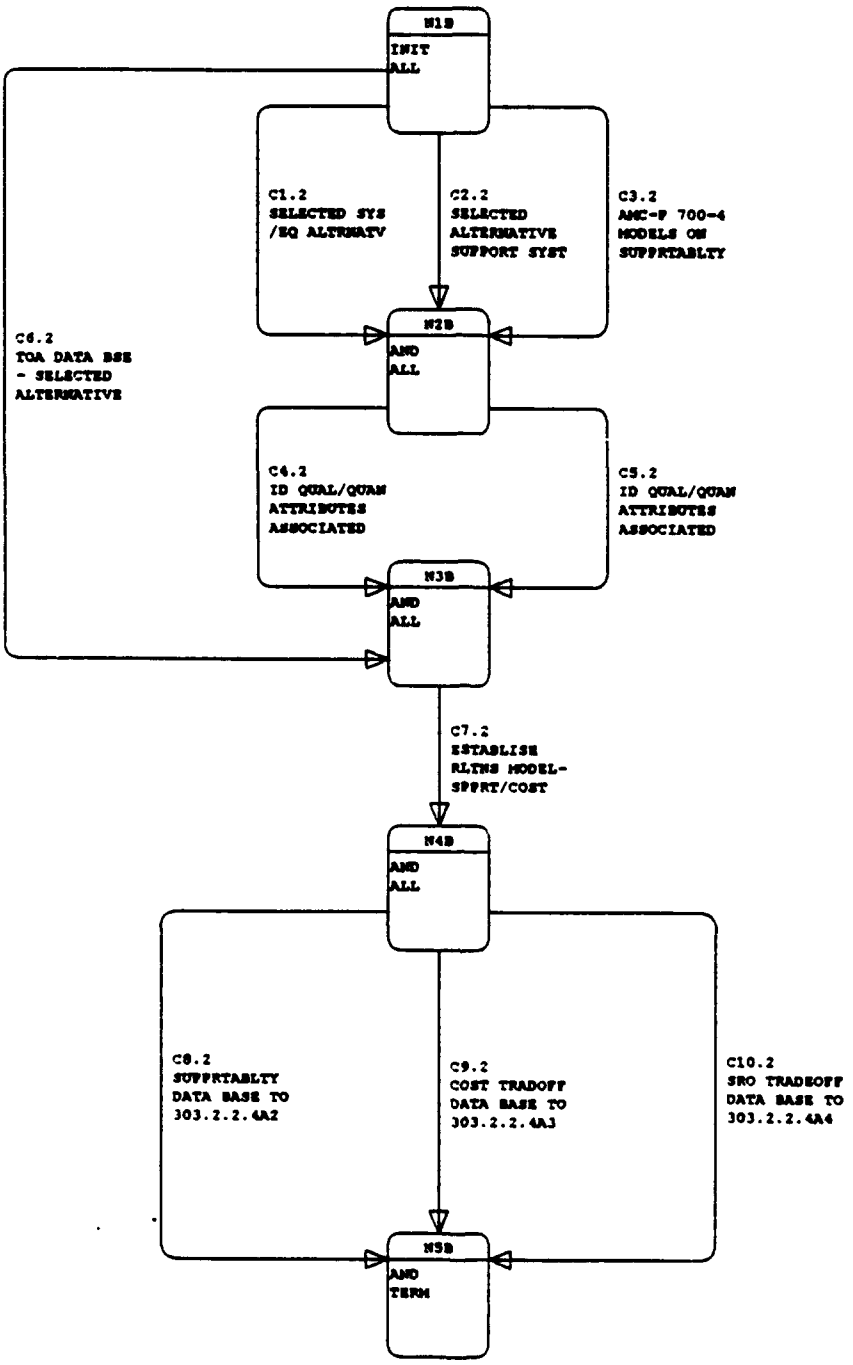
1        N E W   N E T W O R K              PAGE  1
                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
    1. 0016  10                ALTERNATIVES TRADE-OFF ANALYSIS
                +         +         +         +         +         +         +         +
    2. C1.1    N1A     N2A      1.0 GET SELECTED SYSTEM/EQUIPMENT ALTERNATIVE
    3. C1.1    DTIME 1         2      10.0      20.0
    4. C1.1    DCOST 1         2      10.0     100.0
    5. C1.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    6. C2.1    N1A     N2A      1.0 GET TRADE-OFF ANALYSIS DATABASE FOR SLCTD ALTRNATIV
    7. C2.1    DTIME 1         2      10.0      20.0
    8. C2.1    DCOST 1         2      10.0     100.0
    9. C2.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   10. C3.1    N1A     N2A      1.0 GET SELECTED ALTERNATIVE SUPPORT SYSTEM CONCEPTS
   11. C3.1    DTIME 1         2      10.0      20.0
   12. C3.1    DCOST 1         2      10.0     100.0
   13. C3.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   14. C4.1    N1A     N2A      1.0 GET DATA FROM AMC-P 700-4 MODELS ON SUPPORTABILITY
   15. C4.1    DTIME 1         2      10.0      20.0
   16. C4.1    DCOST 1         2      10.0     100.0
   17. C4.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   18. C5.1    N2A     N3A      1.0 SLCT TOA SUPPORT MODEL FOR COST/PERFORMANCE/SRO
   19. C5.1    DTIME 1         2      10.0      20.0
   20. C5.1    DCOST 1         2      10.0     100.0
   21. C5.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   22. C6.1    N1A     N3A      1.0 GET DATA FROM AMC-P 700-4, MODELS ON SUPPORTABILITY
   23. C6.1    DTIME 1         2      10.0      20.0
   24. C6.1    DCOST 1         2      10.0     100.0
   25. C6.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   26. C7.1    N3A     N4A      1.0 PERFORM SUPPORTABILITY TRADE-OFF ANALYSIS
   27. C7.1    DTIME 1         2      10.0      20.0
   28. C7.1    DCOST 1         2      10.0     100.0
   29. C7.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   30. C8.1    N3A     N4A      1.0 PERFORM SRO TRADE-OFF ANALYSIS
   31. C8.1    DTIME 1         2      10.0      20.0
   32. C8.1    DCOST 1         2      10.0     100.0
   33. C8.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   34. C9.1    N4A     N5A      1.0 PERFORM COST TRADE-OFF ANALYSIS
   35. C9.1    DTIME 1         2      10.0      20.0
   36. C9.1    DCOST 1         2      10.0     100.0
   37. C9.1    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   38. C10.1   N5A     N6A      1.0 OPTIMIZE SPPRT SYS ALTRNATV FOR EACH SLCTD SYS/EQ
   39. C10.1   DTIME 1         2      10.0      20.0
   40. C10.1   DCOST 1         2      10.0     100.0
   41. C10.1   DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   42. C11.1   N6A     N7A      1.0 IDNTFY NEW/CRITICAL LOGISTIC SUPPORT REQUIREMENTS
   43. C11.1   DTIME 1         2      10.0      20.0
   44. C11.1   DCOST 1         2      10.0     100.0
   45. C11.1   DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
```

```
                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
1        N E W   N E T W O R K                PAGE  2
                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
   46. C12.1   N6A     N7A      1.0 RECOMMEND SUPPORT SYSTEM ALTERNATIVE
   47. C12.1   DTIME 1         2      10.0      20.0
   48. C12.1   DCOST 1         2      10.0     100.0
   49. C12.1   DPERF 1         2      10.0      50.0
               +         +         +         +         +         +         +         +
   50. C13.1   N7A     N8A      1.0 CONSOLIDATE TOA RESULTS TO PREPARE FOR FINAL REPORT
   51. C13.1   DTIME 1         2      10.0      20.0
   52. C13.1   DCOST 1         2      10.0     100.0
   53. C13.1   DPERF 1         2      10.0      50.0
               +         +         +         +         +         +         +         +
   54. C14.1   N8A     N9A      1.0 SEND CONSOLIDATED RESULTS OF TOA TO 303.2.2.5
   55. C14.1   DTIME 1         2      10.0      20.0
   56. C14.1   DCOST 1         2      10.0     100.0
   57. C14.1   DPERF 1         2      10.0      50.0
               +         +         +         +         +         +         +         +
   58. ENDARC
               +         +         +         +         +         +         +         +
   59. N1A     1  2 0 0
               +         +         +         +         +         +         +         +
   60. N2A     2  2 0 0
               +         +         +         +         +         +         +         +
   61. N3A     2  2 0 0
               +         +         +         +         +         +         +         +
   62. N4A     2  2 0 0
               +         +         +         +         +         +         +         +
   63. N5A     2  2 0 0
               +         +         +         +         +         +         +         +
   64. N6A     2  2 0 0
               +         +         +         +         +         +         +         +
   65. N7A     2  2 0 0
               +         +         +         +         +         +         +         +
   66. N8A     2  2 0 0
               +         +         +         +         +         +         +         +
   67. N9A     2  1 0 0
               +         +         +         +         +         +         +         +
   68. ENDNODE
                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
```



303.2.2.4A1SV
Created by: jack
Revised by: jack
Date changed: 06-NOV-90

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1'        N E W   N E T W O R K              PAGE  1
                1         2         3         4         5         6         7         8
        12345678901234567890123456789012345678901234567890123456789012345678901234567890
     1. 0016  10                SELECT T-O SUPPORT MODEL FOR COST/PERFORMANCE & SRO ANAL
                +         +         +         +         +         +         +         +
     2. C1.2    N1B     N2B      1.0 GET THE SELECTED SYSTEM/EQUIPMENT ALTERNATIVE
     3. C1.2    DTIME 1         2      10.0      20.0
     4. C1.2    DCOST 1         2      10.0     100.0
     5. C1.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
     6. C2.2    N1B     N2B      1.0 GET SELECTED ALTERNATIVE SUPPORT SYSTEM CONCEPTS
     7. C2.2    DTIME 1         2      10.0      20.0
     8. C2.2    DCOST 1         2      10.0     100.0
     9. C2.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    10. C3.2    N1B     N2B      1.0 GET DATA FROM AMC-P 700-4, MODELS ON SUPPORTABILITY
    11. C3.2    DTIME 1         2      10.0      20.0
    12. C3.2    DCOST 1         2      10.0     100.0
    13. C3.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    14. C4.2    N2B     N3B      1.0 IDNTFY QUAL/QUANT ATTRIBUTES ASSOCIATED WITH SYS/EQ
    15. C4.2    DTIME 1         2      10.0      20.0
    16. C4.2    DCOST 1         2      10.0     100.0
    17. C4.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    18. C5.2    N2B     N3B      1.0 IDNTFY QUAL/QUAN ATTRIBS ASSOC. WITH ALT. SPPRT SYS
    19. C5.2    DTIME 1         2      10.0      20.0
    20. C5.2    DCOST 1         2      10.0     100.0
    21. C5.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    22. C6.2    N1B     N3B      1.0 GET TOA DATABASE FOR SELECTED ALTERNATIVE
    23. C6.2    DTIME 1         2      10.0      20.0
    24. C6.2    DCOST 1         2      10.0     100.0
    25. C6.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    26. C7.2    N3B     N4B      1.0 ESTABLISH MODEL RELATIONSHIPS FOR SPPRT/COST/SRO
    27. C7.2    DTIME 1         2      10.0      20.0
    28. C7.2    DCOST 1         2      10.0     100.0
    29. C7.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    30. C8.2    N4B     N5B      1.0 SEND SUPPORTABILITY T-O DATABASE TO 303.2.2.4A2
    31. C8.2    DTIME 1         2      10.0      20.0
    32. C8.2    DCOST 1         2      10.0     100.0
    33. C8.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    34. C9.2    N4B     N5B      1.0 SEND COST T-O DATABASE TO 303.2.2.4A3
    35. C9.2    DTIME 1         2      10.0      20.0
    36. C9.2    DCOST 1         2      10.0     100.0
    37. C9.2    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    38. C10.2   N4B     N5B      1.0 SEND SRO T-O DATABASE TO 303.2.2.4A4
    39. C10.2   DTIME 1         2      10.0      20.0
    40. C10.2   DCOST 1         2      10.0     100.0
    41. C10.2   DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    42. ENDARC
                +         +         +         +         +         +         +         +
    43. N1B     1  2 0 0
                +         +         +         +         +         +         +         +
                1         2         3         4         5         6         7         8
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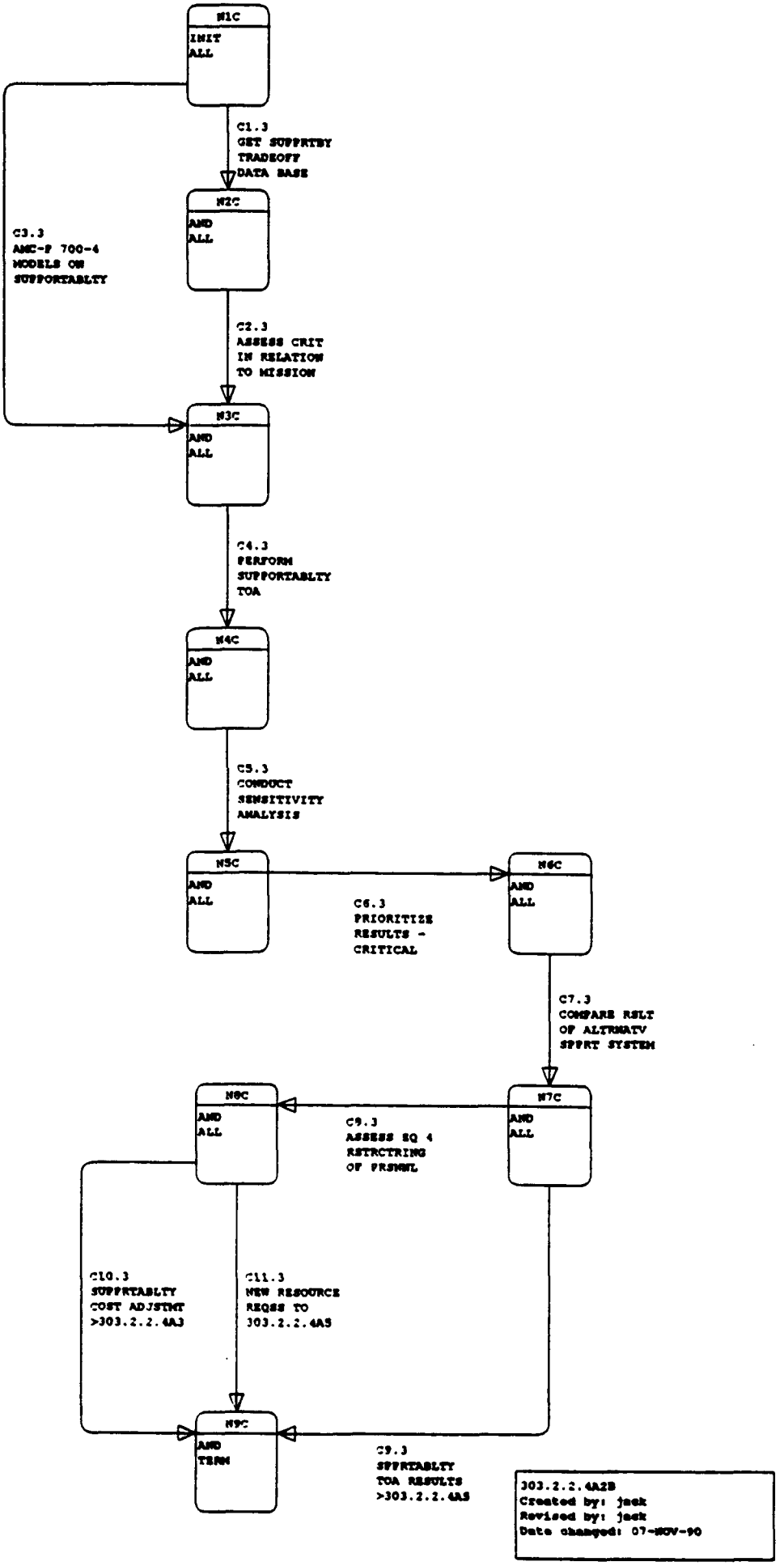
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
1       N E W   N E T W O R K                PAGE  2
              1         2         3         4         5         6         7         8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
   44. N2B    2  2 0 0
               +         +         +         +         +         +         +         +
   45. N3B    2  2 0 0
               +         +         +         +         +         +         +         +
   46. N4B    2  2 0 0
               +         +         +         +         +         +         +         +
   47. N5B    2  1 0 0
               +         +         +         +         +         +         +         +
   48. ENDNODE
              1         2         3         4         5         6         7         8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
```


N1C
INIT
ALL
C1.3
GET SUPPRTBY
TRADEOFF
DATA BASE
N2C
AND
ALL
C3.3
AMC-P 700-4
MODELS ON
SUPPORTABLTY
C2.3
ASSESS CRIT
IN RELATION
TO MISSION
N3C
AND
ALL
C4.3
PERFORM
SUPPORTABLTY
TOA
N4C
AND
ALL
C5.3
CONDUCT
SENSITIVITY
ANALYSIS
N5C
AND
ALL
C6.3
PRIORITIZE
RESULTS -
CRITICAL
N6C
AND
ALL
C7.3
COMPARE RSLT
OF ALTRNATV
SPPRT SYSTEM
N7C
AND
ALL
C8.3
ASSESS EQ 4
RSTRCTRING
OF PRSNNL
N8C
AND
ALL
C10.3
SUPPRTABLTY
COST ADJSTMT
>303.2.2.4A3
C11.3
NEW RESOURCE
REQSS TO
303.2.2.4A5
N9C
AND
TERM
C9.3
SPPRTABLTY
TOA RESULTS
>303.2.2.4A5
303.2.2.4A2B
Created by: jack
Revised by: jack
Date changed: 07-NOV-90

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1'      N E W   N E T W O R K              PAGE  1
              1         2         3         4         5         6         7         8
      12345678901234567890123456789012345678901234567890123456789012345678901234567890
   1. 0016  10                PERFORM SUPPORTABILITY TRADE-OFF ANALYSIS
              +         +         +         +         +         +         +         +
   2. C1.3    N1C     N2C      1.0 GET SUPPORTABILITY TRADE-OFF DATABASE
   3. C1.3    DTIME 1         2      10.0      20.0
   4. C1.3    DCOST 1         2      10.0     100.0
   5. C1.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
   6. C2.3    N2C     N3C      1.0 ASSESS CRITICALITY/RELATIONSHIPS TO MISSION FUNCTNS
   7. C2.3    DTIME 1         2      10.0      20.0
   8. C2.3    DCOST 1         2      10.0     100.0
   9. C2.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  10. C3.3    N1C     N3C      1.0 GET DATA FROM AMC-P 700-4, MODELS ON SUPPORTABILITY
  11. C3.3    DTIME 1         2      10.0      20.0
  12. C3.3    DCOST 1         2      10.0     100.0
  13. C3.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  14. C4.3    N3C     N4C      1.0 PERFORM SUPPORTABILITY TRADE-OFF ANALYSIS
  15. C4.3    DTIME 1         2      10.0      20.0
  16. C4.3    DCOST 1         2      10.0     100.0
  17. C4.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  18. C5.3    N4C     N5C      1.0 CONDUCT SENSITIVITY ANALYSIS
  19. C5.3    DTIME 1         2      10.0      20.0
  20. C5.3    DCOST 1         2      10.0     100.0
  21. C5.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  22. C6.3    N5C     N6C      1.0 PRIORITIZE RESULTS - CRITICALALITY/CHARACTERISTICS
  23. C6.3    DTIME 1         2      10.0      20.0
  24. C6.3    DCOST 1         2      10.0     100.0
  25. C6.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  26. C7.3    N6C     N7C      1.0 COMPARE RESULTS OF ALTERNATIVE SUPPORT SYS EVALUATN
  27. C7.3    DTIME 1         2      10.0      20.0
  28. C7.3    DCOST 1         2      10.0     100.0
  29. C7.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  30. C8.3    N7C     N8C      1.0 ASSESS EQUIPMENT FOR RESTRCTRNG OF PRSNNL CLASSFCTN
  31. C8.3    DTIME 1         2      10.0      20.0
  32. C8.3    DCOST 1         2      10.0     100.0
  33. C8.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  34. C9.3    N7C     N9C      1.0 SEND SUPPORTABILITY T-O RESULTS TO 303.2.2.4A5
  35. C9.3    DTIME 1         2      10.0      20.0
  36. C9.3    DCOST 1         2      10.0     100.0
  37. C9.3    DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  38. C10.3   N8C     N9C      1.0 SEND SUPPORTABILITY COST ADJUSMMENTS TO 303.2.2.4A3
  39. C10.3   DTIME 1         2      10.0      20.0
  40. C10.3   DCOST 1         2      10.0     100.0
  41. C10.3   DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
  42. C11.3   N8C     N9C      1.0 SEND NEW RESOURCE REQUIREMENTS TO 303.2.2.4A5
  43. C11.3   DTIME 1         2      10.0      20.0
  44. C11.3   DCOST 1         2      10.0     100.0
  45. C11.3   DPERF 1         2      10.0      50.0
              +         +         +         +         +         +         +         +
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                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
1        N E W   N E T W O R K              PAGE  2
                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
   46. ENDARC
                +         +         +         +         +         +         +         +
   47. N1C      1  2 0 0
                +         +         +         +         +         +         +         +
   48. N2C      2  2 0 0
                +         +         +         +         +         +         +         +
   49. N3C      2  2 0 0
                +         +         +         +         +         +         +         +
   50. N4C      2  2 0 0
                +         +         +         +         +         +         +         +
   51. N5C      2  2 0 0
                +         +         +         +         +         +         +         +
   52. N6C      2  2 0 0
                +         +         +         +         +         +         +         +
   53. N7C      2  2 0 0
                +         +         +         +         +         +         +         +
   54. N8C      2  2 0 0
                +         +         +         +         +         +         +         +
   55. N9C      2  1 0 0
                +         +         +         +         +         +         +         +
   56. ENDNODE
                1         2         3         4         5         6         7         8
       12345678901234567890123456789012345678901234567890123456789012345678901234567890
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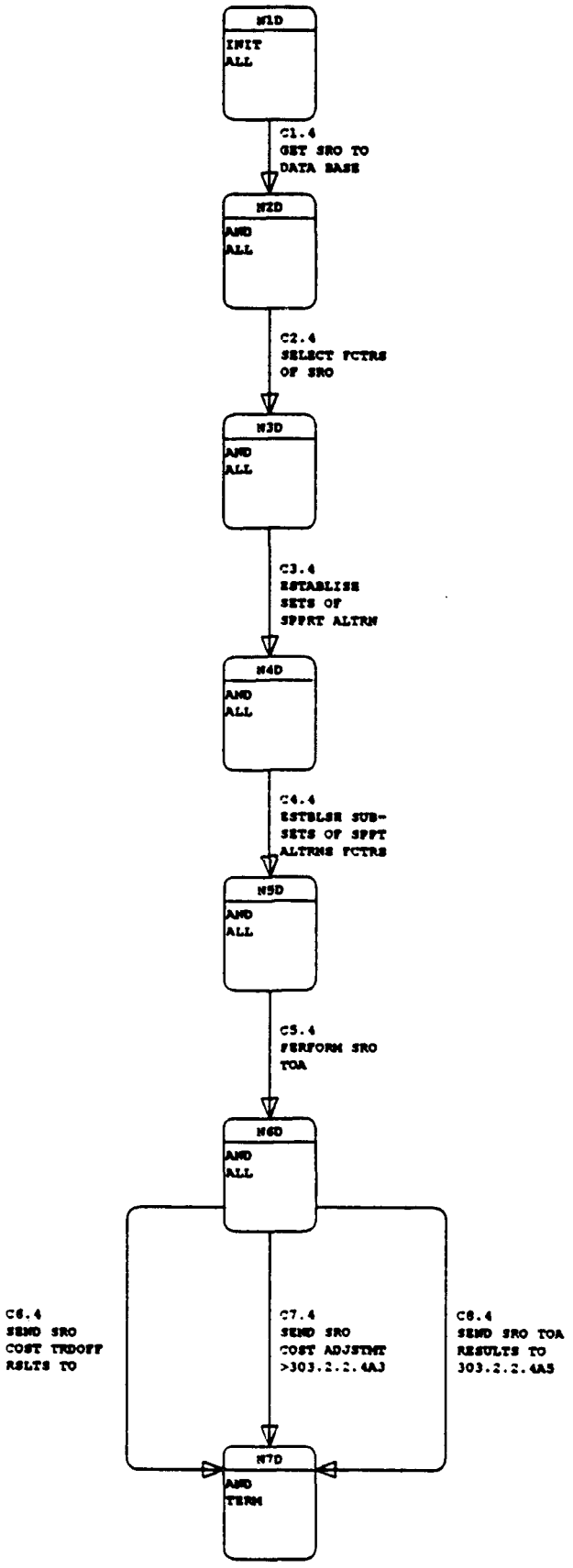

303.2.2.4A4BV
Created by: jack
Revised by: jack
Date changed: 06-NOV-90

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1'      N E W   N E T W O R K              PAGE  1
            1         2         3         4         5         6         7         8
   12345678901234567890123456789012345678901234567890123456789012345678901234567890
 1. 0016  10                PERFORM SRO TRADE-OFF ANALYSIS
            +         +         +         +         +         +         +         +
 2. C1.4    N1D     N2D      1.0 GET SRO T-O DATABASE
 3. C1.4    DTIME 1         2      10.0      20.0
 4. C1.4    DCOST 1         2      10.0     100.0
 5. C1.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
 6. C2.4    N2D     N3D      1.0 SELECT FACTORS OF SRO
 7. C2.4    DTIME 1         2      10.0      20.0
 8. C2.4    DCOST 1         2      10.0     100.0
 9. C2.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
10. C3.4    N3D     N4D      1.0 ESTABLISH SETS OF SUPPORT ALTERNATIVE FACTORS
11. C3.4    DTIME 1         2      10.0      20.0
12. C3.4    DCOST 1         2      10.0     100.0
13. C3.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
14. C4.4    N4D     N5D      1.0 ESTABLISH SUB-SETS OF SUPPORT ALTERNATIVE FACTORS
15. C4.4    DTIME 1         2      10.0      20.0
16. C4.4    DCOST 1         2      10.0     100.0
17. C4.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
18. C5.4    N5D     N6D      1.0 PERFORM SRO TRADE-OFF ANALYSIS
19. C5.4    DTIME 1         2      10.0      20.0
20. C5.4    DCOST 1         2      10.0     100.0
21. C5.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
22. C6.4    N6D     N7D      1.0 SEND SRO COST TRADE-OFF RESULTS TO 303.2.2.4A3
23. C6.4    DTIME 1         2      10.0      20.0
24. C6.4    DCOST 1         2      10.0     100.0
25. C6.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
26. C7.4    N6D     N7D      1.0 SEND SRO COST ADJUSTMENTS TO 303.2.2.4A3
27. C7.4    DTIME 1         2      10.0      20.0
28. C7.4    DCOST 1         2      10.0     100.0
29. C7.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
30. C8.4    N6D     N7D      1.0 SEND SRO TRADE-OFF ANALYSIS RESULTS TO 303.2.2.4A5
31. C8.4    DTIME 1         2      10.0      20.0
32. C8.4    DCOST 1         2      10.0     100.0
33. C8.4    DPERF 1         2      10.0      50.0
            +         +         +         +         +         +         +         +
34. ENDARC
            +         +         +         +         +         +         +         +
35. N1D     1  2 0 0
            +         +         +         +         +         +         +         +
36. N2D     2  2 0 0
            +         +         +         +         +         +         +         +
37. N3D     2  2 0 0
            +         +         +         +         +         +         +         +
38. N4D     2  2 0 0
            +         +         +         +         +         +         +         +
39. N5D     2  2 0 0
            +         +         +         +         +         +         +         +
40. N6D     2  2 0 0
            +         +         +         +         +         +         +         +
            1         2         3         4         5         6         7         8
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   41. N7D     2  1 0 0
               +         +         +         +         +         +         +         +
   42. ENDNODE
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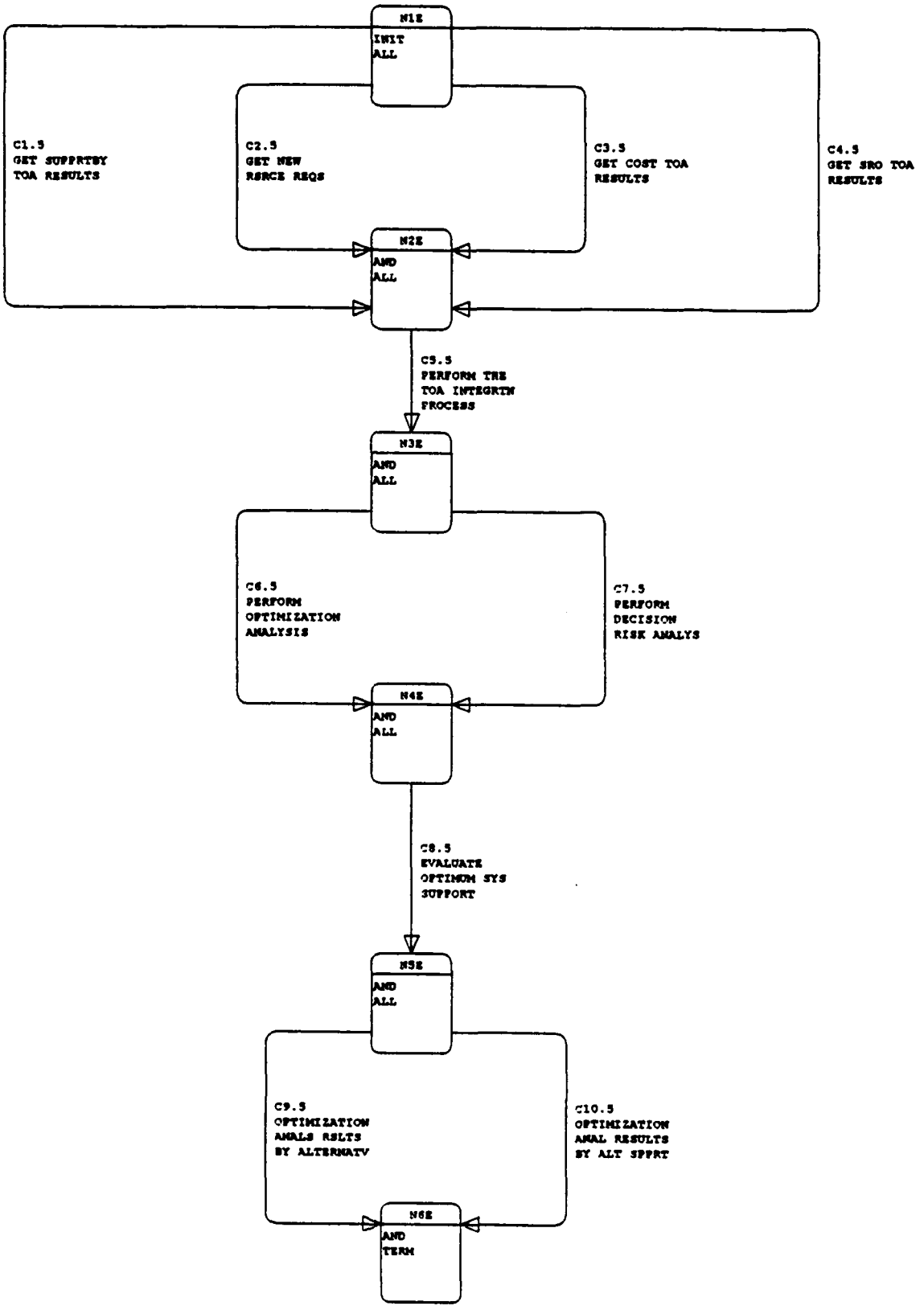

303.2.2.4ASHV
Created by: jack
Revised by: jack
Date changed: 06-NOV-90

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                1         2         3         4         5         6         7         8
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    1. 0016  10                OPTIMIZE SPPRT SYST ALTERNATIVE FOR EACH SYS/EQUIP ALTRN
                +         +         +         +         +         +         +         +
    2. C1.5    N1E     N2E      1.0 GET SUPPORTABILITY TRADE-OFF ANALYSIS RESULTS
    3. C1.5    DTIME 1         2      10.0      20.0
    4. C1.5    DCOST 1         2      10.0     100.0
    5. C1.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
    6. C2.5    N1E     N2E      1.0 GET NEW RESOURCE REQUIREMENTS
    7. C2.5    DTIME 1         2      10.0      20.0
    8. C2.5    DCOST 1         2      10.0     100.0
    9. C2.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   10. C3.5    N1E     N2E      1.0 GET COST TRADE-OFF ANALYSIS RESULTS
   11. C3.5    DTIME 1         2      10.0      20.0
   12. C3.5    DCOST 1         2      10.0     100.0
   13. C3.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   14. C4.5    N1E     N2E      1.0 GET SRO TRADE-OFF ANALYSIS RESULTS
   15. C4.5    DTIME 1         2      10.0      20.0
   16. C4.5    DCOST 1         2      10.0     100.0
   17. C4.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   18. C5.5    N2E     N3E      1.0 PERFORM THE TRADE-OFF ANALYSIS INTEGRATION PROCESS
   19. C5.5    DTIME 1         2      10.0      20.0
   20. C5.5    DCOST 1         2      10.0     100.0
   21. C5.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   22. C6.5    N3E     N4E      1.0 PERFORM OPTIMIZATION ANALYSIS
   23. C6.5    DTIME 1         2      10.0      20.0
   24. C6.5    DCOST 1         2      10.0     100.0
   25. C6.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   26. C7.5    N3E     N4E      1.0 PERFORM DECISION RISK ANALYSIS
   27. C7.5    DTIME 1         2      10.0      20.0
   28. C7.5    DCOST 1         2      10.0     100.0
   29. C7.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   30. C8.5    N4E     N5E      1.0 EVALUATE OPTIMUM SYSTEM SUPPORT CONCEPT
   31. C8.5    DTIME 1         2      10.0      20.0
   32. C8.5    DCOST 1         2      10.0     100.0
   33. C8.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   34. C9.5    N5E     N6E      1.0 OPTIMIZATION ANALYSIS RESULTS BY ALTRN SPPRT CNCPT
   35. C9.5    DTIME 1         2      10.0      20.0
   36. C9.5    DCOST 1         2      10.0     100.0
   37. C9.5    DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   38. C10.5   N5E     N6E      1.0 OPTIMIZATION ANAL RSLTS BY ALTRN SPPRT CNCPT
   39. C10.5   DTIME 1         2      10.0      20.0
   40. C10.5   DCOST 1         2      10.0     100.0
   41. C10.5   DPERF 1         2      10.0      50.0
                +         +         +         +         +         +         +         +
   42. ENDARC
                +         +         +         +         +         +         +         +
   43. N1E     1  2 0 0
                +         +         +         +         +         +         +         +
                1         2         3         4         5         6         7         8
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1       N E W   N E T W O R K                PAGE  2
                1       2       3       4       5       6       7       8
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   44. N2E     2  2 0 0
                +       +       +       +       +       +       +       +
   45. N3E     2  2 0 0
                +       +       +       +       +       +       +       +
   46. N4E     2  2 0 0
                +       +       +       +       +       +       +       +
   47. N5E     2  2 0 0
                +       +       +       +       +       +       +       +
   48. N6E     2  1 0 0
                +       +       +       +       +       +       +       +
   49. ENDNODE
                1       2       3       4       5       6       7       8
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ANNEX E

STRUCTURED SYSTEMS ANALYSIS

Fundamentals

ANNEX E
STRUCTURED SYSTEMS ANALYSIS

Fundamentals

Structured Systems Analysis (SSA) has recently become an industry standard for generating Data Flow Diagrams (replacing "logic diagrams" or "flow charts") to aid in coordinating the functions to be performed by a computer program and its associated Inputs/Outputs (I/O). During the SSA, each set of "flow charts" can be checked by the potential user to assure that there is complete agreement on what is to be done by the program, and how it is to be accomplished. It also provides considerable flexibility for updating or changing the program.

Six basic elements (see figure 1) are used in SSA:

1. Process (PRC)
2. Data Flow (DAF)
3. Data Store (DAS)
4. External Entity (EXT)
5. Data Flow Diagram (DFD)
6. Data Dictionary (DCT)

PROCESS (Represented by a Circle):

A function or operation to be performed which can be explained by a set of instructions representing a single task, e.g., "calculate interest on a loan", "prepare a draft report". If the Process description is too complex to describe in a few steps, it may be necessary to develop a lower level description (see below).

DATA FLOW (Lines interconnecting Processes or I/Os):

Each function or Process cannot be a stand-alone in a complex network. To have any meaning in a program, each process must be initiated by a previous action and/or provided information on which to act. Furthermore, a Process must result in an output which is the input to the next logical Process. These inputs, outputs, or initiating actions are identified as Data Flows, and are represented by the Data Flow lines indicating its point of origin and the process to which it provides data.

DATA STORE (Represented by two parallel lines):

Although some Processes generate data used as input to a succeeding Process, there is often a need to "gather or collect" information from files in which it is stored. This information may come from an external source (such as a MIL-STD, Army regulation, historical experience files, etc.), or an internal source or file in which data is temporarily stored for use by succeeding processes. These Data Stores can be visualized as a "file cabinet", in which the data are stored for later retrieval).

EXTERNAL ENTITY (Represented by a Rectangle):

Each program or logical process must have an initiating action, a "point" of disposition of the results, and possible input guidance or instructions. Each of these have authorities, functions, or applications which are independent of the program Process (although required by the program Process). Thus, these activities, agencies, or facilities are considered "External Entities" to the program.

DATA FLOW DIAGRAM:

The general arrangement of the above can be readily seen. First, the circle or Process describes what has to be done; the interconnecting lines represent the Data Flows, together with the specific description of all I/Os. The Data Stores identify the source and/or file designation of a data base, and the External Entities represent those activities remote from the Process, which are the source of guidance or the recipients of the program. This combination of Processes, Data Flows, Data Stores, and External Entities constitutes a "Data Flow Diagram". The unique feature of the Data Flow Diagram (DFD) is that each process can be considered independently, permitting a change to be made in one Process without a major change in the overall program.

DATA DICTIONARY:

The Data Dictionary consists of a complete description of each of the basic elements. For the Process, it contains a step-by-step description of what has to be performed. The description of the Data Flow identifies the nomenclature of the data, a detailed description of its content, and its source. The Data Stores and External Entities are described, including possible location.

The Data Dictionary (a living document) begins with a description of the first Process and is continually built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

APPROACH TO PERFORMING STRUCTURED SYSTEM ANALYSIS:

The best approach to Structured Systems Analysis is to assume that the program consists of a series of processes, each of which are to be assigned to an inexperienced analyst. Each analyst is to be walked through the assigned process of the Program, explaining step-by-step what functions have to be performed or what actions have to be taken to accomplish the process. The analyst is also informed where the information is coming from (input Data Flow), what is to be generated by each process (output Data Flow), where the data base may to be found (Data Stores), and who to contact for guidance (External Entities).

The best way to initiate a SSA is to set down the point of origin of a program, its final goal(s), and the intermediate functions or actions needed to get from beginning to goal. Each step should be considered as a Process - some may be sequential and others parallel. Then, the steps needed to accomplish the Process should be described. If the description is complex and needs intermediate steps, the Process is then a candidate for an "explosion". That is, the top (or upper) level Process is considered as a "project" and its own Data Flow Diagram is prepared.

When writing the step-by-step procedures in the Process, certain elements of data (or information) must be made available for the procedure. Each element of data is considered as an input Data Flow, which is identified and described. The product (or result) of a Process is an output Data Flow element.

Each Data Flow to the Process must originate from:

1. an earlier Process
2. a Data Store (or file)
3. an External Entity.

These sources are also identified, described and put into the Data Dictionary. As soon as the last portion of the Data Flow Diagram has been described, the SSA is complete.

The structured Analysis phase is followed by Structured Design, then by programming and finally software test and validation. The organization of Structured Analysis and its relationship to Structured System Design is shown on Figure 2.

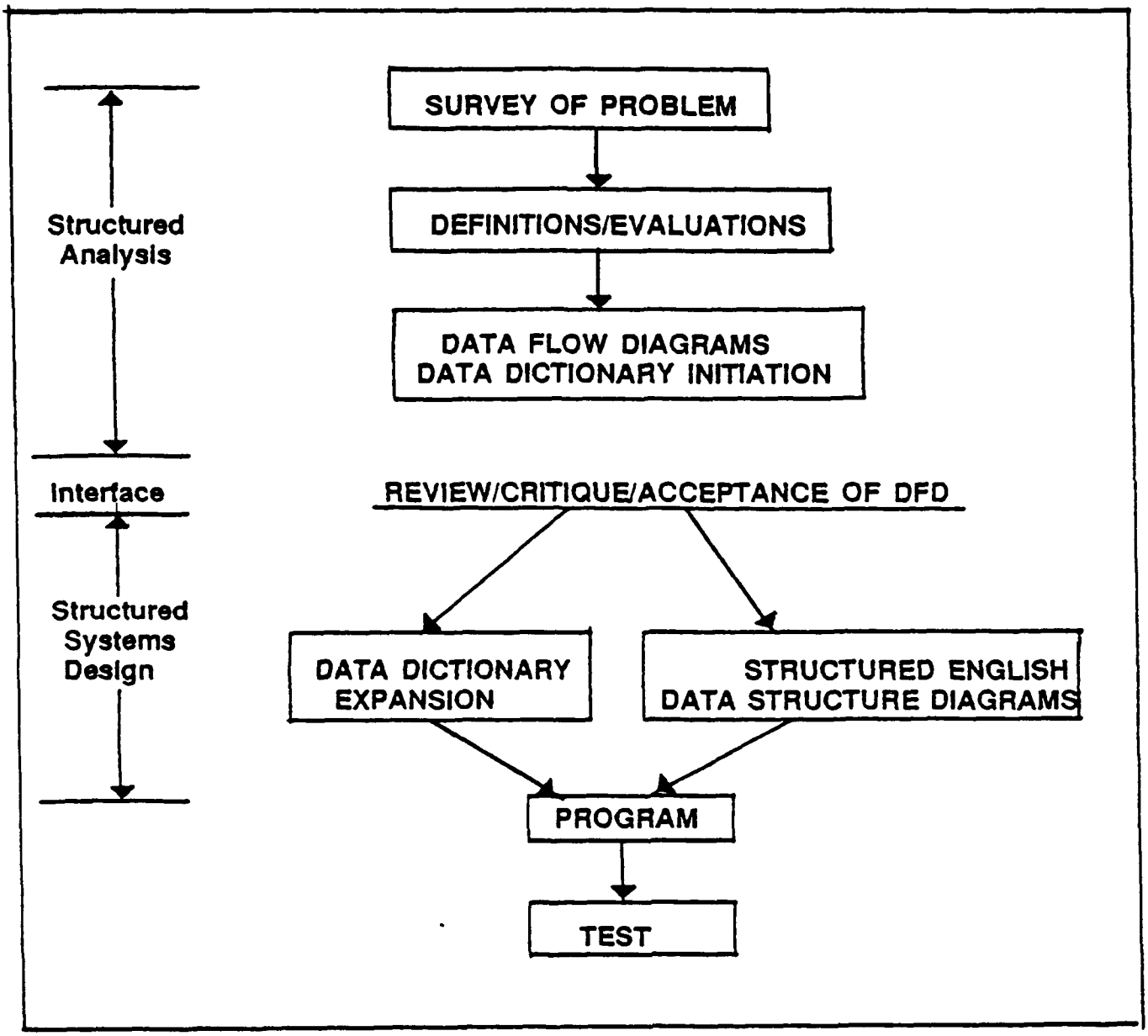

Figure 1. Structured Analysis & Structured Systems Design Organization

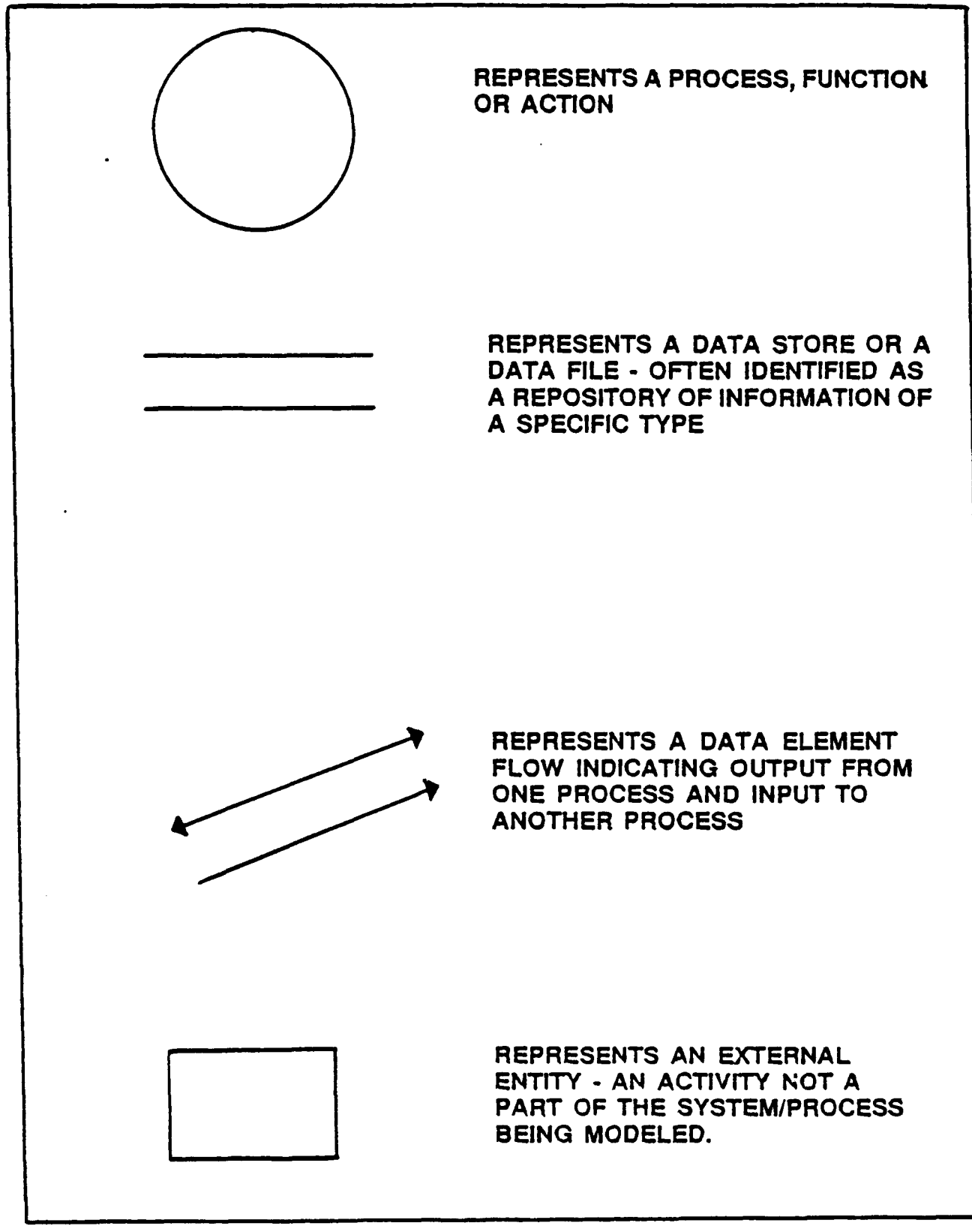

Figure 2. Standard DFD Symbol Definitions