SAMSO STD 77-6
77 Nov 10

SAMSO STANDARD

SYSTEM REQUIREMENTS ANALYSIS PROGRAM

FOR THE MX WEAPON SYSTEM

NOTE:
(NOTICE 1 DTD 20 APRIL 1981
REPLACING APP B IS INCORPORATED INTO THIS
COPY)

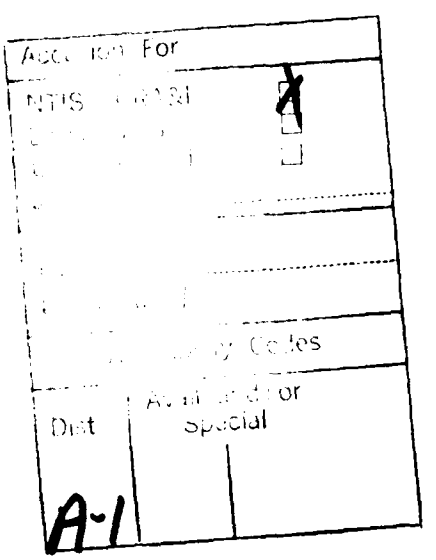
AMSDL 33002

HQ SPACE AND MISSILE SYSTEMS ORGANIZATION
Los Angeles, CA 90009

SAMSO-STD 77-6
System Requirements Analysis Program for the MX Weapon System

1. This SAMSO standard is approved for use by the Space and Missile Systems Organization (AFSC).

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: SAMSO/MNNX, Norton AFB, CA.



SAMSO STD 77-6
NOTICE 1
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SYSTEM REQUIREMENTS ANALYSIS PROGRAM FOR THE M-X WEAPON SYSTEM

TO ALL HOLDERS OF SAMSO STD 77-6:

1. Remove Appendix B dated 10 NOV 77 in its entirety and replace with Appendix B dated 20 April 1981.

2. Retain this notice and insert before table of contents.

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1. SCOPE

1.1 Purpose. This standard specifies the constituents of system requirements analysis (SRA). It implements and complies with the system engineering process objectives of MIL-STD-499 "Engineering Management" and the logistics support analysis objectives of MIL-STD-1388 "Logistics Support Analysis".

1.2 Application. This standard is applicable to weapon system development programs to define requirements for all elements of the weapon system. The requirements defined for operational elements apply to preproduction items (i.e., flight test missiles, ground test missiles, prototypes, engineering models or development program manuals) of the operational element.

1.3 General. The SRA is made up of the operational analysis, the logistics support analysis (LSA), the test planning analysis (TPA), and the assembly, installation and checkout (A&CO) technical analysis. The operational functional analysis, which is a segment of the operational analysis, precedes the other SRA analyses. The preliminary results are the basis of the logistics functional analysis, which is a segment of the logistics support analysis. These two functional analyses generate source data for the test analysis and the A&CO analysis (reference figure 1). System requirements analysis describes the system engineering analysis tasks and the documentation required for definition of the following weapon system elements and plans:

a. Aerospace vehicle equipment (AVE).

b. Support equipment (includes operating and maintenance support equipment (OSE and MSE) and depot support equipment, DSE).

c. Facilities including real property (RP) and real property installed equipment (RPIE).

d. Operating and maintenance personnel.

e. Operating and maintenance technical publications/data.

f. Training equipment.

g. Supplies and spares.

h. Assembly, installation and checkout plans.

i. System test plans.

1.3.1 Compatibility, consistency and correlation of requirements. It is essential to achieve and maintain compatibility among all elements comprising a weapon system. SRA data provides a vehicle for documenting the top level requirement for each element, assures achieving the required compatibility, and records the resulting analysis baseline. The SRA process is a logical, orderly

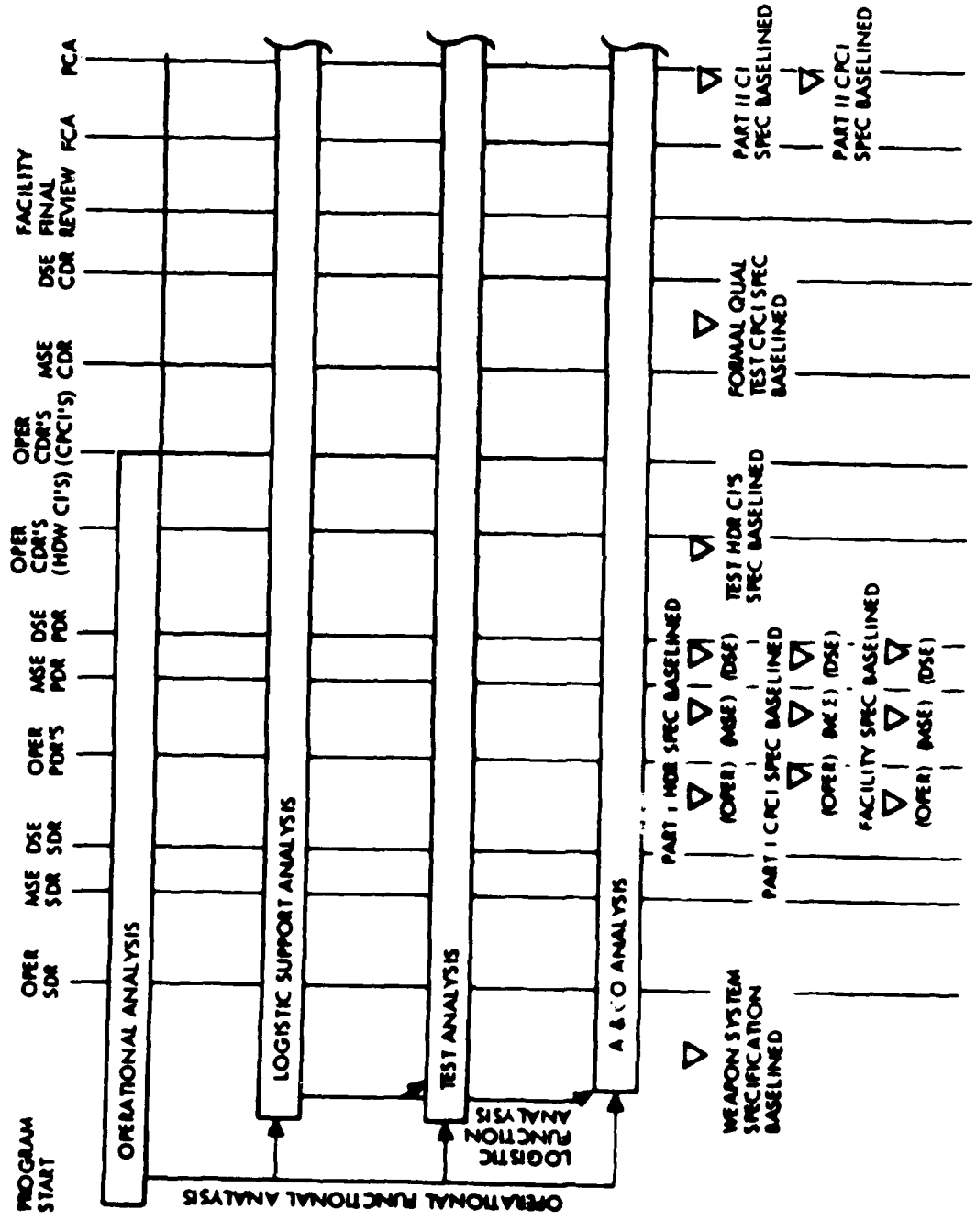


FIGURE 1. System Requirements Analysis Phases

method of assuring complete documentation of all necessary weapon system requirements. To maintain total system visibility, it is incumbent upon all personnel with program responsibility to ensure that no system element deviates from the approved baseline. All program changes and/or additives will be derived and implemented in accordance with the provisions of MIL-STD-480 and this standard.

1.3.2 Preliminary design. The weapon system definition and acquisition program requires preliminary design to translate criteria and source data provided with the contract statement of work into specific requirements for each program element. The requirements of this standard are imposed to provide maximum assurance that the preliminary design effort provides:

a. Adequate definition of all required elements.

b. Specific elements which, when committed for incorporation into the weapon system, will do the total job intended.

c. The logistics requirements identification early in the design process.

d. The necessary visibility for performance versus support tradeoffs.

e. The optimum life cycle cost solution to meet the technical and schedule requirements commensurate with acceptable risk.

f. A baseline for evaluating change requirements.

g. Adequate provision for required test planning analysis.

h. Adequate provisions for A&CO technical analysis.

1.3.3 Use of analysis results. The results of these analyses will be used to support total system life-cycle events such as:

a. Uniform communication of overall requirements.

b. Allotment of functional requirements to configuration items.

c. Associated acquisition tasks such as design, support equipment loading (determination of quantities of support equipment, spare parts, and personnel), spares provisioning, etc.

d. Prediction of weapon system effectiveness.

e. Definition of hardware configuration item (CI), software computer program configuration item (CPCI), and facility design requirements for contractual and configuration management activities.

f. Definition of logistics support requirements.

g. System test plans and requirements.

h. Assembly, installation and checkout (A&CO) technical analysis (A&COTA) requirements.

i. Manufacturing, training, and outlining of operational technical publications/data.

1.3.4 Relation of SRA and specifications. The system requirements analysis data; i.e., flows, forms B, timeline analysis, etc., are the basis for the performance requirements in the specifications that are written per MIL-STD-483 and 490. All allocated performance requirements in the SRA shall be in the specification and all performance requirements in the specifications shall be on the SRA functional analysis forms. All of the requirements developed during the SRA process shall be traceable to performance requirements in the specifications.

2. REFERENCED DOCUMENTS

2.1 Issues of document. The following documents of the issue in effect on date of invitation for bids or requests for proposal, form a part of this standard to the extent specified herein:

STANDARDS

Military

MIL-STD-470	Maintainability Program Requirements (for Systems and Equipment)
MIL-STD-480	Configuration Control Engineering Changes, Deviations and Waivers
MIL-STD-483	Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs
MIL-STD-490	Specification Practices
MIL-STD-1521	Technical Reviews and Audits for Systems, Equipments, and Computer Programs

MIL-STD-1543	Reliability Program Requirements for Space and Missile Systems
MIL-STD-1574	System Safety Program for Space and Missile Systems

SAMSO

SAMSO STD 68-19	Personnel Subsystems Specifications
SAMSO STD 75-2	Minuteman Interface Control Program
SAMSO STD 77-8	Nuclear Hardness and Survivability Program Requirements for the MX Weapon System

PUBLICATIONS

AFLCM/AFSCM 800-4	Optimum Repair Level Analysis

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following document forms a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bid or request for proposal shall apply:

X3.5 - 1970	American Standard Flow Chart Symbols for Information Processing (Prepared by: American National Standards Institute, Inc.)

(Applications for copies should be addressed to the contracting officer or to the American National Standards Institute, Inc.)

3. DEFINITIONS

3.1 Aerospace vehicle equipment (AVE). Aerospace vehicle equipment consists of the operational flight vehicle and all of its flight components.

3.2 Assembly, installation and checkout technical analysis (A&COTA). The A&CO technical requirements analysis is the discipline and/or technique of identifying and reporting the requirements for A&CO, as specified in the contract. The end result of this analysis is the establishment of requirements for design and development of procedures, timelines, drawings, assembly/checkout equipment and operations and maintenance manuals.

3.3 Availability. The measure of the readiness of an item to perform its required function at any instant of time within a stated interval of time under stated conditions of use. The fraction of total time during which an item is in a specified operable condition.

3.4 Capability. The ability of an item to achieve mission objectives, given the item conditions during the mission.

3.5 Cascading failure. A failure which, if not repaired, will result in additional failure mode(s).

3.6 Configuration item. It is the primary level of assembly for management control, accountability, spares provisioning, and technical publications/data preparation. It is the level for which a top assembly drawing will be prepared. It is also the assembly level at which the configuration control board (CCB) will maintain configuration control.

3.7 Dependability. The probability that an item will enter or occupy each one of its operational modes during a specified mission and will perform the functions associated with those operational modes successfully.

3.8 Design constraint. A detailed design requirement which identifies limits within which the CI must be designed to perform its functional requirements.

3.9 Design requirement. A statement of essential characteristics of an element.

3.10 Design reviews. Design reviews are defined in MIL-STD-1521. Design reviews are held to formalize system requirements, preliminary design and detailed designs. The design reviews are:

a. System design review (SDR)

b. Preliminary design review (PDR)

c. Critical design review (CDR)

3.11 Detailed design. An effort expended to translate the functional requirements (specified in CI specifications or facility design criteria or procedural documents and in personnel and logistics data), into detail drawings and/or data required to fabricate or procure system elements.

3.12 Detailed design requirements. A design requirement which satisfies the following:

a. Prevents incorporation of undesirable characteristics.

b. Establishes parametric, quantitative boundary values within which element characteristics must fall.

c. Provides explanation of qualitative criterion in terms of unique application to elements.

d. Translates qualitative criterion into quantitative values unique for elements.

e. Provides reasonable assurance that design solutions will be acceptable.

f. Permits quantitative evaluation of element characteristics at technical reviews, audits, etc.

g. Applies to only one element.

3.13 Element. Any discrete component of one of the following parts of the weapon system:

a. Aerospace vehicle equipment (AVE).

b. Support equipment (SE).

c. Facilities, including RP and RPIE.

d. Operations and maintenance personnel.

e. Operational and maintenance technical publications/data.

f. Supplies and spares.

3.14 Failure. The termination of the ability of an item to perform its required function.

3.15 Fault. Any defect in or impairment of item performance.

3.16 Function. That action which must be performed by an element or elements of the system in order for the system to accomplish its intended purpose.

3.17 Functional requirement. A detailed design requirement which specifies a function of an element.

3.18 Indenture number. The indenture number is the group assembly breakdown order starting with indenture zero identifying the equipment group; indenture 1, as the configuration item identifier; and progressing in order through 2, 3, 4, etc., in accordance with the mechanical disassembly relationship (e.g., 2 is a subassembly of 1, 3 is a subassembly of 2, etc.).

3.19 Integrated logistics support (ILS). That part of the systems engineering process which defines support needs, develops an integrated logistics plan, and interfaces with item design to insure the most economical support of a developing system, subsystem or equipment. It supports the optimization of tradeoffs between design and support requirements for the total life cycle to achieve the lowest practical cost of ownership.

3.20 Item. A generic term to denote system, segment of a system, subsystem, personnel subsystem, software, equipment, component, part, etc.

3.21 Life cycle cost/design to cost (LCC/DTC). Life cycle cost is the total cost to the government of acquiring, operating and supporting the weapon system. LCC includes research, design, test, evaluation, production and/or procurement, and operating and support costs. DTC is the management concept which is applied to the program wherein rigorous cost goals are established during development. The control of these goals is achieved by practical tradeoffs between performance, cost, and schedule. The analyses defined in this standard have as their goal the delivery on schedule of the minimum cost system that meets the essential requirements.

3.22 Logistic element. One of the areas of support activity which collectively comprise the management concept of integrated logistics support.

3.23 Logistic support analysis (LSA). A technical interactive process of analyses, integral to the engineering design process, that define logistic support system requirements and injects them into system/equipment design and acquisition. The LSA identifies quantitative and qualitative requirements and the means for satisfying these requirements.

3.24 Operational element. Any element intended for SAC, AFLC, or ATC usage.

3.25 Preliminary design. Engineering effort prior to and including the PDR includes requirements analysis; definition of proposed design solution; engineering testing; tradeoff studies; and preliminary performance analysis, conducted during proposal phases, preliminary study contracts or development contracts.

3.26 Skill. Skills involve physical or manipulative activities. They often require knowledge for their execution. All skills are actions having special requirements for speed, accuracy, or coordination.

3.27 System analysis. The process of examining the parts of a system or subsystem in detail to determine (a) the capabilities of the system, (b) whether the system meets its overall requirements, and (c) whether the requirements are sufficiently defined.

3.28 System effectiveness. A measure of the extent to which a system may be expected to achieve a set of specific mission requirements. It is a result of system availability, dependability and capability.

3.29 System engineering. A logical sequence of activities and decisions transforming an operational need into a description of system performance parameters and a preferred system configuration.

3.30 Support equipment (SE). All equipment required to make and/or keep system, support system, subsystem, or configured items of equipment or components operational in their intended environment. This includes all non-AVE

required to install, launch, arrest, guide, control, direct, inspect, test, adjust, calibrate, appraise, gauge, measure, assemble, disassemble, handle, transport, safeguard, store, actuate, service, repair, overhaul, maintain, or operate the system, subsystem, configuration item, component, and SE for SE. SE may be categorized as general purpose and special purpose; within these categories may exist two subcategories: developmental (no government approved specification/drawing) and standard (with government-approved specification/drawing). SE may be functionally subclassified as operational support equipment (OSE) and maintenance support equipment (MSE). OSE is that which is a functional part of a system and MSE is that SE required to restore a system, subsystem, equipment, or component to operating condition. MSE is not an essential functional part of the system, subsystem, equipment, or component being supported. Automatic test equipment (ATE) can therefore be classified as either OSE or MSE. For the purpose of this document the following equipment is excluded in the definition of SE:

a. Housekeeping items.

b. Office furniture and similar equipments which are required as indirect support and are defined in applicable allowance lists.

c. Common production tools and tooling such as lathes, drills, presses, plating equipment, grinders, induction heaters, etc.

d. Items which are used only by the contractor.

3.31 System requirements analysis (SRA). A sequential and iterative engineering process designed to establish the functional requirements for each element of a weapon system. The process provides a logical sequence and a clear record of the development of system requirements to manage the system engineering effort throughout all phases of system acquisition.

3.32 System test bed. Any location at which the combination of two or more weapon system subsystems from two or more contractors is tested.

3.33 Special test equipment (STE). Test support equipment which may be expended during testing.

3.34 Task - human factors. A task is a related set of activities directed toward a purpose. A task has a definite beginning and end. A task involves an individual's interaction with equipment, other people and/or media. A task, when performed, results in a meaningful product, an advance toward a goal, or completion of a step in a sequence. A task includes a mixture of decisions, perceptions, and/or physical (motor) activities required of a person. A task may be any size or degree of complexity, but it must be directed toward a specific purpose or output.

3.35 Test planning analysis (TPA). A technical iterative process utilized to establish the test requirements and test support requirements. The test planning analysis is developed using the system requirements analysis data and the

subsystem design data. The test support requirements including operational hardware and software, test facilities, test support equipment, special test equipment, range support, technical data and personnel are defined in the test planning analysis.

3.36 Test support equipment (TSE). That support equipment which can or will be repeatedly used to support the test program.

3.37 Definition of acronyms. The following acronyms used in this standard are defined as follows:

AB	allocated baseline
A&CO	assembly, installation and checkout
A&COTA	assembly, installation and checkout technical analysis
ACO	assembly, installation, and checkout equipment
AF	Air Force
AFLC	Air Force Logistics Command
AFS	Air Force standard
AFSC	Air Force Specialty Code or Air Force Systems Command
AFSI	Air Force standard item
ALCC	airborne launch control center
AT&SS	assembly, test and system support
ATC	Air Training Command
ATE	automatic test equipment
AVE	aerospace vehicle equipment
CCB	Configuration Control Board (Air Force)
CDRL	contract data requirements list (DD Form 1423)
CDR	critical design review
CFE	contractor-furnished equipment
CI	configuration item
CPCI	computer program configuration item
DSE	depot support equipment
DTC	design to cost
ECP	engineering change proposal
EOD	explosive ordnance disposal
FB	functional baseline
FCA	functional configuration audit

FMA	failure mode analysis
GFE	government-furnished equipment
HDR	hardware
ICBM	Intercontinental Ballistic Missile
ICD	interface control drawing
ICWG	interface control working group
ILS	integrated logistics support
ITP	intergrated test plan
LCC	life cycle cost
LSA	logistics support analysis
LSAR	logistic support analysis record
MLCC	Missile Launch Control Center
MLF	missile launch facility
MSE	maintenance support equipment
MTBF	mean time between failure
NH&S	nuclear hardness and survivability
OCC	operations control center
ORLA	optimum repair level analysis
OSE	operating support equipment
OT&E	operational test and evaluation
PCA	physical configuration audit
PDR	preliminary design review
PHST	packaging, handling, storage and transportability
PMEL	Precision Measurements Equipment Laboratory
PO	project office
PSF	primary support facility
RP	real property
RPIE	real property installed equipment
SAC	Strategic Air Command
SAMSO	Space and Missile Systems Organization
SCN	specification change notice
SDR	system design review
SE	support equipment (includes OSE, MSE, and DSE)

SMR	source maintenance and recoverability
SMSB	strategic missile support base
SOW	statement of work
SRA	system requirements analysis
STD	system test directive
STE	special test equipment
TA	technical analysis
TI	technical interchange
TO	technical publication data (technical manual)
TPA	test planning analysis
TSE	test support equipment
VAFB	Vandenberg Air Force Base

4. GENERAL REQUIREMENTS

4.1 System requirements analysis

4.1.1 General. System requirements analysis is a systematic approach to establishing and optimizing requirements for equipment, personnel, procedures, and facilities. It provides a baseline against which proposed system changes can be evaluated. This analysis covers the total system including all operational aspects, all levels of logistics support, test planning, assembly and checkout, and training. Systems requirements analysis shall be conducted as specified in this standard and to the level necessary to define detailed design requirements for all weapon system elements associated with a development program. Separate analysis shall be conducted for each major weapon system. Each of these sets of analyses shall integrate all approved subconfigurations. Any development common to more than one major weapon system requires separate sets of analyses except as specifically authorized by SAMSO. The instructions for preparations of analysis data are contained in Appendices A through D.

4.1.1.1 Relationship of SRA to design. Contractors shall conduct the SRA as an integral part of weapon system design. It shall be completed to support the design review requirements of MIL-STD-1521, or equivalent if MIL-STD-1521 is not applied to the element(s) being developed (e.g., technical manuals, qualitative and quantitative personnel requirements information, etc.).

4.1.1.2 Relationship of SRA to specification. Contractors shall base their SRA on the weapon system specification or configuration item specifications, when supplied by SAMSO, and other source data as specified in the contract statement of work (SOW). The contractor shall use their developed SRA to update the SAMSO provided configured item specifications. The contractor developed SRA is the basis for contractor prepared configured item specifications. The

analysis shall be conducted in a manner that will reveal desirable changes to these criteria to more effectively (performance, cost, and schedule) meet the weapon system mission. The criteria for these analyses is to obtain the optimum cost solution. The DTC cost goal analysis and trade study shall be conducted as an integral part of the SRA activities. Evaluations shall be supported by back-up studies and working data analyses.

4.1.1.3 Use of source data. Source data developed during the analysis (design studies, trade studies, back-up studies, etc.) and the documents recording the results thereof, shall be maintained and utilized at the contractor's facility as a current, working definition of detailed design requirements. The data shall be used to control internal detailed design activities.

4.1.1.4 Interfaces. Working data involving interfaces with other associate contractors and other government agencies shall be made available to these interfacing associate contractors through technical interchange. An associate contractor developing more than one CI which interface with each other, or one who has efforts involving interfaces with other associate contractors, shall conduct the interface development as a joint preliminary design task. If associate contractor interface support is not available, the procuring agency shall be advised.

4.1.1.5 Scope of analysis. The analysis scope for each operational element or group of elements shall include consideration and analysis of all usage, test, and logistic support factors; the operational activities at the system test site and other SAMSO designated operational, support, or test areas.

4.1.1.6 Depot maintenance analysis. The analysis for depot maintenance of operational elements shall include investigation of detailed design requirements for optimizing depot support. These maintainability studies and investigations shall be completed prior to PDR of the applicable element. Depot level maintenance analysis for operational equipment end items shall be conducted and completed to support CDR evaluations of recommended designs. Maintenance analysis of depot support equipment (DSE) end items shall be initially completed only to the SDR equivalent level. Further development will be directed on an as-required basis designated by SAMSO in accordance with contract provisions. Contractors shall conduct depot operations analyses in conjunction with production tooling design efforts to assure maximum cost savings in the design, development and production of DSE.

4.1.1.7 Common useage of data. Contractor shall make maximum utilization of studies, analysis procedures, etc., that are common. An example is missile deployment procedures that are common to the A&CO, test and logistic support operations. The data developed will be disseminated by SAMSO to assure this action is accomplished.

4.1.1.8 Relationship between logistic support analysis and operational analysis. The interface between the logistics support analysis and the operational analysis are as follows:

a. The operational analysis defines all activities related to the operation and operational test of the weapon system. Thus, the tools, equipment, technical publications/data and personnel required to operate and evaluate the weapon system are recorded in the operational analysis.

b. The logistics support analysis defines the total resources (tools, support equipment, technical data, spares, personnel, etc.) required to maintain the weapon system in the operational mode.

4.1.1.9 Tiering of SRA. SRA tiers from the top level functional analysis to the identification of subsystem and then the end item detail design requirements. The flow diagram first level flows will define the gross functions to satisfy the operation, test and maintenance concepts of the weapon system and subsystem criteria. Based upon the allocation of functions, detailed flows shall be developed to the level needed to meet the requirements for total function identification. Detailed functional requirements forms shall be prepared to support the detailed flows.

4.1.1.10 Nuclear hardness and survivability requirement allocations. The NH&S requirement allocations will be based on trade studies defined in SAMSO STD 77-8. The NH&S requirements allocations shall include the identification and quantification of allowable performance changes. Functions which must operate during or, in some cases, not operate during, nuclear environments shall be identified. The acceptable probability of nuclear weapons environment-induced failures (all allowable performance degradations, when applicable) shall be allocated among subsystems, assemblies and parts.

4.1.2 Analysis planning. Figure 2 depicts system requirements analysis, design reviews, design and SOW relationships in the system engineering process. The engineering efforts, for a typical development program, are shown in discrete increments, each culminating in a design review.

4.1.3 Functional analysis. This analysis is conducted as a technique for identifying detailed design requirements. It is based on the principle that the selection of the most effective means to accomplish requirements must first be based upon identification of the detailed functions that must be satisfied.

4.1.3.1 Engineering efforts. Functional analysis involves two basic engineering efforts: (1) identification of functions to be analyzed (which is accomplished by flow diagramming or selecting from applicable (standard) maintenance functions), (2) detailed analysis of each of the identified functions to determine and define the technical requirements imposed. These analyses include trade studies and design studies which substantiate the requirements.

4.1.3.2 Top-level functional analysis. Top-level functional analysis is depicted in flow diagrams (described later). Initial functional considerations are derived from these diagrams or the functional diagram level as provided by the contract SOW. If the development program requires a revision of master flows, to more properly reflect the scope or character of required functional analysis, the contractor shall propose such changes and obtain SAMSO concurrence in advance of the operational and support system design reviews.

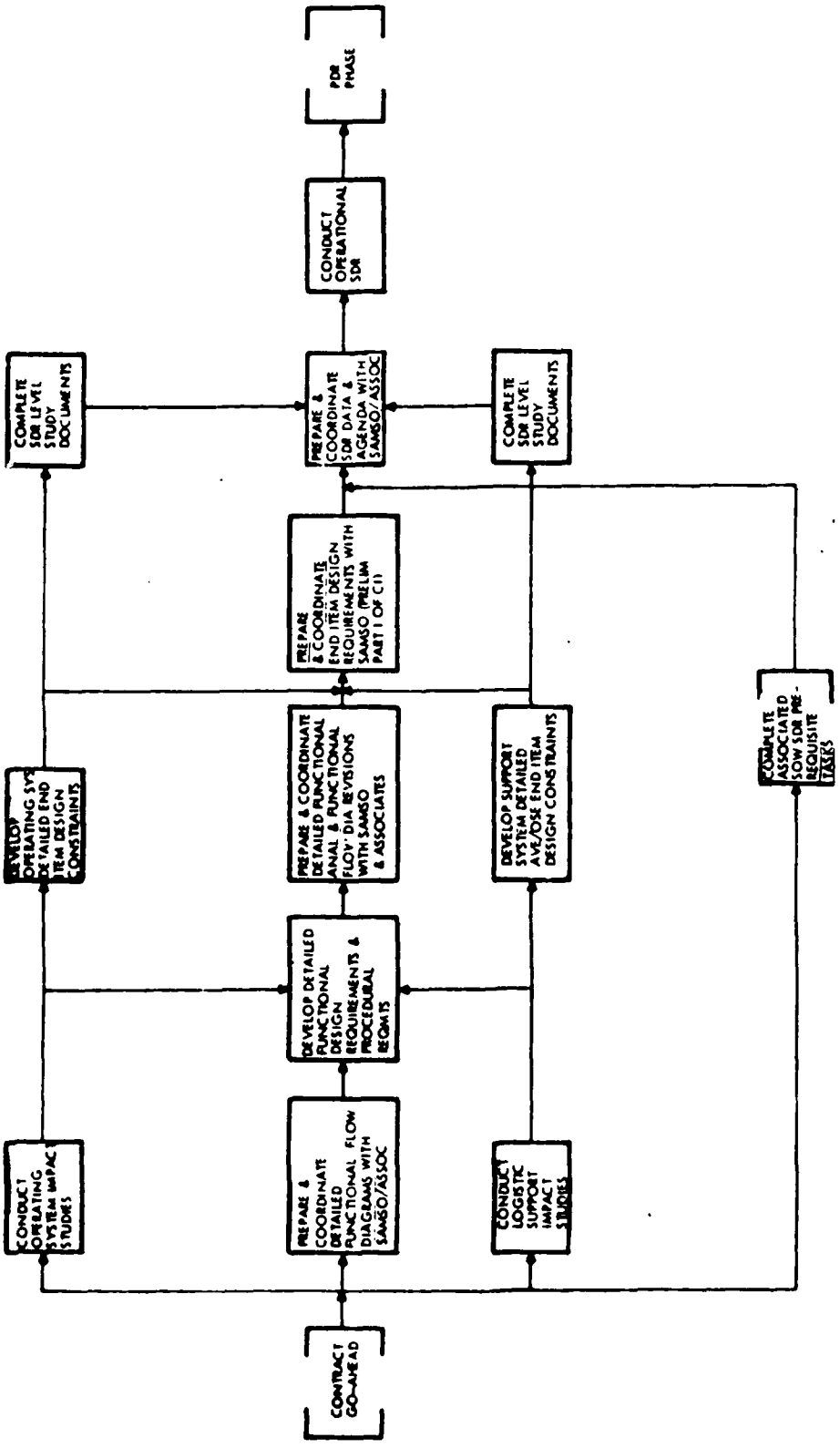


FIGURE 2. System Engineering Phases (Sheet 1 of 4)

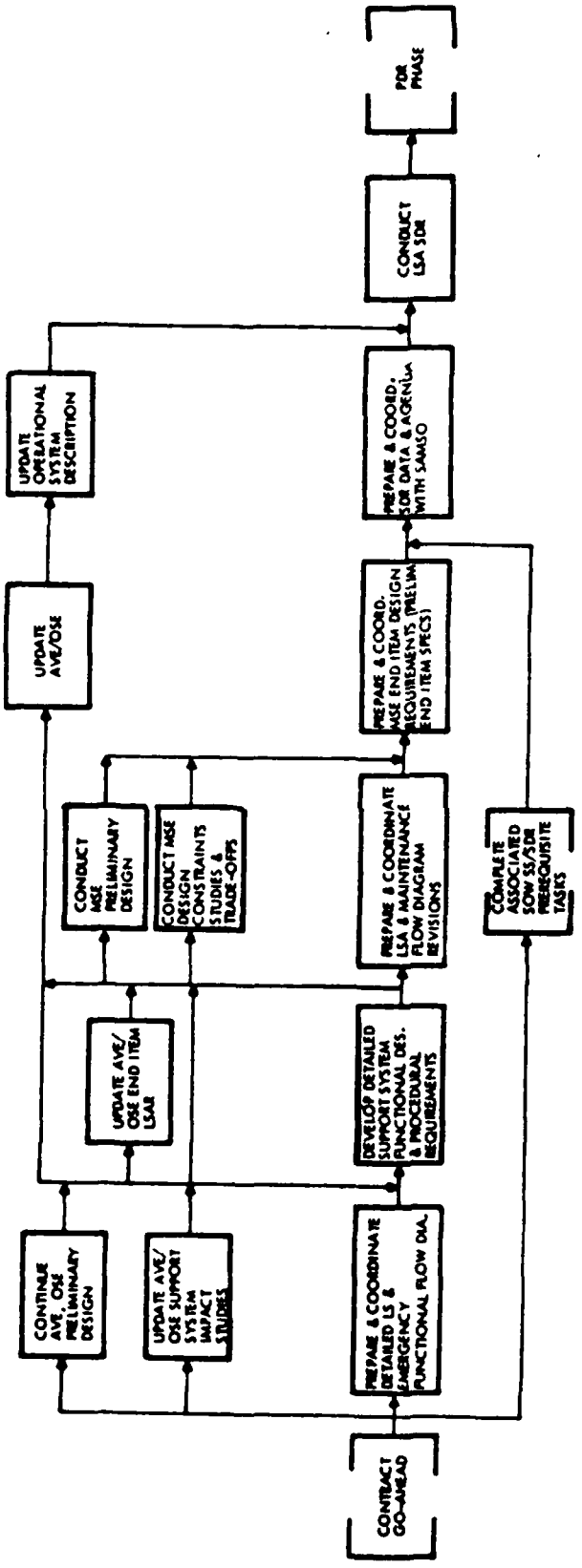


FIGURE 2. System Engineering Phases (Sheet 2 of 4)

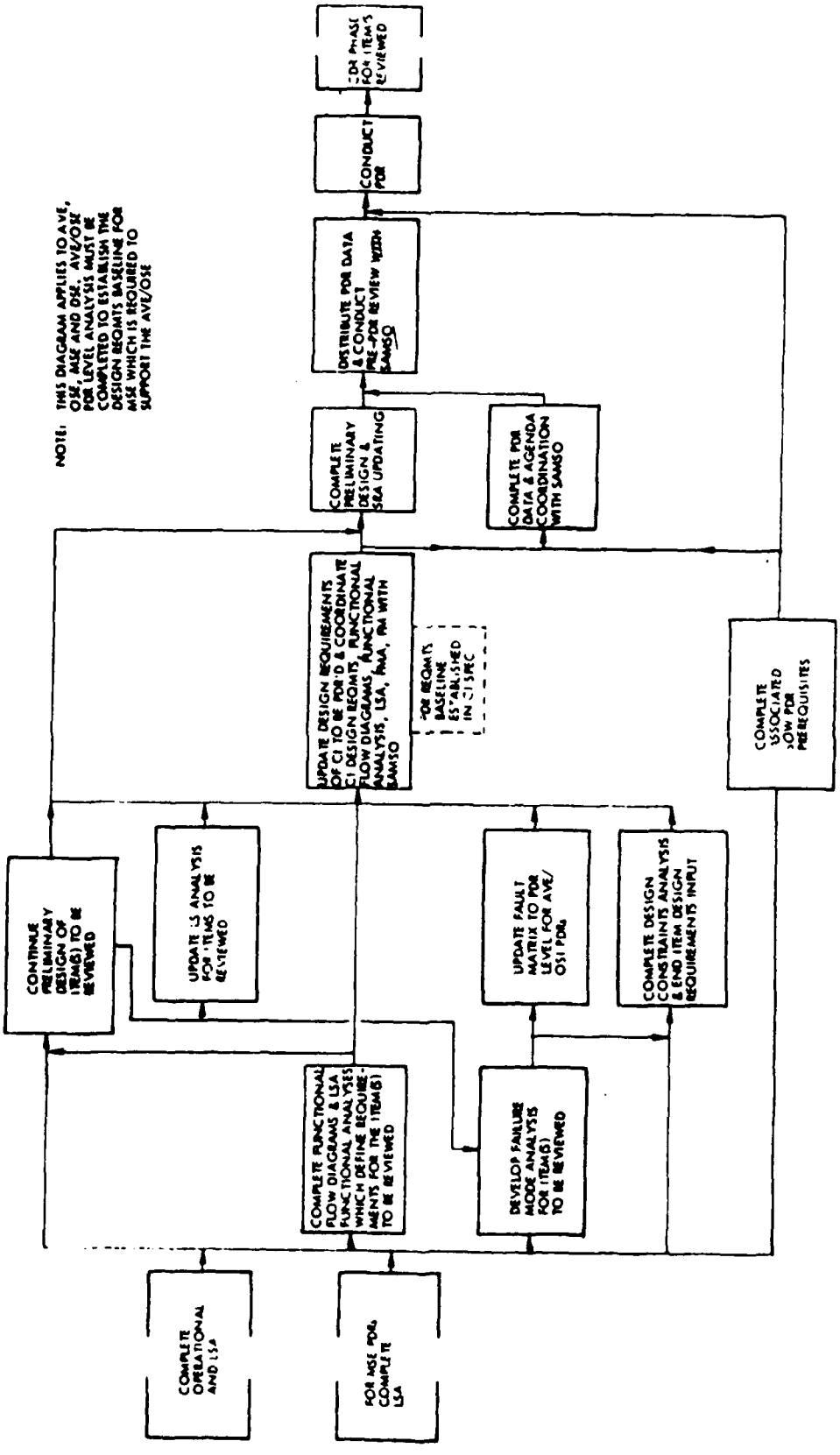


FIGURE 2. System Engineering Phases (Sheet 3 of 4)

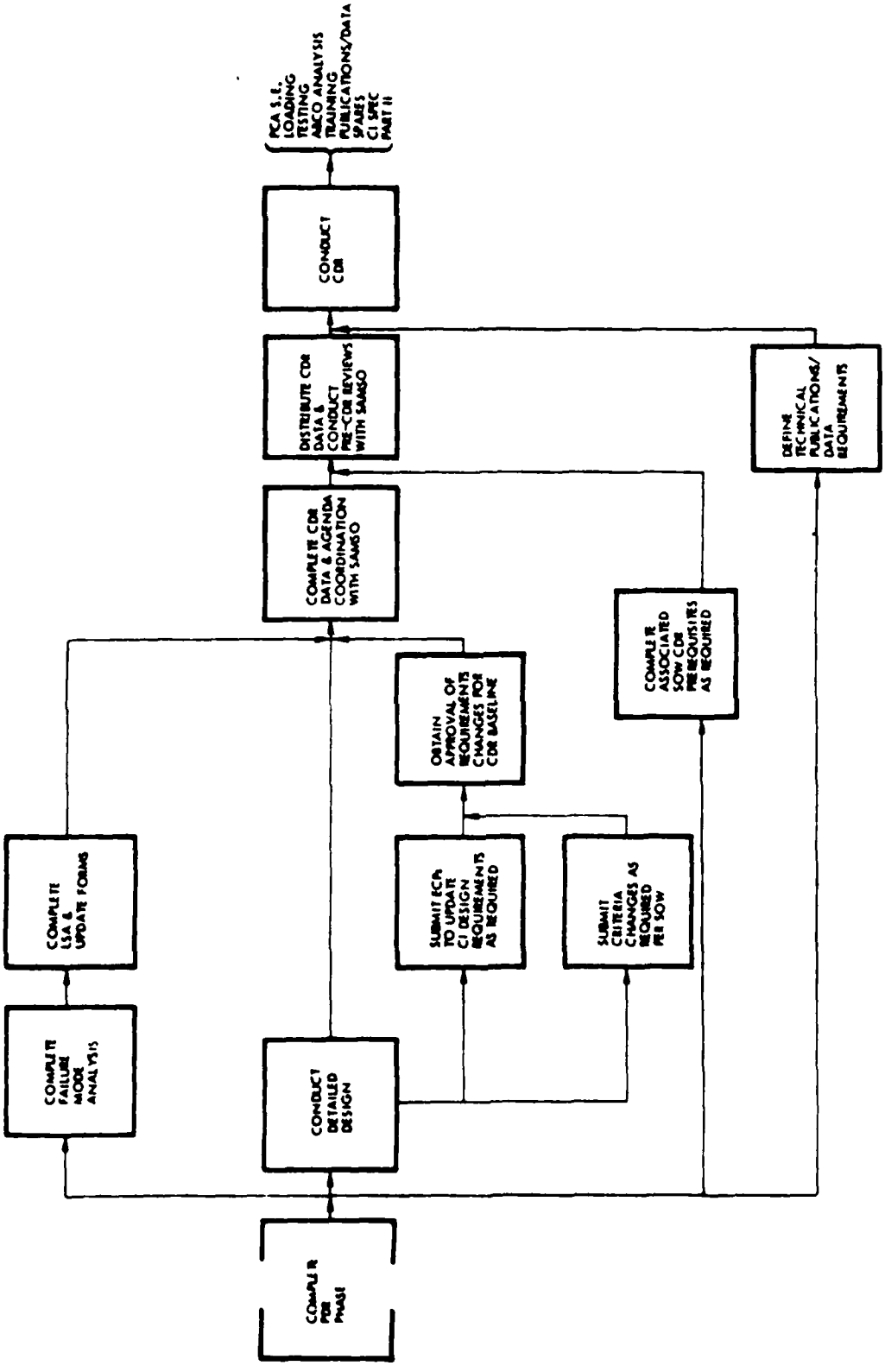


FIGURE 2. System Engineering Phases (Sheet 4 of 4)

4.1.4 Timeline analysis. (Figure 3)

4.1.4.1 Timeline performance studies. Contractors shall conduct "time performance" studies to provide for (1) technical evaluation of equipment and personnel reaction times, and (2) analysis and evaluation of support system characteristics. Timeline analyses shall be performed for operations involving time-critical functions. These analyses shall cover (1) flight mission functions, (2) launch readiness, and (3) missile launch. Operational timelines shall reflect squadron and flight level operations as well as single missile launch control center (MLCC) to missile launch facility (MLF) control loops. (Specific requirements for these analyses will be resolved during technical interchanges with SAMSO.)

4.1.4.2 Timeline structure. The structure of the timeline shall, whenever possible, match the structure of the functional flows. For the operational system, timeline analysis shall determine the weapon system reaction time and flight time. These studies shall show the sequence and duration of equipment and personnel operations using timing diagrams and timeline drawings, respectively.

4.1.5 Interface definitions. The completion of the flow and Form B process identifies at the gross level the configuration item(s) and the interface between these identified configuration items for hardware and software. Interface control drawings (ICDs) are created between interfacing CIs in accordance with MIL-STD-483 as amended by contract or by government agency to the level of detail and format as defined in SAMSO STD 75-2. Associate contractor to associate contractor interfaces are documented in ICDs which are under control of the Interface Control Working Group (ICWG) chairman. Interfaces between CIs within a contractors purview shall be documented in internal ICDs which are not under the control of the ICWG chairman. These internal ICDs shall be made available at appropriate design reviews.

4.2 Systems requirements analysis instructions

4.2.1 Guidelines for developing analysis data. The guidelines for developing analysis data are as follows:

a. Equipment functional requirements shall be presented in diagram form using logic symbology contained in document X3.5-1970, American Standard Flow Chart Symbols for Information Processing, or by statement. Diagrams shall be included directly on the system functional analysis form to describe what would otherwise be a lengthy and complex statement. A brief description of the diagram may be included, when necessary.

b. Environmental profiles under which recommended personnel and configuration item designs must operate and/or survive shall be included in graphic form.

c. Electrical signal and power parameters shall be included in graphic form or by statement to show transients, pulse shapes, timing relationships, etc. Tabulations or similar detailed design requirements derived from

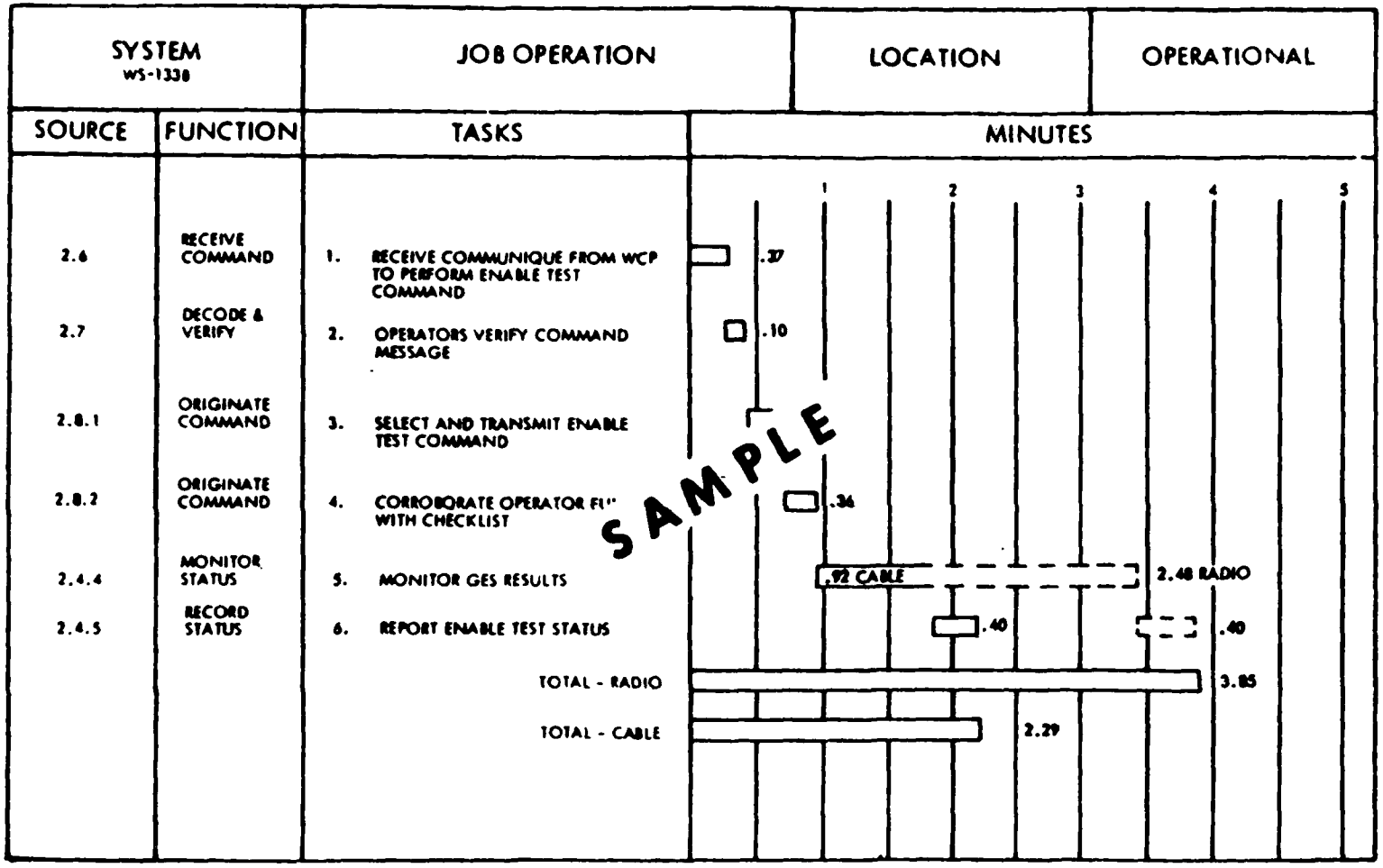


FIGURE 3. Operational Timeline Drawings

multiple sources may be used, e.g., power supply load requirements, cooling system delivery requirements, etc.

d. Lengthy technical requirements for configuration items specified in design criteria may be referenced in detailed functional analysis forms when they are (1) directly applicable to the configuration item, (2) derived from documents included in the contract applicable design documents listings, and (3) do not require further expansion in detail.

e. Specification of technical requirements by reference to documents not subject to contractual control is undesirable. If, however, such references are made, they shall be only to specific (dated versions) documents which are deliverable line items in the contract data requirements list (CDRL). The referenced documents must be in SAMSO's possession at the time of review.

f. Functional requirements shall have the following characteristics:

(1) Requirements shall be traceable to the system level.

(2) Each detailed design requirement entry (except explanatory notes) shall be directly related to and fully applicable to a specific configuration item recommendation.

(3) Each task sequence, facility requirement, configuration item designation, etc., must be directly related to a specific functional requirement.

(4) When a functional requirement is not applicable to all weapon system configurations being analyzed, the specific applicability shall be noted.

(5) Recommended functional requirements specifically in conflict with applicable design criteria will be temporarily flagged (as such) until approved or revised by design review/CCB approval action and/or criteria change. (These annotations will be removed by routine administrative action after resolution of the conflict and prior to the CDR).

g. Qualitative descriptions of design goals, objectives, etc., are not acceptable as detailed design requirements.

h. Logistics support analysis shall be considered a part of the technical design requirements. The logistics support analysis data, documenting the support requirements, shall be prepared incrementally during the analysis as the requirements are defined.

4.2.2 Data preparation and distribution

4.2.2.1 General

a. Data prepared under this standard are directly involved with the design and design review activities. They are prepared and distributed as part of the engineering working data and design review data as required to complete the design approval actions. During this process, the data are periodically published, as is, to provide reference information to development activities not directly participating in technical interchanges, and design reviews and approval meetings. Preparation and delivery or deferred delivery directions for the various data requirements shall be as specified in the CDRL.

b. System definition data are normally published for each major weapon system. Packaging of data will reflect these categories except when directed otherwise by SAMSO.

c. All data prepared under this document and published and distributed are provided to SAMSO who shall maintain a centralized file for all data for each weapon system.

d. Each associate contractor shall publish and distribute the data he prepares. When data are developed jointly by two or more contractors, they shall be published by the contractor who prepares the final master.

e. In addition to individual contractor publications, SAMSO or a designated contractor shall publish all functional flow diagrams and Form Bs. SAMSO or a designated contractor shall publish the integrated fault matrix and the "0" indenture LSAR as required. In the performance of this task, SAMSO and the designated contractor shall monitor the completion status of the engineering working data and publish the latest reproducible data available. These data shall include those received by SAMSO and SAMSO designated contractor via design review data package distributions, technical interchange, and the periodic reference distribution, whichever is available at the time of publication.

f. Contractors with more than one development contract for a weapon system will normally publish and distribute data under only one contract.

g. Data packaging shall be by contractor, by weapon system and VAFB, as applicable to the contractor's equipment or service. Subpackaging within these categories shall be at the discretion of the contractor. However, applicability shall be clearly defined and data indexed to provide single-thread continuity for retrieval (e.g., flow to Form B to specification to LSAR, etc.).

4.2.2.2 Publishing instructions

4.2.2.2.1 Format. Wherever possible, the forms, diagrams, and drawings shall be reduced to 8½ x 11 inches format. When detail would be lost by over-reduction, fold-out sheets may be used.

4.2.2.2.2 Section titles. Each document containing more than one section shall include a heavy tab between each section to identify data contained therein.

4.2.2.2.3 Cover. The cover of each data package shall clearly identify the contractor, the material, applicability and all other data required to establish the identity of the package. For this purpose, descriptive terms shall be used. The term "System Requirements Analysis" shall be used in the title. The cover shall also indicate SAMSO designated identification for other systems.

4.2.2.2.4 Page numbering. Pages shall not be numbered. Data numerical sequences shall be used for retrieval (e.g., Form Bs X.2, X.150, M5-4, 2.0, X.40, etc.).

4.2.2.2.5 Revision identification. Revisions issued may take the form of complete submittals or changed page issues. Each revision shall contain a current table of contents and "add-delete" instructions.

4.2.2.2.6 Packaging. Volumes should be packaged according to data categories (e.g., flight mission flows and Form Bs; maintenance analysis; specifications, etc.), and functional for numerical CI sequences. Volume designators shall be selected by each contractor as necessary to provide cross-referencing and indexing. Depot data are to be packaged separately. No volume shall be greater than two inches thick.

4.2.2.2.7 General requirements for preparation of reproduction copy. Preparation of originals shall be made with either a reproducible type carbon ribbon, reproducible type cloth ribbon (carbon backing is not acceptable), or electronic data processing compatible media.

4.2.3 Analysis approvals. The analysis and design solutions will be given formal approval at the design reviews and audits as specified in MIL-STD-1521 and this document. The functional baseline (FB) will be established by the SAMSO prior to SDR. The allocated baseline (AB) will be established prior to PDR by CCB approval of the specification, Part I. The product baseline will be established after physical configuration audit (PCA) by CCB approval of the specification, Part II. Subsequent changes to the baselines shall be initiated per 4.2.4. Further requirements are as follows:

a. To formalize the design analysis upon which the PDR will be based, SAMSO may, at its discretion, hold technical meetings. The contractor's Part I specification shall be reviewed for correctness of the allocated requirements and for format compliance to MIL-STD-483 and MIL-STD-490. These technical meetings will result in a technical concurrence with the allocated requirements to allow the contractor to proceed to the PDR.

b. At the discretion of SAMSO, incremental functional configuration audits (FCAs) may be held. SAMSO will give incremental technical concurrence to that portion of the draft Part II specification for which the FCA is being performed. Format approval for compliance with MIL-STD-483 and MIL-STD-490 will also be given.

c. When analysis or analysis changes are not directly involved with a design review, approval shall be obtained by contractors through SAMSO technical interchange.

d. Pending the approvals indicated above each contractor responsible for the generation of system requirements data associated with proposed designs shall use the data developed under this standard for controlling internal design efforts such as training, procurement, technical publications/ data development, etc.

e. Documentation changes that do not involve detailed design requirements, personnel and quantities will not require approval.

4.2.4 Analysis changes. Analysis changes shall be initiated in response to problems identified during preliminary design, design review, detailed design, engineering testing and follow-on test programs, A&CO, technical manual reviews, support equipment loading, spares provisioning, equipment procurement, and operational usage by Air Force agencies. A systems engineering effort to define these changes shall be provided for the duration of contracts applying this standard. The rules governing analysis changes are as follows:

a. During the period leading to initial approval of analysis data, which includes the specification functional baseline, system engineering studies and investigations shall be maintained current. Analysis data shall show the latest technical decisions and system impacts, resulting from technical interchanges, technical direciton meetings, design reviews, test, etc. Therefore, current SRA documentation shall be availabile as required for all technical meetings to reflect the proposed requirements baseline. During pre-approval periods, the documentation shall be considered working data to identify all system engineering in progress.

b. Proposed changes to the functional requirements shall be documented. The level of detail presented in the change documentation shall be as specified in 4.2.4a. The methodology of working changes and the control and distribution shall be as specified in 4.2.4c and 4.2.4d. This change documentation review does not supersede the design review direction nor the specification. The approval of the change documentation does not constitute approval of any other analysis or the specification.

c. Changes to CCB approved requirements, which include the allocated baseline and product baseline, shall be accomplished through documentation in accordance with the system engineering requirements of this

standard and incorporated by engineeering change proposal (ECP). Changes shall be analyzed for all functional and constraint considerations and defined to control the requirement/design/support change. The approval of the change documentation does not constitute approval of any other analysis or the specification.

d. Working copies shall be used for recording analysis changes; this eliminates time lags caused by formal publication, delivery, etc. A working copy is defined as any timely revision technique that produces a readable, reproducible and controlled prototype of the final product. It may be developed by annotation, "cut and paste," attached change sheets, etc. The objective is to provide system engineering control over detailed design efforts and timely distribution and utilization of system engineering source data. Working copies shall be annotated, flagged, etc., to clearly indicate changes.

e. Contractors shall maintain a timely and accurate system of technical control and distribution of system requirements data changes for use by designers, technical writers, provisioning groups, etc. This system of control shall be analogous to that which is required for production drawings in that required system changes initiate revisions to the system requirements analysis data and system requirements analysis data changes cause revisions to the system.

f. System engineering in support of ECPs shall be accomplished as follows:

(1) If a proposed change is submitted to obtain authorization to complete detail design, the system requirements analysis shall be completed equivalent to the PDR level per MIL-STD-1521 prior to submission of the ECP. SRA data which show effects on previously approved elements shall be included with the ECP; other requirements analysis data must be available for review (on request) at the contractor's facility. CDR-level SRA data shall be completed prior to release of drawings for procurement or fabrication.

(2) If an ECP is submitted to obtain authorization to release a completed specific design, the SRA data shall be completed equivalent to the CDR level per MIL-STD-1521, and available at the contractor's facility, prior to submission of the ECP. SRA data to show the detailed design requirements for affected system elements shall be submitted with the ECP. Specification change notice (SCN) will be used with ECPs for submitting specification changes.

(3) System engineering studies and investigations for the required change shall be available at the contractor's facility for technical review. Unless otherwise specified, CCB approval of a change constitutes system engineering data approval.

g. System engineering that does not involve ECPs shall be phased to support recommended technical manual program changes and other technical data changes as follows:

(1) If a data change request is initiated by the contractor, all system engineering in support of the change shall be updated as working copies prior to submitting requests for change.

(2) If a data change request is initiated by SAMSO, the contractor shall review the change requirements and provide system engineering in support of the change evaluation. Change requests of this nature, and approval thereof, may be varied. As soon as the change problem becomes known to the contractor it shall be evaluated for impact on previous analysis; if it is affected, system engineering shall be completed prior to release of revised contractor technical data or prior to presentation of contractor recommendation to the approval agency. In-plant working copies of the documentation thereof, and weapon system technical data releases based on these data, shall be maintained compatible.

h. The Air Force standard item shall be updated to reflect changes. Each update shall be considered as new data for review and approval. AFSIs are for identification only and are not subject to the controls placed on CIs.

4.2.5 Design review. Formal design reviews, in addition to serving a technical function, serve an administrative function in that they are a means of determining contractor performance on a contract. When all review action items, if any, are resolved and the contractor has obtained approval of the final minutes from the chairman, the contractor shall forward the minutes to the contracting officer for official record and request notification that he has complied with the contractual requirements of the design review. Since the intent of a design review is to determine acceptability of designs being developed to approved criteria and approved specification(s), it is not necessary to originate contractual action to require the contractor to correct deficiencies noted at the time of review. The following governs contractor action:

a. An exception exists where it is necessary to deviate from SAMSO imposed criteria and specifications to correct a recognized deficiency. When it is necessary to revise technical requirements defined by the CCB approved configuration item, originate a new configuration item, or cancel an approved configuration item, the contractor will be directed by the Chairman of the Review to submit an ECP in accordance with MIL-STD-480 and the CDRL.

b. If the contractor is of the opinion that response to specific technical direction originated by SAMSO at the time of review will require work outside the scope of contract, as in force at the time of the review, the contractor shall notify the review chairman. If the chairman considers such work essential, he may direct the contractor to request additional

contractual coverage from the responsible SAMSO contracting officer. Such requests shall be submitted within 48 hours after the review, and contain reference to the specific portion of the contract to be changed, the nature of the change, the associated costs, and the period of performance. If it is not practical for the contractor to submit complete information within 48 hours, which will permit evaluation of the validity of the request as well as the reasonableness of the quoted costs, the contractor shall submit a preliminary request within 48 hours with such information as can be made available, and shall commit in the preliminary request to a specific date on which the final and complete request for contractor change shall be submitted for review.

5. DETAILED REQUIREMENTS

5.1 Operational analysis. As part of the weapon system functional analysis, the contractor shall conduct an operational (system utilization) analysis to identify the elements required for the operational and operational test and evaluation (OT&E) portion of the weapon system (OSE and AVE remote control aspects). The analysis shall include operational routines and responses to system failures identified through failure mode analysis (described later). The instructions for preparation of analysis data are contained in Appendix A.

5.1.1 Operational analysis data. The operational analysis includes human factors studies required to support the recommended allocation of functions between operators and equipment and provide the rationale for man-machine interfaces. The analytical approach shall result in operational flows and detailed analysis forms that depict any discrete operations that would require procedures for operating personnel. Checklists shall include all critical actions directed by maintenance control, squadron command, and higher command levels required to transfer or accept control responsibilities for other flights or other MLCC functions and to cooperate with maintenance crews. Operational analysis data shall include (a) functional flow diagrams, (b) detailed operability analyses for displays and controls, and (c) timeline analysis.

5.1.2 Man-machine interface. Contractors shall conduct operational analysis to support man-machine interfaces for resolution of design requirements regarding controls, panels, readouts, automation, etc.

5.1.3 Design constraint analysis. This analysis provides an additional approach of assuring investigation of all weapon system requirements by identifying detailed design constraints. When the functional and the constraint approaches overlap, the functional analysis procedures of paragraph 4.1.3 shall be applied. Contractors shall evaluate all applicable system, subsystem, and CI design criteria for possible design constraints to identify additional areas of technical consideration.

5.1.4 Failure mode analysis. Failure mode analysis (FMA) shall be performed by the contractor for the primary purpose of identifying all failure modes and provide data to design the equipment to eliminate failure modes wherever

possible, to minimize the failure rate of those failure modes that cannot be eliminated, and to determine fault isolation, logistics and maintenance actions associated with each remaining failure mode.

5.1.4.1 Failure mode analysis data. The basic data needed for, and obtained from, FMA are used in their original format for reliability analysis, maintenance analysis, logistics, safety analysis, test planning, etc. Typical data are:

a. Identification of the piece part contained in the lowest indentured assemblies and identificaiton of all assemblies within the CI.

b. Identification of the failure modes for each piece part and higher level assembly and the failure rates for each failure mode. Contractors shall develop and maintain the data common to the FMA as a single basic set of information to support the earliest program needs. When a change occurs that affects the FMA (e.g., a change that eliminates a failure mode), the changes shall be identified, documented in the FMA data and the FMA data disseminated to using organizations to enable them to update their design data to reflect this change. This failure analysis is conducted to:

(1) Identify critical fault modes and eliminate these fault modes through design change; or minimize the impact of each critical fault mode on system effectiveness.

(2) Determine AVE/OSE detailed design requirements and constraints for optimum readiness mode failure detection, control and predispatch fault isolation.

(3) Determine AVE/OSE detailed design requirements for test points, monitors, self test, etc., to support maintenance fault isolation and checkout at the organization, intermediate and depot levels.

(4) Evaluate proposed AVE/OSE characteristics regarding failure detection, failure impact upon interfacing equipment and system operating modes, and operator actions required to maintain missile remote control and isolate faults.

(5) Determine modes of operation, under fault conditions, that must be fully analyzed to define requirements for operation of remaining system capabilities.

(6) Provide data for safety analysis, maintainability analysis, maintenance analysis, reliability analysis and human factors analysis.

(7) Provide failure-mode characteristics for determining logistics support procurement requirements and specifications.

(8) Identify areas where redesign is required to provide better predispatch fault isolation.

(9) Provide current failure mode data for use during the deployment phase. The data will be used for reliability/performance monitoring programs such as aging and surveillance, and hardness maintenance (including hardness surveillance) programs.

(10) Provide for analysis to determine the affects of failures of selected pieces of special test equipment (STE) and test support equipment (TSE) on operational equipment.

c. Identification of mission critical hardware elements whose hardness might be degraded during routine operational life. The analysis process shall identify the hardness degradation modes.

5.1.4.2 Failure mode analysis phase

5.1.4.2.1 Pre-PDR phase. Firm detailed design requirements shall be established during this phase. Proposed hardware design solutions shall be evaluated for failure characteristics, rates, and system operations impact. The analysis documentation includes: engineering studies, functional flow diagrams, detailed functional analysis forms, failure mode analysis data, and fault matrices.

5.1.4.2.2 Pre-CDR phase. During this phase the failure mode analysis shall be completed for the recommended designs. Results shall be coordinated between concerned contractors to resolve interface fault-mode reactions. All fault characteristics of a CI shall be translated into functional and maintenance analysis data and fault matrices for review and approval at the CI CDR.

5.1.4.3 Critical fault assessment. During the conduct of AVE/OSE failure mode analysis, and the development of fault matrices, any critical fault modes shall be uniquely identified and eliminated by design (or at the direction of SAMSO protected through definition of operational or support system activities and resources). Critical fault modes fall into the following typical categories:

a. Loss of missile operational command and status control regarding such functions as fuzing, targeting, enabling, inhibiting, launching, and determination of missile go/no-go status.

b. Loss of MLF access security status.

c. Loss of MLF/missile critical ordnance status.

d. Loss of ordnance safety features.

e. Loss of MLF critical equipment status.

f. Malfunction of critical equipment functions such as environmental control, power, etc.

g. Loss of launch critical equipment functions that are not detectable in the remote control system.

h. Loss of redundancy features.

i. Loss of survival capability.

j. Loss of flight mission critical equipment functions.

k. Loss of missile launch control center (MLCC)/operations control center (OCC)/Higher Headquarters critical functions.

Critical faults, and control thereof, shall be specifically defined in the analysis not later than the CDR, desirably no later than the PDR. To assure attention to this type of fault, a summary technical evaluation shall be presented at the CI PDR and be updated for the CDR. It shall summarize all critical faults identified during the failure mode analysis and indicate the actions taken to eliminate the problem. It shall tie together the failure mode analysis, the design data, fault matrices, man-machine interface, and the maintenance and operating requirements presented for the design review. If there are residual critical undetected failures, the contractor shall define the design required to provide detection.

5.1.5 Emergency analysis. In conjunction with critical fault assessment, contractors shall investigate possible emergencies.

5.1.5.1 Typical emergencies. The following are typical emergency situations that should be investigated:

a. Disarming ordnance when monitors thereof indicate unsafe conditions.

b. Electrical power shutdown required to prevent or eliminate destruction of power distribution or consumer equipment.

c. Recovery from leakage of toxic gases/fluids.

Emergencies that involve remote actions by the operating crew, e.g., MLF security alarms, or critical launch status control, are covered in the analysis of the operational functions. Emergencies that require immediate, but routine, maintenance actions using existing system elements, are covered in the fault matrix and maintenance analysis forms.

5.1.5.1.1 Emergency investigations. Emergency investigations shall be based on reviews of the fault conditions predicted through failure mode analysis and system safety analysis programs. Possible operator-induced hazards defined in the human factors and safety analysis shall also be considered in this investigation. Investigations shall identify situations that require definition of weapon system AVE, OSE or MSE detailed design requirements, and operating and maintenance procedures to control emergency possibilities.

5.1.5.1.2 Frequency of occurrence. Whenever the frequency of occurrence of the emergency does not warrant the provisioning of system elements, the contractor shall so recommend and shall obtain SAMSO concurrence.

5.1.5.1.3 Emergency analysis definition. When weapon system unique elements of emergency analysis require definition, this definition must include operating and/or maintenance crew functions. This starts with the identification of the condition through the sequence of activities and ends with removal, control or turnover of the emergency to special emergency teams such as the explosive ordnance disposal (EOD) teams, teams dispatched from a centralized depot, or other Air Force teams not unique to the weapon system. When a special unique team is identified, its requirements shall be defined.

5.1.5.2 Emergency analysis schedule. Because the contractor must scope this analysis to interface with existing Air Force capabilities, or Air Force capabilities to be provided by other means, the initial investigation of emergencies shall be reviewed with SAMSO to define these interfaces. (This should be initiated prior to SDRs. The analysis shall be completed no later than CDR for affected configured items.

5.2 Logistics support analysis (LSA)

5.2.1 General. The LSA is an integral part of the systems engineering process and shall be accomplished in conjunction with system/equipment design to evaluate the affects of design alternatives on support costs and operational readiness, to assess logistics risks and to identify optimum support requirements. The impact of support alternatives upon system/equipment life cycle cost, availability, equipment and manpower loading, and stocking of parts shall be predicted and evaluated. The LSA shall identify logistics resources required for preoperational A&CO, test and operational phases of the system/equipment at all levels of maintenance. The logistic resources shall be defined in terms of:

a. Support and test equipment

b. Supply support

c. Transportation and packaging

d. Technical data

e. Support facilities

f. Personnel and training.

5.2.1.1 LSA tasks. Logistics Support Analysis is a series of tasks which shall be accomplished by the contractor in conjunction with the other elements of system requirements analysis, life cycle cost/design to cost analysis, and design engineering efforts. There is much interdependency among these efforts because results from one impact the others. The logistics support requirements of system/equipment are initially identified by the analysis via the maintenance flow diagrams and attendant Forms B. As the design/development activities progress, the LSA is further documented on LSAR data sheets, maintenance timeline diagrams and AFSI forms. These LSA data, documenting the support requirements, shall be prepared incrementally during the analysis as the requirements are

defined. The LSA data forms are designed to follow a logical flow of support activities starting at the highest indenture and installation level (at the system installed facility) and ending at the lowest repairable assembly level and associated repair area. This section contains the specific tasks that shall be accomplished by the contractor in the performance of a logistics support analysis. The results of the LSA tasks shall be recorded in the appropriate LSA data format as shown in Appendix B.

5.2.1.1.1 Use study. Studies on the use of the proposed system/equipment shall consider such factors as mobility, mission frequency and duration, operating environment, basing concepts and anticipated service life as they relate to the operating requirements. Resulting data shall include, but not be limited to, annual operating requirements, consisting of number and duration of missions and number of operating days; number of systems supported; transportation time sequences; support profiles; allowable maintenance periods; and environmental requirements.

5.2.1.1.2 Historical data review. Historical data shall be reviewed to relate past experience to the logistic support requirements of the new acquisition. This review shall utilize supply, maintenance and operational information from existing systems, and other Service or contractor information as appropriate. The review will consider:

a. High rate failure potential of subsystems, components, items, etc.

b. Major downtime contributors.

c. Specific design features which will enhance logistic support.

d. Potential logistic support problem areas to include design features degrading ILS.

e. Design concepts with potential safety impacts.

f. Design characteristics versus support costs.

g. Gross requirements for logistic support resources such as manpower, equipment, transportation and facilities.

These historical data establish a basis for logistic support requirements for new acquisitions and provide indications for special attention if significant deviations from established support concepts are noted. Data may furnish insight to justify new approaches or significant departures from traditional concepts. Such changes may consist of reducing or increasing the allocation of resources for maintenance, establishing different support procedures, reallocating maintenance workloads among the different levels of maintenance, or changing the concept for built-in versus manual checkout equipment. The identities, sources and application of historical data must be clearly defined to facilitate verification by the procuring activity.

5.2.1.1.3 Design projections. Design projections are conceptual systems/design engineering efforts to meet the stated operational requirements. Engineering and logistics personnel shall participate in the engineering process to assure a balance between design and support requirements. Design projections influenced by historical data, support functional requirements, and constraints imposed by existing logistic systems shall be utilized as system design progresses to definition of hardware. They shall form the basis for support syntheses and cost analyses.

5.2.1.1.4 Functional requirements identification. Support functional requirements such as inspection, calibration, repair, and replacement shall be identified as a frame of reference for developing support approaches. This identification shall be accomplished in time to provide a basis for concurrent consideration of support requirements and critical design decisions. Functional requirements identification shall progress from gross functional levels, possibly with no mention of hardware in the conceptual stage, to a more formalized identification during full-scale development when hardware has been definitized.

5.2.1.1.5 Support synthesis. Support synthesis is the identification, description and assembly of all support approaches into alternative support systems for examination in tradeoff analyses. Support synthesis shall be used to provide an organized basis for the examination and selection of the support system that best provides economical, effective support of mission requirements. The contractor will consider each support parameter within restraints imposed by operational requirements and cost effectiveness. A functional model or procedure with quantification is useful on all except the most minor acquisitions. LSA data elements will be selected appropriate to the modeling technique used and the outputs required for the specific system/equipment procurement. Three basic areas shall be considered in performing the synthesis:

a. Variables representing the system/equipment must meet the purpose of the investigation.

b. The scope of the representation must be adequate.

c. Care must be taken in the manner of describing the synthesized support system. Characteristics of each approach will be defined and quantified.

5.2.1.1.6 Tradeoff studies. The tradeoff analysis shall be a part of the continuous dialogue between support and design personnel which is an inherent part of system development. Optimum benefits are realized when this analysis identifies problems and causes design versus support tradeoff decisions before the design is finalized. The nature of the tradeoff models or special techniques to be used and the magnitude, scope and level of detail of the analysis will depend upon both the acquisition phase and the system complexity. Tradeoffs early in the program will be interdisciplinary and broad in scope. Restraints will be based upon the cost, delivery schedule, and gross estimates of operational capability and system concepts. As development progresses, tradeoffs are progressively refined. Inputs become increasingly more specific and outputs influence a smaller number of related parameters. Tradeoffs between support alternatives identified during

support synthesis and equipment design parameters are made to provide an effective, economical support system which best satisfies system operational requirements. The analysis normally involves the following considerations:

a. The initial effort will be directed toward identifying support alternatives without consideration of the system/equipment. Alternatives which are patently unacceptable will be retained on record but will be omitted from in-depth consideration.

b. Following refinement of design/support/cost factors bearing upon the tradeoff analysis, a model or manual procedure will be used to simulate the interrelationship of these factors. It is emphasized that the validity of tradeoff decisions is directly dependent upon the completeness and thoroughness of the study. The model (or procedures) will then be used to weigh the various factors as to importance and sensitivity. Care will be exercised to keep relationships in proper perspective relative to their importance.

c. The full reasonable range of various alternatives and related parameters will be examined. Results, including the rationale for selection and rejection of alternatives, will be recorded and documented. The primary objective of the documentation is to define parameter relationships for subsequent iterations and refinements. Final disposition of such documentation will be as directed by the procuring activity.

5.2.1.1.7 Cost factors. Cost factors in the analytical tradeoff process shall be used in deriving the life cycle cost of the development, procurement, deployment, operation, and support of proposed and selected alternatives. Whenever possible, cost factors will be based upon pertinent data provided by the procuring activity from surveillance of operational systems. These factors may be measured in terms of manpower, equipment, facility space, and supplies normalized to dollars to provide visibility to the decision maker.

5.2.1.1.8 Maintenance timeline analysis. Contractors shall conduct "time performance" studies to provide (a) technical evaluation of equipment and personnel reaction times, and (b) analysis and evaluation of support system characteristics. Timeline analysis shall be performed for the (a) on-site maintenance function, and (b) certain selected activities to be performed at the maintenance areas. Contractors shall determine composite timelines as needed to support evaluation of proposed designs (specific requirements for these analyses will be resolved during technical interchanges with SAMSO).

5.2.1.1.8.1 Structure. The structure of the timelines, shall, whenever possible, match the structure of the functional flows. For the maintenance phase, timeline analysis will provide the basis for determining the required quantities of MSE, personnel, spare parts, and to determine system downtime for scheduled and unscheduled maintenance.

5.2.1.1.9 Logistic design appraisal. A logistic design appraisal shall be an integrated part of program and design reviews held for the system, subsystems, or equipment. As a minimum, logistic design appraisals shall be conducted (a) upon completion of conceptual design; (b) prior to the release of design drawings for full-scale development; and (c) upon completion of full-scale development. Informal support system design appraisals will be conducted at lower system indenture levels throughout full-scale development. The primary objective of the appraisal is to evaluate the projected design, and finally the actual design upon completion of the full-scale development phase. The system/equipment design is reviewed for incorporation of logistic requirements from early in the program initiation phase through full-scale development. Specifically, the design appraisal shall consider the following:

a. Logistic support for the total system.

b. Physical configuration to include, but not be limited to, structural arrangement, installation, controls, displays, mounting, accessibility of subcomponents, and transportability.

c. Maintainability considerations such as performance monitoring/built-in test/built-in test equipment, on-line versus off-line test equipment, component interchangeability, modularization, accessibility, criticality, standardization and human engineering factors.

d. Component reliability or malfunction rate/mode of subassemblies.

Subsequent to the support system design appraisal, a systematic follow-up shall be performed to insure incorporation of changes defined for logistic considerations.

5.2.1.1.10 System impact review. Reviews to determine impacts of the proposed system/equipment on the other logistic and operational requirements of the weapon system shall be performed. Conversely, impacts of the proposed support system on the system/equipment under development are continuously examined throughout the LSA. Interface requirements which necessitate changes to other systems must be identified and entered into system requirements documentation; e.g., specifications, standards, etc. This analysis assures that the support requirements for the system/equipment under development are not designed as separate entities. Early system impact review accomplishes the first mating of the system performance requirements with the requirements of the Air Force overall logistic system. The concepts, policies, and principles established by operations and logistic support studies form the constraints of the support system design, and must be compatible with mission and effectiveness requirements of the system/equipment. These concepts, policies, and principles dictate allowable logistic resources and are the basis for statements of early requirements. Depot workload and scheduling, provisioning and inventory factors, personnel factors, training requirements, and the transportation process will be examined.

5.2.1.1.11 Logistic requirements identification. Logistic resource requirements associated with the proposed design configuration shall be identified and refined as the proposed system/equipment progresses through full-scale development. The extent of identification depends upon the magnitude and complexity of the system/equipment. As development progresses and the basic design configuration is established, the identification becomes a process of analyzing specific design data to more completely define support system requirements. The operational, preoperational A&CO and test support requirements will be covered.

5.2.1.1.11.1 Maintenance planning. The maintenance plan for the system will form the basis for tracking the other elements of LSA. Initially, the LSA strives to establish concepts and goals that the program must achieve in regard to the maintenance characteristics of the system. Throughout full-scale development, LSA documentation shall keep pace with and reflect the current state of proposed maintenance for the system. This is done by describing to increasingly lower indenture levels the maintenance and supply support required by the system. Data required from the LSA for detailed definition of the maintenance plan include the maintenance concept; reliability and maintainability parameters and requirements; maintenance tasks (time and skills); descriptions of maintenance organizations; broad support and test equipment requirements; maintenance standards; broad supply support requirements; and facilities requirements. Optimum repair level analyses (ORLA) shall be conducted to establish the maintenance level at which each hardware item will be replaced, repaired or discarded. The repair level determination shall provide the initial basis for maintenance planning. The necessity for an economic evaluation will be determined as early as possible. A non-economic engineering evaluation, which examines such factors as item size, safety requirements, technical feasibility of repair, and required support and test equipment will always be performed. The economic evaluation includes cost factors pertaining to operations, preventive maintenance, repair, inventories, documentation, and disposal. Detailed non-economic and economic (when required) repair level determinations shall be accomplished prior to completion of full-scale development.

5.2.1.1.11.2 Maintenance analysis. The contractor shall perform a maintenance analysis for each peculiar configuration item or group of configuration items of AVE, OSE, MSE and DSE. The analysis identifies maintenance functions specific to system/equipment configuration. The maintenance analysis shall identify all preventive (scheduled) and corrective (unscheduled) maintenance functions down to the lowest repairable nonstandard component. Iterative maintenance analyses provide data used in defining the resources required for maintaining the system/equipment. Specific analysis outputs include:

a. The delineation, by maintenance level, of specific maintenance tasks necessary to sustain the equipment in, or return it to, operating condition.

b. Task times and frequencies.

c. Personnel requirements (skill levels and quantities).

d. Support and test equipment, spares, repair parts, and consumables.

e. Support facility requirements.

5.2.1.1.11.2.1 Task analysis. As in many areas of LSA, the task analysis is evolutionary, performed in greater detail as the design is defined. Maintenance times and personnel requirements are estimated in the program initiation phase and defined in detail as the design progresses through the full-scale development phase. The FMA (reference 5.1.4) is the primary source of data for identification of requirements for maintenance tasks. When detailed design data are available, tasks are organized into step-by-step procedures which are used as the basis for technical data preparation. Examples of task analysis data are task descriptions, sequential actions comprising a task, task frequencies, man-hours per task, personnel requirements per task, replacement parts per task, and support and test equipment per task.

5.2.1.1.11.3 Support and test equipment. The LSA provides a comprehensive identification of support and test equipment requirements at all levels of repair. During program initiation, usable existing equipment must be identified so that development of peculiar equipment is held to a minimum. A primary data source in the determination of equipment needs is the task analysis, which also defines the skill levels necessary to operate and maintain the equipment. Support and test equipment data resulting from the LSA include complete equipment identification; maintenance level at which required; quantity of equipment required per organization per operating location; equipment function and capability; calibration requirements; and spares and repair parts lists.

5.2.1.1.11.4 Supply support. The LSA identifies system requirements by maintenance level and frequency of use, for spares, repair parts, and consumables, to include War Readiness Material when appropriate. Requirements for operations consumable supplies and material such as fuel, lubricants, oxygen, etc., are also determined. Impacts upon storage spaces, supply facilities, equipment, personnel, and procedures are evaluated for each support system approach under consideration. Supply data resulting from the LSA include spares and repair parts provisioning; consumption and usage rates; recommended allowances; supply storage requirements (PHST data); and source, maintenance and recoverability (SMR) coding.

5.2.1.1.11.5 Transportation and packaging. The LSA provides data pertaining to packaging, handling, storage and repair turnaround times to the packaging, handling, storage and transportability (PHST) program. Conversely, PHST data affecting operations, maintenance and provisioning will be inputs into the LSA. As the design evolves during full-scale development, LSA data will be continuously refined and updated. The LSA supports the PHST program in providing design feedback to insure that the system/equipment, support and test equipment, spares and repair parts are designed wherever possible, to be compatible with available modes of transportation and existing handling equipment.

5.2.1.1.11.6 Technical data. The LSA provides information from system/equipment design, operations, maintenance, and supply support which is essential for development of technical publications and provisioning lists. Levels of details

in the LSAR are progressively expanded and refined throughout full-scale development. Use of the LSAR will contribute to preparation and delivery of accurate, adequate technical publications in a timely, economical manner.

5.2.1.1.11.7 Support facilities. The logistic, test and operational SRA tasks identify and define facilities required to support the testing and maintenance functions for the system/equipment. The proposed concepts and designs for facilities shall be predicated on the specific technical requirements identified during the conduct of the SRA. Data recorded on LSAR data sheet F shall be used as a checklist of specific facility requirements. The contractor shall assure that the information recorded on LSAR data sheet F describes and justifies all proposed special or additional facility requirements which have been initially indicated on LSAR sheet D_1 during the conduct of the maintenance analysis. Sketches and other information shall be attached to the LSAR data sheet F, as required, for further definition of the proposed facility.

5.2.1.1.11.8 Personnel and training. The personnel and training requirements shall be determined on the basis of the operational and maintenance task analysis data recorded during the conduct of the SRA. The functions necessary to satisfy the qualitative and quantitative requirements for trained operations and maintenance personnel and training devices necessary to support the system/equipment is an integrated task within the Human Factors Engineering Program established in accordance with SAMSO STD 68-19.

5.2.1.1.12 LSA data verification. Verification shall be conducted continually to correct and amplify the LSA data. Initially verification will be performed to update preliminary LSA data. Later, as system/equipment design progresses, LSA verification tasks become formal evaluations to assess whether the logistic support system will effectively and economically maintain the CI. Data feedback from maintainability demonstrations, support and test equipment compatibility tests, and technical publications validation and verification actions must be assured to provide corrections to affected LSA data.

5.2.1.1.13 Engineering interfacing. Interfacing with engineering provides those system and design engineering inputs which are essential to the performance of the LSA. The following paragraphs discuss those engineering factors which directly affect the LSA.

5.2.1.1.13.1 Failure/reliability factors. The system/equipment failure mode analysis (FMA), conducted in accordance with this document, and the reliability program, conducted in accordance with MIL-STD-1543, provide the following types of input data to the LSA: reliability apportionment/predictions; the effects of storage, shelf life, packaging, transportation, handling and maintenance on reliability; failure mode analysis (FMA) data; and a preferred parts list. These data interface with and are impacted by the PHST and system safety programs. Examples of FMA data inputs to the LSA are item failure modes; failure rates; failure symptoms; failure criticality; and detection methods.

5.2.1.1.13.2 Maintainability factors. The system/equipment maintainability program, conducted in accordance with MIL-STD-470, provides detailed qualitative and quantitative maintainability design requirements and maintenance planning factors as inputs to the LSA. Maintainability analysis data include design criteria, allocation of requirements and predicted/measured performance values. The performance values which interface with the LSA are discussed below:

a. Maintainability predictions provide system/equipment maintainability parameters used in estimating system maintainability values associated with hardware indenture levels. Initially, quantification may be limited by uncertainty of design and scarcity of data. Best estimates will be used in conjunction with LSA data pertaining to repair levels, logistic support resources and optimized support characteristics. During full-scale development, prediction techniques will provide quantitative estimates of maintainability parameters for use in identifying design features requiring corrective action and in determining logistic support requirements. Examples of maintainability predictions, which are inputs to LSA, include mean-time-to-repair; mean-downtime; and maintenance man-hours.

5.2.1.1.13.3 Human engineering factors. The human engineering program, established in accordance with SAMSO STD 68-19, provides maintenance task analysis data as LSA inputs for use in defining resources required to support the system/equipment. This data corresponds to that provided to LSA from the maintenance task analysis.

5.2.1.1.13.4 System safety factors. The system safety program, implemented in accordance with MIL-STD-1574, generates requirements for control of hazards. The controls are normally incorporated in the system design but can also result in requirements placed against ancillary portions of the system which directly affect support system engineering and provisioning. Examples of requirements resulting from various system safety hazard analyses are: explosive quantity-distance constraints, launch facility or launch pad configuration constraints, specialized vehicle requirements for transport of hazardous materials, specialized equipment requirements for detection of hazardous conditions, fire protective equipment, emergency rescue equipment and personnel protective equipment requirements, plus the associated impact of all the above on personnel training and training material.

5.2.1.1.13.5 Nuclear hardness and survivability (NH&S) factors. This element is a characteristic of the design and is expressed as an engineering parameter. NH&S parameters shall be developed per SAMSO STD 77-8 as quantitative inputs to the design process and utilized in tradeoff analyses. The goal of NH&S interface as an LSA element is to assure that the level of system hardness provided for in the basic system design is not inadvertently degraded as a result of routine operational and maintenance functions and that unacceptable levels of hardness degradation do not occur as a result of the stresses of operational life, such as aging, corrosion, etc. Results of the NH&S program shall be utilized in developing NH&S data for the LSA.

5.2.1.1.14 Logistic support management information. A management information system shall be implemented for the purpose of integrating logistic support management data. The following data shall be available from the logistic support management information system:

a. LSA control documentation and support engineering test and demonstration reports.

b. Support program schedules and cost controls.

c. Standard system and equipment support codes and item identification procedures.

d. Identification of each support element's specific data needs.

e. Directed configuration management accounting and control procedures.

f. Supply management effectiveness reporting systems which reflect current demand and usage data.

g. Supportability versus performance design tradeoff studies.

5.2.1.1.15 Logistic support resource funds. Based upon information contained on the LSAR data sheets and other sources, resource fund requirements for the logistic support of the system/equipment shall be developed. Information to be used in developing these funding requirements shall include, but not be limited to:

a. Demands on the support system resources based on operating and maintenance characteristics.

b. Support equipment loading information obtained from support equipment, spare parts, and personnel requirements data recorded on applicable LSAR sheets.

c. Requirements for facilities, technical data, transportation and handling, and other significant support items.

5.2.1.1.16 Optimum repair level analysis (ORLA). The maintenance planning process shall include an ORLA to evaluate all off-equipment maintenance alternatives identified during the LSA. This analysis shall make use of the general decision process presented in AFLCM/AFSCM 800-4 to determine those tasks that will require a detailed economic analysis so that a valid repair decision can be reached. The results of the ORLA process shall be documented in accordance with the CDRL.

5.2.1.2 Nonduplication of effort. LSA planning shall identify coincident program data to be utilized in the LSA, and LSA data to be provided to coincident programs. Duplication of contractor effort shall be avoided.

5.2.1.3 LSA candidates. System/equipment items for which the government does not have an established maintenance analysis shall be candidates for LSA. The contractor shall recommend LSA candidates in consonance with this requirement. In general, an analysis of the following types of material is required:

a. Contractor-furnished equipment which can or will be repaired or overhauled separately from the assembly, subsystem or system with which they are functionally associated.

b. Government-furnished equipment which are incorporated into contractor-furnished functional assemblies and subsystems, when such analyses are to provide interface information required for determination of total support requirements for the assembly or subsystem.

c. Government-furnished equipment for which no previous analysis data are available, and where such data are necessary for contractor determination of support requirements under the terms of the contract.

5.2.2 Zero indenture logistics support analysis. Zero indenture LSA is conducted whenever additional support functions or elements must be defined for a group of AVE or SE CI (zero indenture). Additional support functions and elements are those which are not defined by maintenance analysis.

5.2.2.1 Zero indenture areas. The contractor shall identify requirements for this LSA to SAMSO for:

a. Critical fault ambiguities documented in the fault matrices during the failure mode analysis (Appendix A, 50.6).

b. Other actions associated with groups of CIs not directly related to failure modes such as checkout, alignment, calibration, etc.

A critical ambiguity exists when testing and checkout requires procedures or equipment not identified by the individual system/equipment data and the total failure rate of all contributing failures exceeds a threshold value to be established by SAMSO or designated contractor. Associate contractors shall provide support as required to assure proper definition and identification of system elements associated with their equipment involved in the ambiguity. Guidelines for defining those ambiguities which will require additional analysis will be provided by SAMSO.

5.2.2.2 Responsibility. The zero indenture analysis will be accomplished by SAMSO (or at the direction of), coordinating with interfacing contractors as applicable. Contractors shall provide support as required to assure proper definition and identification of system elements associated with their equipment involved in the ambiguity. SAMSO establishes the appropriate guidelines, thresholds, etc., for defining which ambiguities require additional analysis to support weapon system maintenance activities.

5.2.2.3 Non-fault ambiguity analysis. Zero indentured analysis developed for other than fault ambiguities shall be accomplished by the contractor responsible for the configured items involved. If more than one contractor is involved, SAMSO will designate preparing and supporting contractors.

5.2.3 Critical-to-launch spares. As an integral part of the logistic support analysis and the operational system requirements analysis, those elements of the system that are considered critical to the missile launch function shall be identified. These analyses shall provide the basis for preparation of repair parts lists, inventory control procedures, and consumption/usage reporting. A critical-to-launch spares report shall be prepared. These items shall reflect the results of the critical fault assessment as defined in 5.1.4.3 of this document.

5.2.4 Software considerations. During the design, development and operation of software systems, consideration shall be taken for logistic support and supporting tape copies, storage facilities, handling containers, and appropriate security considerations.

5.2.5 Calibration requirement summaries. Calibration requirement summaries shall be based on, and maintained compatible with, the analysis conducted under this document.

5.3 Test planning analysis

5.3.1 System test activities. The basic system test activities flow is shown in figure 4. This flow shows the elements of system test planning, starting with the system functional requirements and resulting in the system compliance report. The instructions for the preparation of analysis data are contained in Appendix C. The elements are described below.

5.3.1.1 Subsystem and system specifications. Subsystem and system specifications shall be used as the basic requirements for test planning. The specifications are prepared per Appendix A, 50.5.1. The system specifications are prepared by SAMSO and subsystem specifications may be prepared by SAMSO or by the contractor responsible for the subsystem.

5.3.1.2 Interface control documents. The interface control documents (ICDs) and the specifications are the source of test planning requirements. ICDs are created between interfacing configuration items by the design and development contractors per Appendix A, 50.4.

5.3.1.3 Integrated test plan. The results of SAMSO's preliminary test planning analysis (TPA) for system level testing and the required system level analyses which are conducted in lieu of tests are documented in the integrated test plan (ITP).

5.3.1.4 Test matrices. Test matrices will be used by SAMSO in the management of the program. Some of the uses will be as follows:

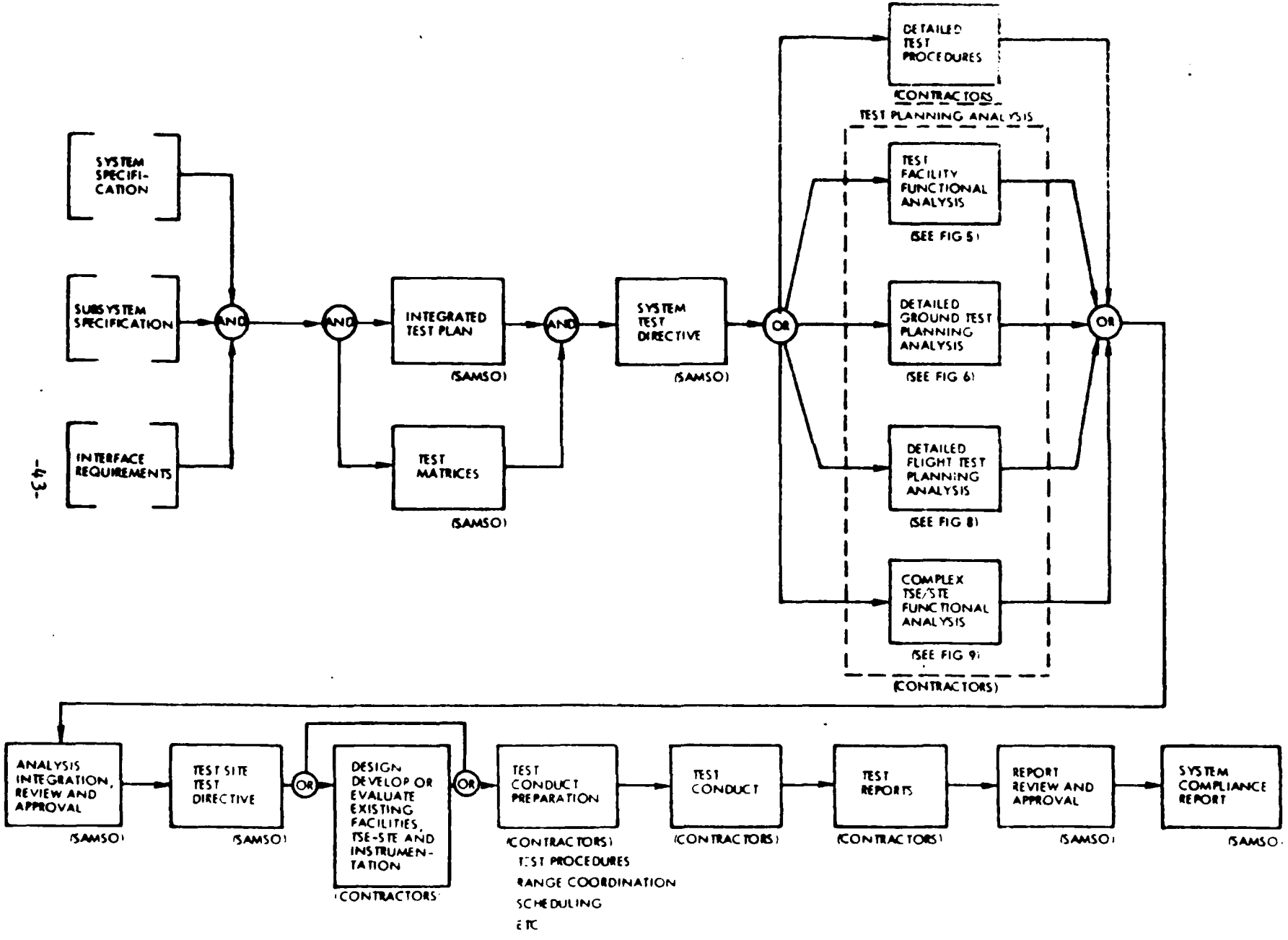


FIGURE 4. System Test Flow

a. Allocation of a particular specification requirement, ICD requirement or other types of requirements which are to be verified during specific system tests.

b. The tracing of compliance verification for requirements which will be accomplished during system tests.

c. The documentation of program progress and overall planning.

d. Expansion and clarification of ITP test and analysis objectives.

The primary document will be the test compliance and allocation matrix. Submatrices such as the flight test matrix or ground test matrix will be used to establish visibility for the management of various test and evaluation efforts. SAMSO will maintain the matrices consistent with current requirements. The details of the matrices, for each test, will be documented in the system test directive(s) (STDs) which authorize the test planning analysis.

5.3.1.5 System test directives. The SAMSO prepared and issued STDs constitute Air Force direction to contractors to implement a test planning cycle. The STD defines the major test objectives, configuration requirements and applicable sections of the ITP and/or applicable sections of the matrices to be used as inputs for the test planning analysis. The STDs may be applicable to single or multiple test increments.

5.3.1.6 Detailed test procedures. The test planning analysis does not have to be performed for simple tests or for tests that have sufficient information or previous test planning. The test conductor may be directed by the STD to write test procedures directly from the STD and bypass the test planning analysis process.

5.3.1.7 Test planning analysis. TPA is the approach for defining requirements and conducting/planning for system test program activities involving both hardware and software. TPA includes identification of detailed test objectives, special test equipment (STE) requirements, test support equipment (TSE) requirements, instrumentation requirements, test facility requirements, success criteria, and documentation for each test in the program.

5.3.1.7.1 Types of TPA. TPA consists of four basic types of analysis (reference figure 4) in developing the requirements for a test program. These analyses are described below.

5.3.1.7.1.1 Test facility functional analysis. For new test facility development or major facility modifications, a functional analysis shall be conducted to identify facility and associated support equipment design requirements. A typical top level flow for this type of analysis is shown in figure 5. This analysis will be based on consideration and satisfaction of each applicable requirement and basic constraints listed in Appendix V of MIL-STD-490. The support equipment requirements will be generated from the TPA into TSE requirements as defined in

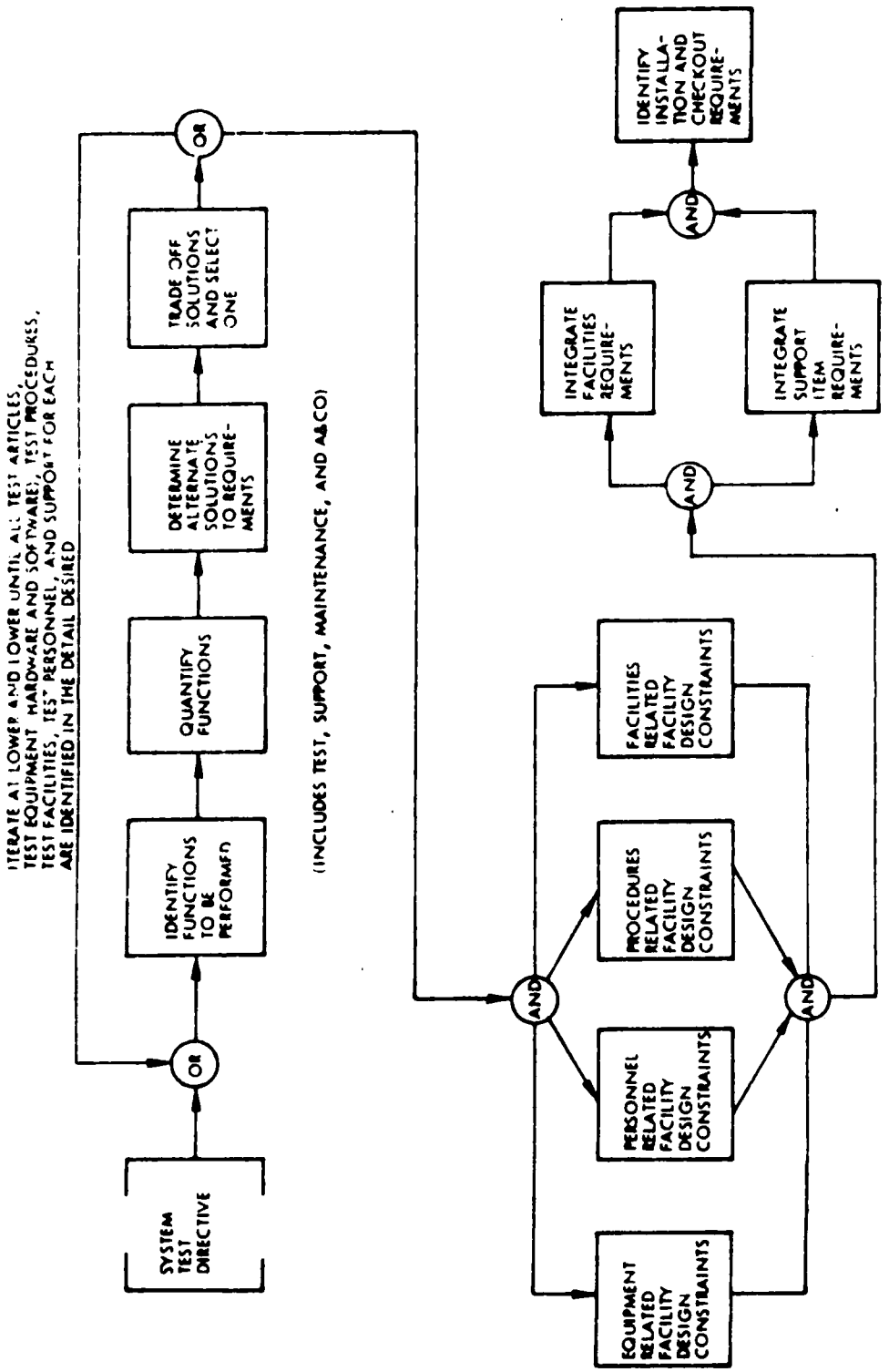


FIGURE 5. Test Facility Functional Analysis

this document. Minor facility modification required in support of ground tests or flight test processing shall, at the direction of SAMSO, be integrated into the associated ground or flight test planning analysis.

5.3.1.7.1.2 Detailed ground test planning analysis. Detailed ground test planning analysis shall be conducted to develop test Form Bs and to develop any new TSE, instrumentation, facility or test support requirements. A typical flow is shown in figure 6.

5.3.1.7.1.3 Detailed flight test planning analysis. The detailed flight test planning analysis shall functionally analyze the planning for each flight test from receipt of hardware/software on-site through completion of the flight. This shall be accomplished by first developing a baseline functional analysis for each similar series of flight tests (i.e., pad launched flight tests, etc.). The analysis, for each flight of a series, shall then document only the changes from the baseline functional analysis. The detailed flight test planning analysis baselines break down into two basic parts:

a. The flight test processing of hardware/software and associated ground tests

b. The flight test planning.

The flight test planning portion of the detailed flight test planning analysis baseline for all flight test series shall be developed using the operational SRA flow for performing the missile flight mission which contains the basic operational test and evaluation functions. The ground portion of the baseline will be based primarily on the ground processing requirements which should be as similar as possible to the operational SRA but as constrained by hardware/software, facilities and range safety requirements. Top level flows of the detailed flight test planning are shown in figures 7 and 8.

5.3.1.7.1.4 Complex TSE/STE functional analysis. When it is determined by SAMSO that a proposed TSE/STE is sufficiently complex that the requirements cannot be developed from existing or planned TPA, a functional analysis shall be conducted to develop the functional and design requirements of the TSE/STE. A typical flow is shown in figure 9.

5.3.1.7.1.5 A&CO test planning. Tests of A&CO procedures and equipment may be accomplished using the A&COTA instead of TPA.

5.3.1.8 Analysis integration. The integration function for the TPA effort can be performed by SAMSO, a contractor, or a combination of both. Different contractors may be selected for the integration function for each test site as program and test site requirements dictate. Those contractors that have TPA support responsibilities will provide inputs to the TPA integrator in accordance with each contractor's CDRL. Technical interchange meetings will be held to review the incremental release of the TPA. At these meetings the TPA for each increment is reviewed by SAMSO and the contractors regarding test adequacy, program progress, schedules, design changes, test planning changes, and problems. The TPA increment will be approved by SAMSO.

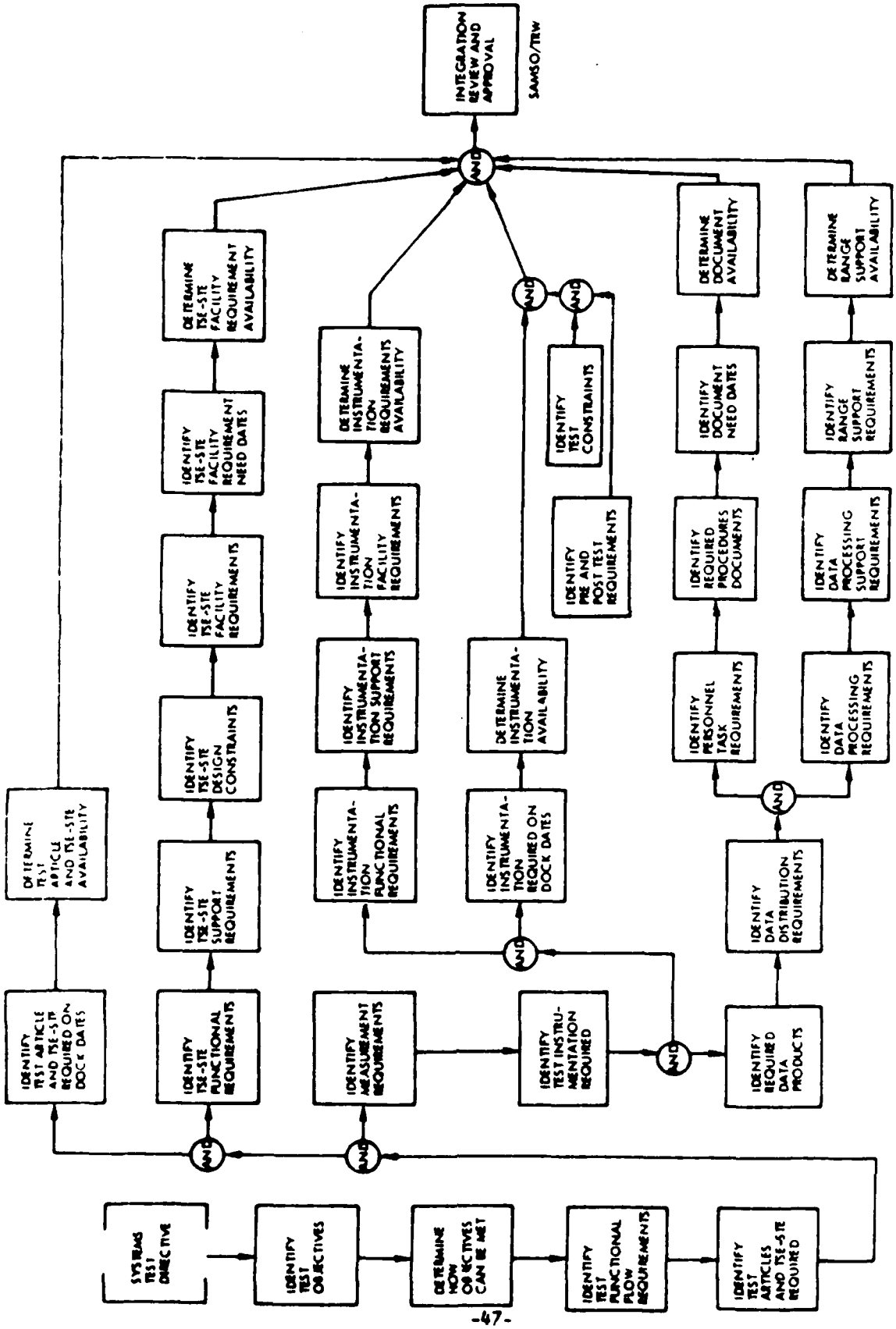


FIGURE 6. Detailed Ground Test Planning

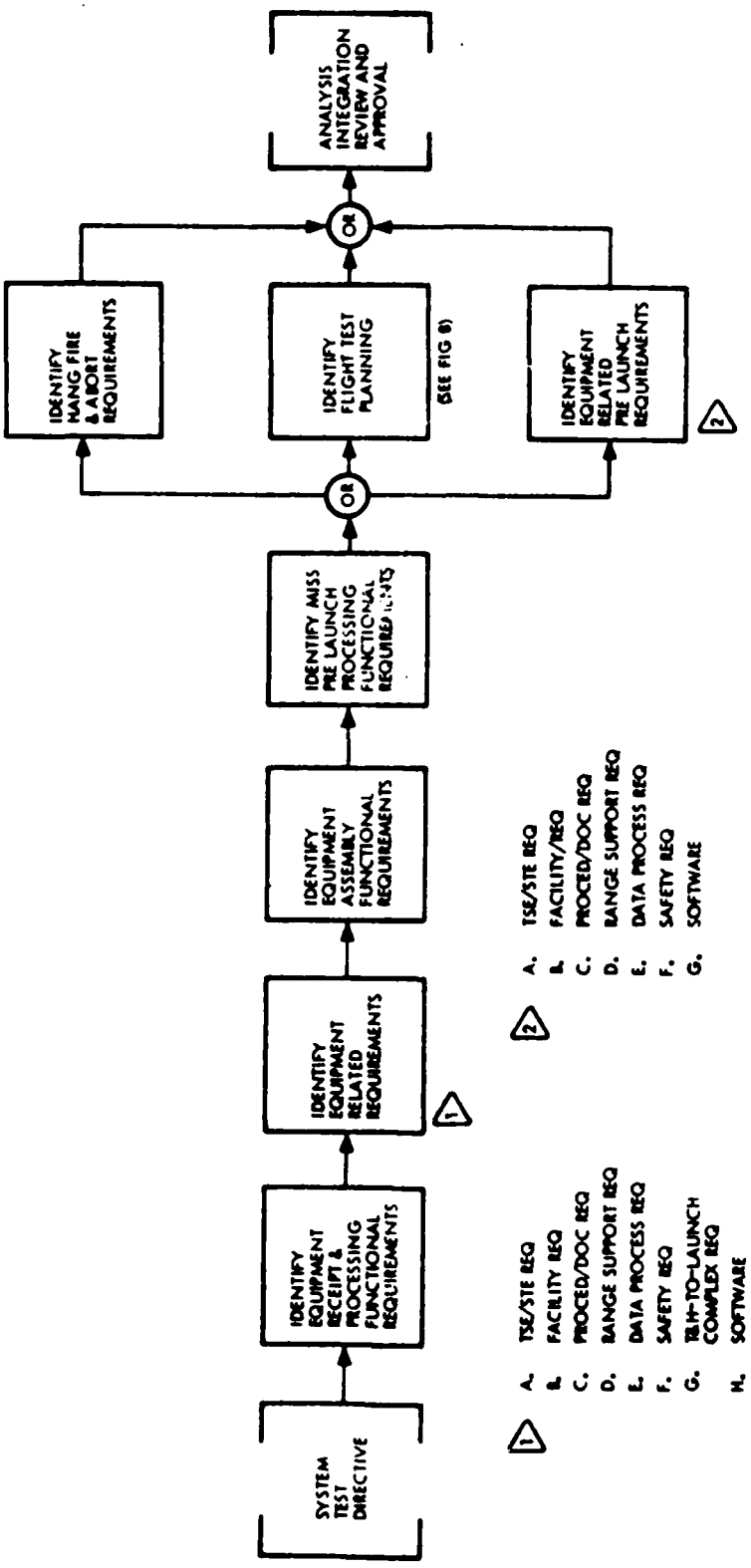


FIGURE 7. Flight Test Ground Processing Functional Analysis

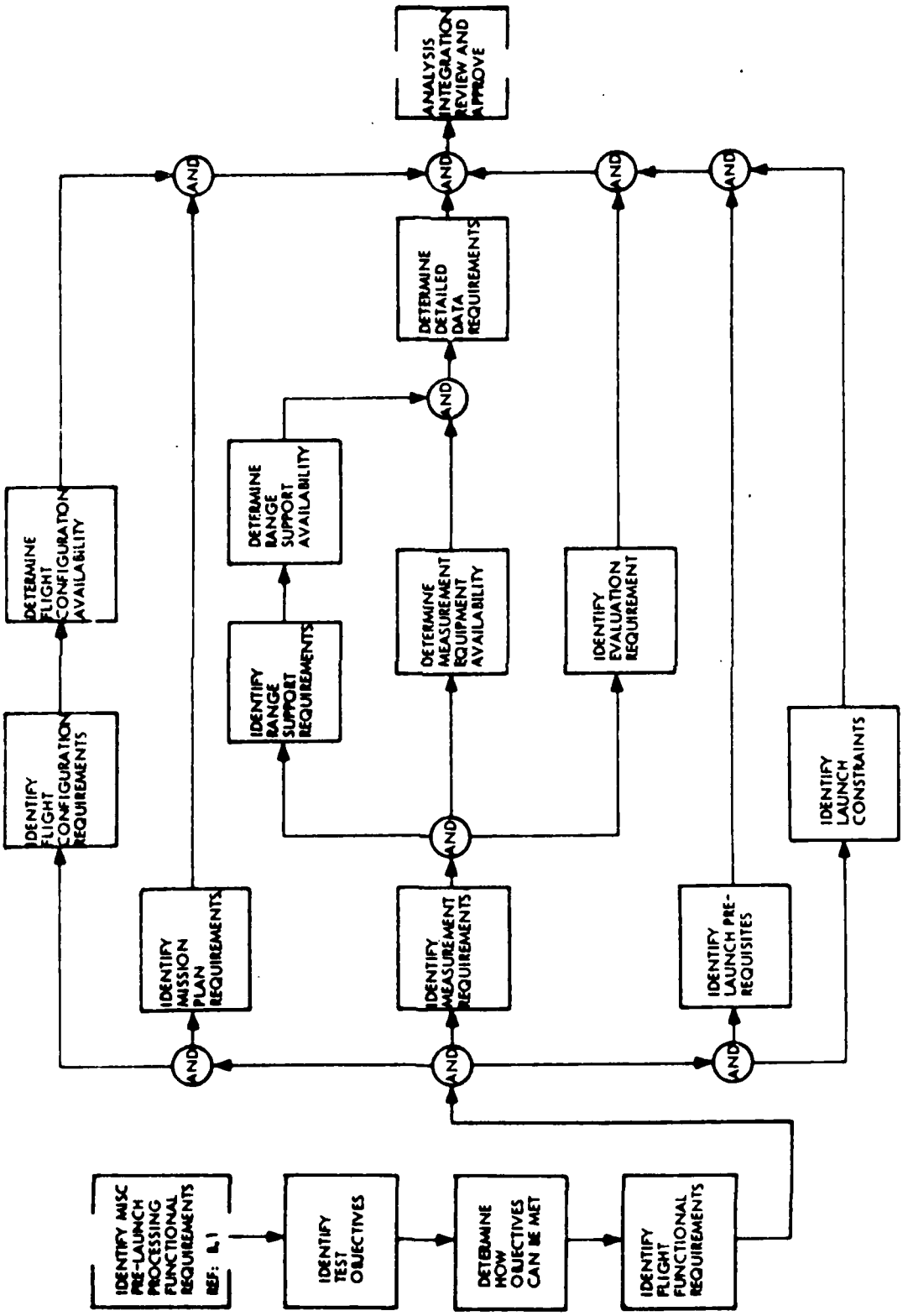


FIGURE 8. Identify Flight Test Planning

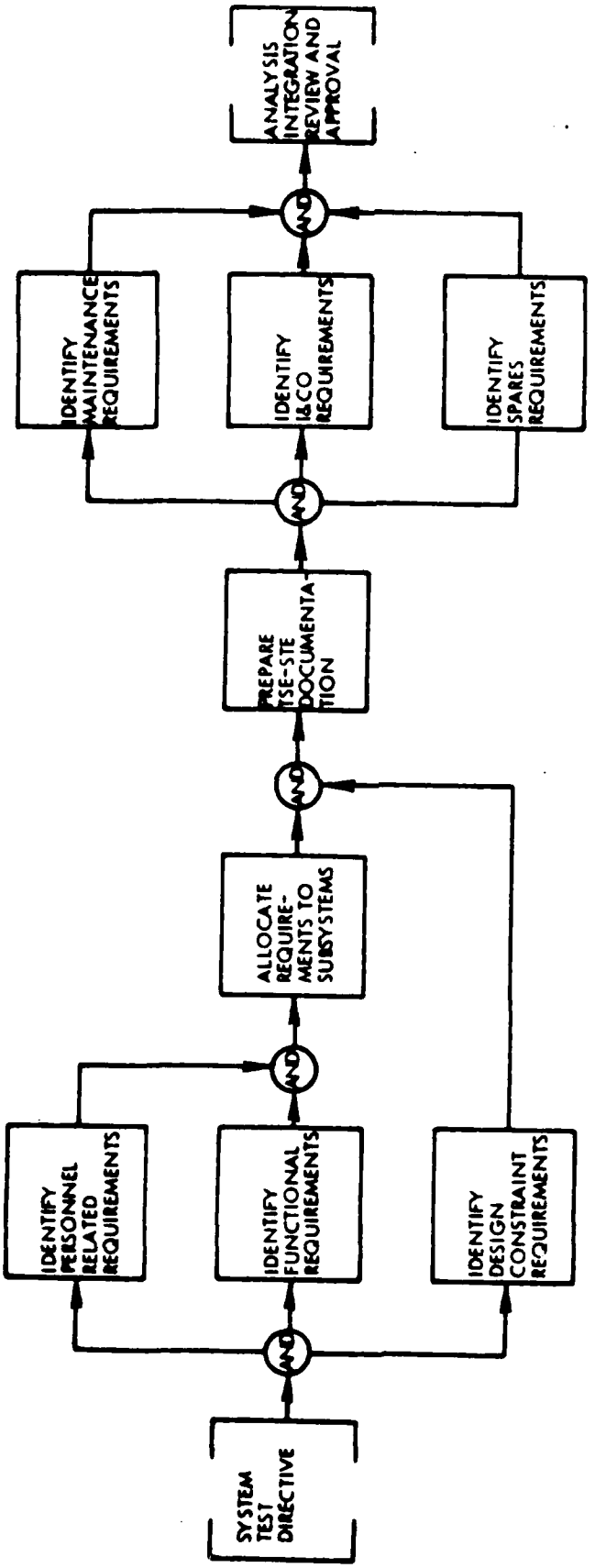


FIGURE 9. Complex TSE/STE Functional Analysis

5.3.1.9 Test increment implementation. To implement the program directed by the Test Site Test Directive, the contractor shall:

a. Design/develop facilities, TSE/STE and instrumentation

b. Prepare test conduct procedures, range coordination, scheduling, etc.

c. Conduct the test

d. Prepare or support preparation of test reports by test evaluation teams.

In support of this activity, SAMSO will:

a. Review and approve test reports

b. Prepare a system compliance report which will identify which system requirements have had compliance demonstrated.

5.4 Assembly, installation and checkout technical analysis

5.4.1 General. The assembly, installation and checkout (A&CO) technical analysis (TA) is the systematic approach to provide the necessary planning information for conduct of an optimized A&CO program. The instructions for the preparation of analysis data are contained in Appendix D.

a. The A&COTA shall be conducted in two phases. The first phase of analysis shall be conducted during the weapon system preliminary design period to define impacts on deployment. The second phase of analysis shall be conducted later in the design period to define and document A&CO requirements.

b. Analysis shall be applied to all phases of A&CO activity conducted at operational sites and weapon system test beds where it is necessary to install, assemble, checkout and verify proper operation of weapon system elements or test support equipment prior to delivery to a using Air Force command or other agency. A&CO of weapon system test beds shall be conducted as tests. The requirements for A&CO tests shall be determined from an A&COTA and shall not deviate from the operational A&CO except to accommodate unique test bed configurations.

c. Analysis inputs to an A&COTA integrator shall be in accordance with the statement of work. The integrator shall integrate inputs to form a baseline for an A&CO program. The integration function may be performed by SAMSO, a contractor, or combination of both.

5.4.2 A&COTA objectives. The primary objective of the A&COTA is to perform the required detailed analyses and associated trade studies necessary to provide an approved A&CO program at lowest cost. The approved integrated TA becomes the baseline for the planning and conduct of the A&CO field effort. The specific objectives of the A&CO analysis are as follows:

a. The development and update of top level A&CO functional flows (master flows).

b. The definition of detailed technical requirements and their associated success criteria.

c. The definition of necessary tasks to be performed to satisfy the technical requirements.

d. The identification of A&CO equipment (ACO) to be used for installation, assembly, and checkout.

e. The identification of technical procedures necessary to perform each task.

f. The identification of facility requirements necessary to perform A&CO activities, reference Appendix V, MIL-STD-490.

g. Specification of minimum mandatory sequencing of A&CO activities.

h. The definition of weapon system element design impact on deployment.

5.4.3 Requirements for analysis. The following requirements for analysis shall be considered:

a. The contractor shall base the analysis on A&CO criteria and other source data as specified in the contract statement of work.

b. The analysis shall be conducted in a manner that will reveal desirable changes to the criteria and source data to more effectively meet A&CO objectives. Changes shall be supported by back-up trade studies.

c. All detailed analyses and trade studies conducted shall consider each functional A&CO activity interms of required manpower and time, equipment and technical data required, and technical adequacy of the actions to be performed. The analyses shall also be constrained by the following ground rules:

(1) Weapon system safety to personnel and equipment shall be a prime consideration.

(2) The weapon system SRA and element design shall provide the baseline for operational A&CO analysis. A&CO functions shall be equivalent to weapon system functions whenever possible. The system test bed A&CO analysis shall additionally be baselined to the weapon system test planning analysis (TPA).

(3) The functional checkout of equipment, checkout of subsystem and verification of system operation shall be analyzed in a manner which assures performance while minimizing redundancy.

(4) The TA shall develop A&CO techniques which can be effectively and efficiently applied to deployment of multiple end items in a field environment.

(5) The TA shall not result in any destructive checkout.

(6) All analyses shall consider cost effective techniques and methods.

(7) All methods, techniques, and concepts developed to satisfy A&CO requirements shall be evaluated as to their influence upon weapon system element design.

(8) All source data (trade studies, backup studies) developed to support the TA shall be made available for SAMSO review.

(9) Functional illustrations shall be developed and included as required to amplify or clarify an activity. Illustrations shall show any interrelationship between an ACO, facility, or equipment being installed or checked out.

(10) A&COTA shall specify the use of weapon system maintenance support equipment (MSE) and technical publication date (TO) to the extent of their adequacy and availability. Test bed procedures shall be specified for A&CO of TSE/STE to the extent of their adequacy and availability.

(11) A&CO requirements developed in the TA shall consider and preserve the NH&S aspects of weapon system design.

d. All documentation developed during the process of the TA shall be structured to provide efficient update or change and referenced interrelationship to other documents.

e. The TA shall be scoped to include all expected A&CO activities at the operational site or weapon system test bed including A&CO contractor support areas, assistance to the facility contractor during the construction phase, or immediate post delivery transition activity to the using agency or command.

f. The TA shall be conducted concurrent with the design and development of the weapon system.

g. The results of the TA shall be developed and reviewed incrementally at technical interchange meetings and design reviews.

h. The A&CO master flows shall establish the approved baseline from which the analysis is developed. The flow diagrams shall provide the master index for the analysis and reflect all anticipated A&CO activities. The A&CO master flows will be originated by SAMSO and

provided to the contractor as source data. These flow diagrams will depict top level functional weapon system element data and A&CO conceptual information. The format of the flow diagrams will be in accordance with Appendix A.

i. The completed analysis shall require SAMSO approval and include the following:

(1) Master functional flows

(2) Detailed functional flows

(3) Functional analysis

(4) ACO specifications

(5) Checkout matrices

(6) Operational deviations matrix

(7) Predelivery maintenance matrix

(8) A&CO loading matrix

(9) A&CO sequential flows.

6. NOTES

6.1 Data requirements. Data requirements of this standard shall not be prepared or delivered to the purchasing office unless specified by the contract data requirements list (CDRL). The data normally required for delivery under this standard includes:

a. DI-S-30602, Operational Systems Requirements Analysis (SRA) Data

b. DI-S-30603, Test Planning Analysis (TPA) Data

c. DI-S-30604, Assembly, Installation, and Checkout Technical Analysis

d. DI-S-30605, Logistics Support Analysis (LSA) Data

e. DI-S-6171A, Logistics Support Analysis Record (LSAR) Data.

APPENDIX A

INSTRUCTIONS FOR PREPARATION OF OPERATIONAL AND MAINTENANCE SYSTEM REQUIREMENTS ANALYSIS DIAGRAMS, FORMS, AND DRAWINGS

10. SCOPE

10.1 Purpose. This appendix establishes the detailed instructions for the preparation of documentation required by the operational and maintenance system requirements analysis.

10.2 Application. Compliance with this appendix by contractors is mandatory.

20. REFERENCED DOCUMENTS. The following document of the issue in effect on date of invitation for bids or requests for proposal, forms a part of this standard to the extent specified herein:

STANDARDS

SAMSO

SAMSO STD 68-8 Methodology for System Safety Analysis

30. DEFINITIONS

40. GENERAL REQUIREMENTS

50. DETAILED REQUIREMENTS

50.1 Functional flow diagrams. Diagramming is a creative technique for scoping functional aspects of the systems engineering effort. Flow diagramming also provides indexing for referencing, ordering, and retrieving system definition data. These diagrams provide a flow prediction of weapon system functional characteristics. They provide a systematic means for identifying, communicating, discussing, evaluating, resolving, and recording system engineering functional considerations during preliminary design. Flow diagramming requires investigation and analysis of:

a. Initial conditions.

b. In-process sequential, parallel, and contingency conditions for functions under consideration.

c. Output conditions required for subsequent function.

50.1.1 Phases. Flow diagramming shall be phased for completion in accordance with the following.

50.1.1.1 Operational or support system design review (SDR). Flows to the final level of detail will be completed and reviewed prior to the SDR for technical concurrence and approved at the SDR.

50.1.1.2 Preliminary design review (PDR). Flows prepared for the SDR shall be revised as required during preliminary design to support the design configuration to be reviewed. Revised flows are reviewed through technical interchange prior to the PDR for technical approval at the PDR. Approval action is recorded in design review minutes. Flow diagrams, as applicable, shall be provided for reference purposes but are not subject to CCB approval or control.

50.1.2 Responsibility. Contractor responsibility for each function will be indicated on the flows. If more than one contractor is involved, the principal contractor ("prime") will be responsible for the preparation and release of the final drawing. The assignment of these responsibilities will be resolved during technical interface meetings.

50.1.3 Relation to Form B. Flow diagrams are used in conjunction with detailed function analysis Form Bs (described later) when preparing timelines (also described later).

50.1.4 Scope and content of functional flow diagrams. The master functional flow diagrams shall be the top functional flow diagrams for the operational weapon system. Detailed diagrams shall be developed for each block on the master diagrams. Development of diagrams is the reverse of left-to-right presentation starting with the final function(s) required. (Analyze back from the final desired functions.) analysis for operational system test activities shall be developed concurrently with operational analysis. The applicable timeline analysis shall be included on or with each flow diagram.

50.1.5 Levels of functional flow diagrams. First level flows will define the gross functions to satisfy the operation and maintenance concepts of the weapon system and subsystem criteria. Based upon the allocation of functions, contractors shall develop detailed flows to the level needed to meet the requirements for total function identification. The level of detail in flow diagrams is a matter of judgment. The following criteria shall be used:

a. The presentation of tasks on follow-on system functional analysis forms (described later) does not require detailed explanation and correlation of initial conditions, sequences, contingencies, etc.

b. Responsibility for individual functions should be assigned to a single contractor, if feasible.

c. The total scope of functional design considerations to be investigated are identified for all system elements. (Although the total scope could be presented on detail analysis forms, diagrams provide a diagrammatic picture of this scope and helps those evaluating the data.)

50.1.6 Flow diagram identification and structuring

50.1.6.1 Flow diagram identification. Identification shall permit retrieval of the lowest level diagram beginning with the master diagrams. The following conventions shall be used:

a. Subordinate diagram numbers shall normally be decimal expansions, (e.g., 2. x. 1, 2. x. 2, ... 2. x. n.).

b. When usage of a previously developed function is required, the same number shall be used. (This avoids unnecessary duplication of data.) The following limitations must be observed:

(1) Other analysis forms referenced to more than one flow diagram shall be annotated to reflect each flow application.

(2) Referencing of other contractor data is not permitted except when the function is included for information (and future changes to it are independent of the analysis of products being developed).

c. Whenever possible, sequential flow numbers shall be assigned from left to right and from top to bottom.

d. When identical functions appear on the same or different flow diagrams, the subsequent appearances shall be partially enclosed ("referenced") and the first appearance title and number used.

e. When multiple contractors are interfacing on a flow and a clean interface exists between each individual function or group of functions, blocks of numbers shall be assigned (e.g., with 20 functions involved for one contractor, a block of 25 numbers (1-25) will be assigned in sequence with the next contractor using 26 and up).

f. When multiple contractors are interfacing on a flow diagram, and interfaces occur randomly throughout, the "prime" contractor for that flow shall assign sequential numbers to the functions.

g. When flows are reworked after initial numbering: (1) to add blocks – use next available number, regardless of location of function on drawings; (2) to delete blocks – eliminate block and delete number, do not renumber remaining blocks or reuse function numbers.

50.1.6.2 Mechanics and symbology for functional flow diagrams. Certain rules and symbols have been devised to aid in developing and interpreting the flow diagrams; symbols are shown and identified in figure A-1. The conventions are as follows:

a. Diagrams shall be organized to present the weapon system functions in a clear, logical and easily interpreted manner. They shall clearly show inputs, outputs, location of, and relationships between functions (where applicable), and all other elements that assist the user to understand the various function paths and conditions associated with each path. Input and output blocks shall be drawn with bolder lines.

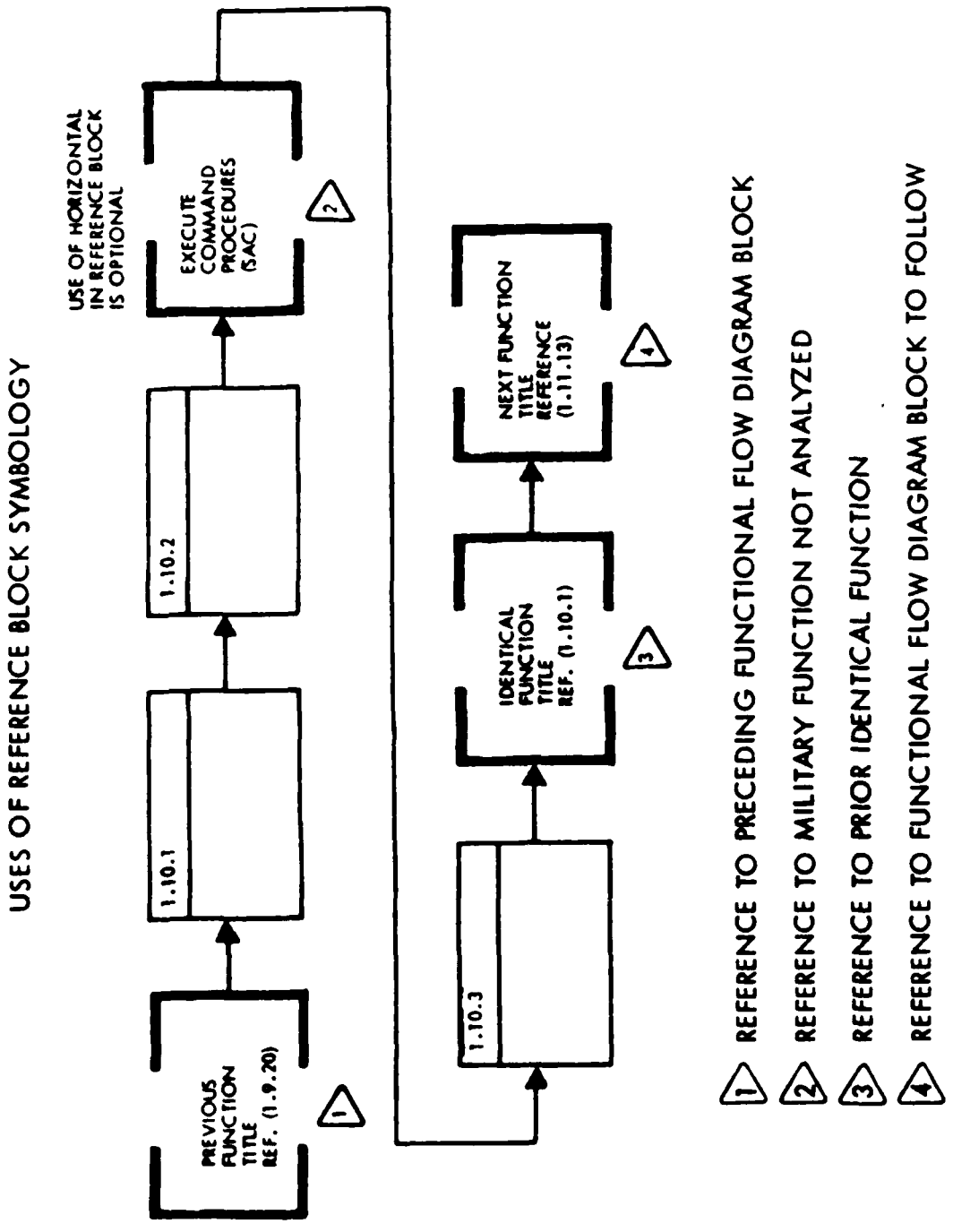
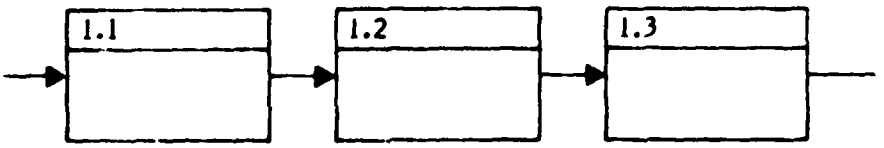


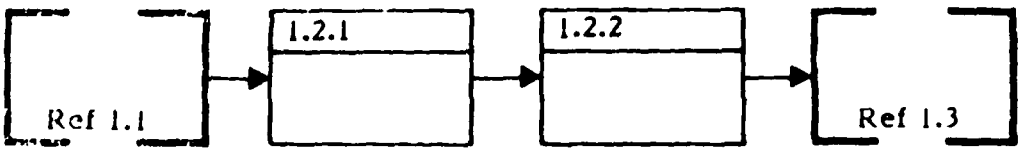
FIGURE A-1. Functional Flow Diagramming (Sheet 1 of 5)

FLOW DIAGRAM SYMBOLOGY

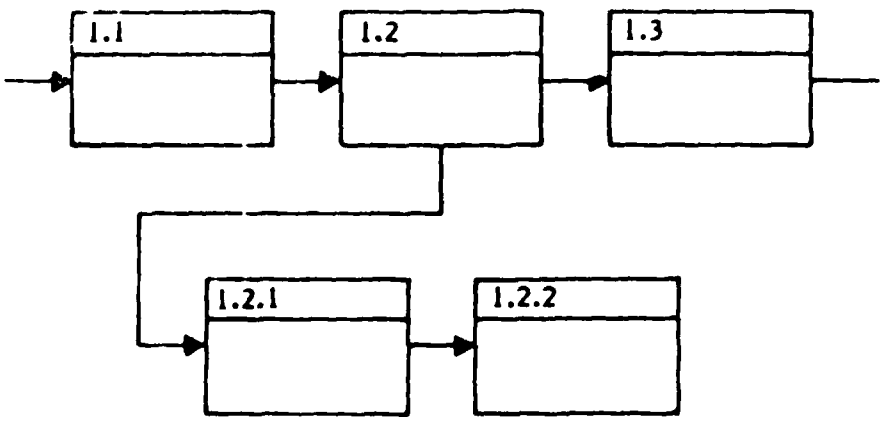
THE FOLLOWING ALTERNATIVES ARE CONSIDERED EQUIVALENT. USAGE IS A MATTER OF JUDGEMENT CONCERNING SIMPLICITY OF PREPARATION AND COMMUNICATIONS



SEE DETAILED DIAGRAM



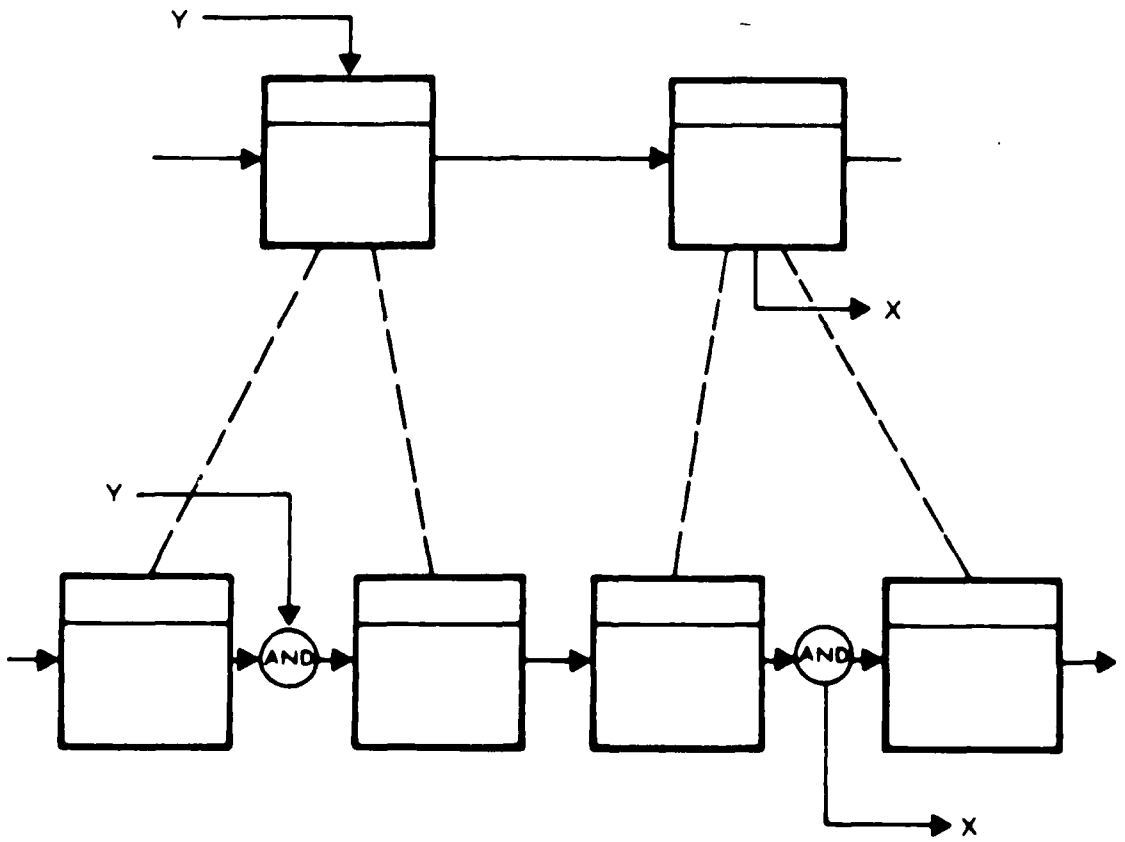
EXAMPLE SHOWING DETAIL SUBFLOW DIAGRAM BROKEN OUT ON SEPARATE SHEET



EXAMPLE SHOWING DETAIL SUBFLOW DIAGRAM INCLUDED ON SAME SHEET

FIGURE A-1. Functional Flow Diagramming (Sheet 2 of 5)

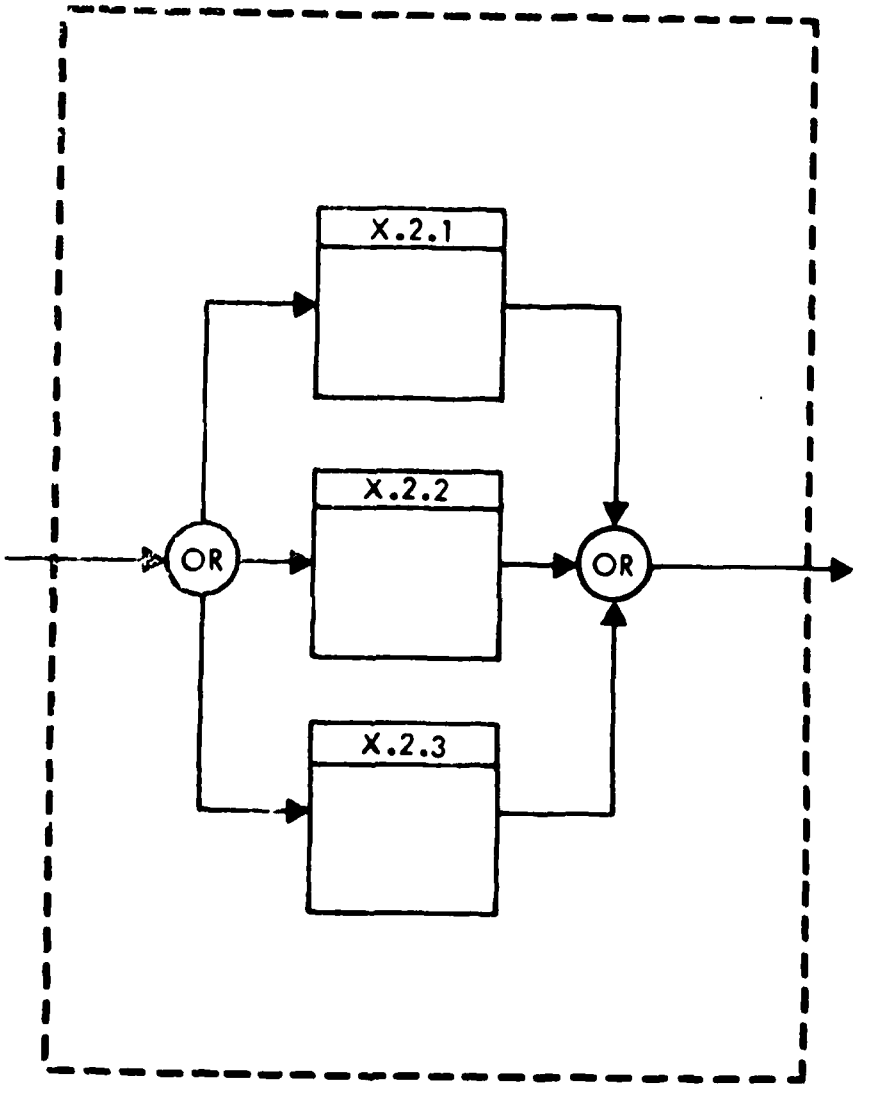
INPUTS AND OUTPUTS OCCURRING DURING A FUNCTION ARE SHOWN AS FOLLOWS BUT ONLY WHEN THE FUNCTION CANNOT BE SEPARATED AS SHOWN IN THE LOWER DIAGRAM



CONTINUOUS FUNCTIONS SUCH AS POWER INPUT, SHOCK ISOLATION, COOLING AIR, ETC., WILL NOT BE SHOWN WHEN DIAGRAMMING "CONSUMER" OPERATIONS

FIGURE A-1. Functional Flow Diagramming (Sheet 3 of 5)

FLOW DIAGRAM SYMBOLOGY



GROUPING OF FUNCTIONS (DOTTED LINES) TO INDICATE RELATED ACTIVITY (NOT NECESSARY FOR FUNCTIONS TO ORIGINATE/TERMINATE AT SAME POINT AS ILLUSTRATION INDICATES)

FIGURE A-1. Functional Flow Diagramming (Sheet 4 of 5)

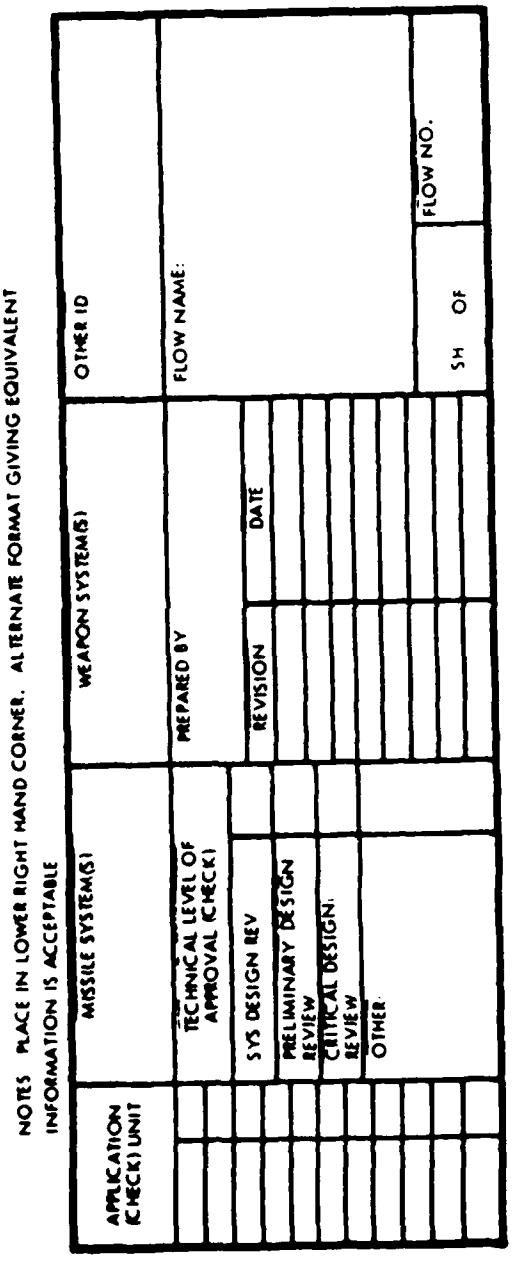


FIGURE A-1. Functional Flow Diagramming (Sheet 5 of 5)

b. Each separate function shall be presented in a single box enclosed by a solid line (for this purpose, a function is defined as a discrete identifiable entity causing a particular state or event to occur in the system). Each function is identified by a descriptive title and a unique number. Functions may be as general or detailed as required by the level of the flow depicted (see paragraph 50.1.5).

c. Diagrams shall, whenever possible, be laid out so that the primary flow is from left to right and, if applicable, the reverse "feedback" flow from right to left. Primary flow shall indicate function initiating inputs on the left side of blocks and terminating outputs emanating from the right side of the blocks. When an input is required during a function, it shall be indicated as entering the top (or bottom) of the block. When an output is generated during a function, it shall be indicated as emanating from the top (or bottom) of the block. A dead ended flow from the bottom of a block is sometimes used to detail the flow within a block (see figure A-1, sheet 2).

d. Solid lines connecting functions shall indicate starting or terminating flow and shall not indicate an intermediate activity or represent time lapse. Lines shall be labeled with condition statements where required for clarity. When a main/primary flow exists, a heavier line may be used.

e. When multiple relationships exist between functions, a circle shall be used to interconnect them. A circle is used to indicate the convergence or divergence of parallel or alternative functional paths and is annotated with an "AND" or "OR." The term "AND" is used to indicate that all parallel functions leading into the circle must be accomplished before proceeding into the next function or that all paths emerging from the "AND" must be accomplished after the preceding function. The term "OR" is used to indicate that any of several alternative paths converge to or diverge from the "OR." The "OR" thus indicates that alternative paths may lead to or follow a particular function. The "logic" of an "OR" must be defined by either line labels, detailed analysis forms, titles, etc.

f. Related functional flow diagrams shall have lead-in and lead-out functions identified as "reference functions" in order to preserve the continuity of overall flows. Associated with the lead-in shall be a statement as to the function to be performed and when and where it is performed. At the end of the flow, and associated with the lead-out, shall be a summary statement as to what has just happened and what is next. These, and any other "referenced functions" required for clarity of the diagram shall be shown in partially enclosed boxes (see figure A-1).

g. When a function does not have a sequential relationship, an isolated block may be entered on the bottom of a diagram to indicate a separate analysis (e.g., "provide power," "provide cooling," etc.).

h. All functions shall be indicated in appropriate sequential/parallel relationships. When required, a dashed box may be drawn around a logical group of functions which comprise an activity. Such a group may be given a title, within the dashed box, which is indicative of the nature of the activity (see figure A-1). (Such titles will not be given function numbers.)

i. Each function on a given flow diagram that is expanded on a subordinate diagram shall have "see detail diagram" or "SDD" appearing with the applicable block.

j. Functional flow diagrams shall have an 11-inch vertical dimension for direct reproduction and the data vertical dimensions shall be 10½ inches between borders. Horizontal dimensions shall be any reasonable foldout length. (Deviations are acceptable as long as the data is reproducible, readable and suitable for publications in 8½ x 11-inch binders.

(1) Function blocks shall be approximately 1-1/4 to 1-3/4 inches outside dimension.

(2) Printing in function blocks shall be 8 point minimum, "DIRECTORY" type.

(3) "FROM" and "TO" reference blocks shall be the same size as function blocks but shall have heavier borders.

(4) The function numbers in reference blocks shall be 8 point "DIRECTORY" type. Other printing shall be the same type as specified for function blocks.

(5) "AND" and "OR" circles shall be approximately one-half-inch diameter. The same type as specified for function blocks shall be used.

50.1.6.3 Diagram identification. Each diagram shall include a title block providing the information indicated on sheet 5 of figure A-1.

50.2 Completing system functional analysis, Form Bs. (See figure A-2.) Results of detailed functional analysis shall be performed for each function on each functional flow diagram. First, requirements necessary to satisfy the function being analyzed are entered. Next, entries are made to indicate how the functional requirements are to be satisfied – by equipment or personnel. Other related facilities, personnel and logistics data are then added.

50.2.1 Detailed functional analysis Form B entries. (See figure A-2.)

50.2.1.1 Major function number. The appropriate major function number (1.0, 2.0, etc.) shall be entered at the bottom of the form below the border.

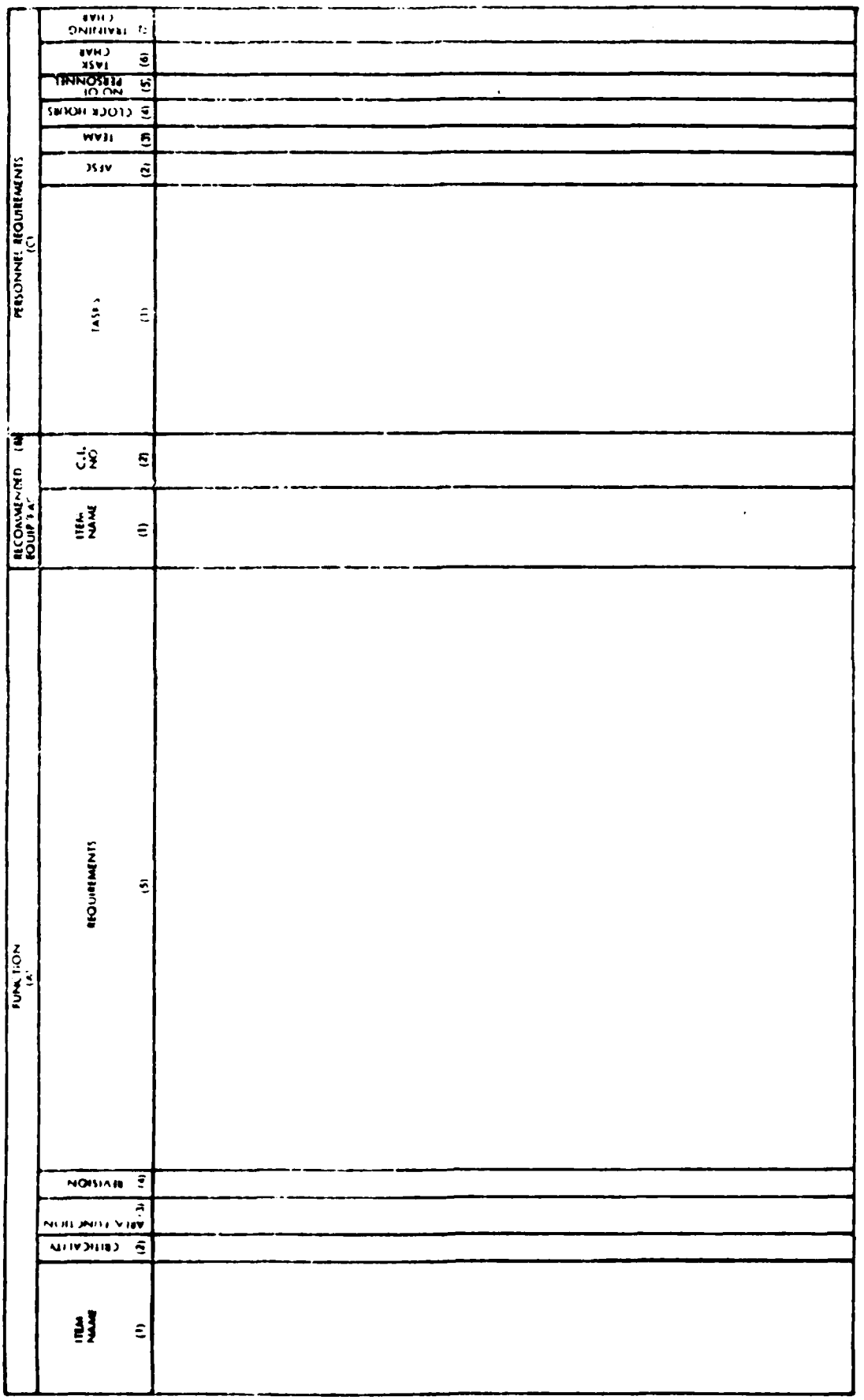


FIGURE A-2. System Functional Analysis Form - Form B

50.2.1.2 Page number. Enter at top of page the page number of this Form B.

50.2.1.3 Revision and date. Enter at the top or bottom of the form the revision date of this Form B.

50.2.1.4 Column A1, name and number. Enter the number of each block on the functional flow diagram in numerical sequence. Sequential subfunctions, which are part of a discrete function on a flow diagram, may be detailed here. If space permits, more than one discrete and sequential function may be included on one sheet.

50.2.1.5 Column A2, criticality. Identify, through the codes indicated below, the critical design characteristics of the system regarding launch control, safety, security and equipment fault damage. The classification of critical functions shall be defined by the contractor through evaluation of proposed personnel action and designs per paragraph 5.1.4.3, Critical Fault Assessment. The classifications are as follows:

a. Code "L" for (1) functions part of the command message system used to target, fuze, enable, recall, launch or otherwise comand the tactical aspects (including launch timing) of a launch mission of one or more otherwise ready missiles and (2) functions, which when they fail, cannot be executed by at least on surviving crew/system combination.

b. Code "S" for functions part of the status message system used to verify target or fuze selection, or enable or launch status regarding an otherwise ready missile and the function, which when it fails, cannot be excuted by at least one surviving crew/system combination.

c. Code "A" for functions when failure causes loss of missile launch facility (MLF) access security status to the remote control center and the MLFs access security cannot be monitored by at least one control center.

d. Code "F" for functions when failure would cause failure of the flight mission as specified in the applicable weapon system requirements.

e. Code "O" for functions when failure requires immediate dispatch of an ordnance disposal team.

f. Code"E" for functions when failure requires emergency dispatch to prevent further, pending or potential equipment damage.

g. Code "R" for functions when failure requires cooperative action to be taken by two or more launch crews to restore control of the system.

h. Code "H" is entered if a maintenance task is hardness critical.

i. When more than one classification applies, the applicable letters shall be listed vertically in the column. When considering Codes L and S categories, ground and airborne control systems shall be considered independently.

50.2.1.6 Column A3, area/function code. Entries indicate the area of operation where the maintenance function(s) are performed. The code consists of an alpha code for area and a numeric code for function. An entry is made for, and aligned with, each maintenance function.

50.2.1.6.1 Area code. The area codes are:

a. "A" Airborne Launch Control Center (ALCC) area.

b. "C" A&CO Support area.

c. "D" Depot area.

d. "M" Missile Launch Facility (MLF) area.

e. "P" Primary Support Facility (PSF) area.

f. "R" Other. That portion of the development area not otherwise defined in these codes, i.e., where the wide area surveillance; fences, cable plant, etc., are located.

g. "S" Strategic Missile Support Base (SMSB) area.

h. "T" System Test area.

i. "V" Vandenberg AFB.

50.2.1.6.2 Function code. The function codes are as specified below:

a. "01" Missile Assembly

b. "02" Missile Component Transfer and Storage

c. "03" Missile Guidance Set Maintenance

d. "04" Canister Assembly and Maintenance

e. "05" Munitions Handling, Storage and Assembly

f. "06" Destruct Ordnance Installation

g. "07" Electronic Maintenance

h. "08" Communications-Electronic Maintenance

i. "09" Mechanical Maintenance

j. "10" Precision Measurement Equipment Calibration

k. "11" Encoder/Decoder Maintenance

l. "12" Electrical/Power Production Maintenance

m. "13" Battery Maintenance

n. "14" Refrigeration Maintenance

o. "15" Vehicle Maintenance and Test

p. "16" Support Vehicle Maitenance

q. "17" Test Equipment Maintenance

r. "18" Unloading/loading (rail, aircraft, truck)

s. "19" Maintenance Control

t. "20" Supply/Storage

u. "21" Material Control

v. "22" Radar Maintenance

w. "23" RP/RPIE Maintenance.

50.2.1.7 Column A4, revision. Enter the paragraph revision number in numerical sequence.

50.2.1.8 Column A5, requirements. Entries shall include detailed design requirements established by translating analysis of functions into requirements. Requirements are resolved using all applicable criteria specified for the analysis established by AF Standards as well as results of preliminary design studies and analysis of the functional blocks. These entries establish: (a) performance requirements in the specifications and/or (b) the basic procedural requirements which are to be expanded in column C.

50.2.1.8.1 Column A5, facility requirements. Entries shall identify facility requirements resulting from the function being analyzed, or from the design described on the recommended equipment involved in satisfying the function. This information will provide input for the eventual preparation of facilities requirements and the architectural and engineering drawings. Entries shall be prepared to the same detail as the design requiremets and shall define such things as structural requirements; power requirements; controlled and natural environmental requirements such as noise levels, illumination, temperature, ventilation; etc., as they pertain to to the function being analyzed. This analysis will be based on consideration and satisfaction of each applicable requirement and basic constraint listed in appendix V of MIL-STD-490.

50.2.1.8.2 Column A3, procedural data. If the function involves personnel, procedural support data required for the personnel performance shall be identified. Entry will be identified as "tech data" (underlined) followed by the title of the data required and a control number which identifies an AF technical order which exists (or is programmed) that contains the specific items of data, or a contractor proposed document number. The number will be followed by a listing of the types of procedural data required to support the personnel requirements listed. Examples of the types of procedural support data that might be required are:

a. Operation instructions

b. Maintenance instruction

c. Inspection requirements

d. Calibration requirements

50.2.1.9 Column B, recommended equipment

50.2.1.9.1 Column B1, item name. Provide short form item name of the item of aerospace vehicle equipment (AVE), operational support equipment (OSE), maintenance support equipment (MSE), facility or common hand tools recommended to meet each technical requirement. Nomenclature need only be entered once for each major function. Reference, where repetition within the function occurs, will thereafter be by item number. When MSE and/or common hand tools are required, a logistics support analysis record (LSAR) shall also be prepared to document the requirements, substituting the Form B for the LSAR data sheet D_1.

50.2.1.9.2 Column B2, number. Enter the equipment number of the items of AVE, OSE, MSE or facility corresponding to the item listed under item name.

50.2.1.9.3 Column B2, number - requirements correlation. Prior to the specification being placed under configuration control by SAMSO this column shall be used to list the paragraph(s) of the specification that specify the requirement.

50.2.1.10 Column C, personnel requirements

50.2.1.10.1 Column C1, tasks. Provide the personnel actions required for accomplishment of the indicated functions. The level or detail and the scope of the task shall be governed by the following:

a. Data should show the results of incorporating evaluations for operability and maintainability requirements into the design, identify human engineering requirements and personnel. Multiple crew operations shall be included.

b. Procedural compatibility with system and CI design characteristics and system policies should be maintained.

c. Complete correlation must exist between the functional requirements, personnel recommendations, equipment, accommodations, facilities, requirements and the listed tasks.

d. Critical procedural requirements regarding safety must be defined.

e. Single thread step-by-step continuity for all end-to-end actions required by the function (no gaps), should be maintained.

f. Tasks should be detailed and sequenced to eliminate possibilities of technically incorrect procedures.

g. Unique procedural considerations that would not otherwise be available to technical writers through design data should be detailed.

h. Task sequences shown shall permit timelining and evaluation of the time required to complete operations.

i. Critical procedural requirements regarding nuclear hardness and survivability (NH&S) must be defined.

j. Complex task descriptions should include identification of the input stimulus, cues, signals and indications that call for the action or reaction; identification of the action (the individual's observable performance); and identification of the output stimulus, cues, signals and indications that the action is (or is not) completed, correct or accurate.

k. Where performance to a particular standard is required, this standard and tolerance must be stated in the task description if it is not stated in the functional requirements column (A5).

l. Appropriate cautions, warnings and notes shall be provided to assure that the consequences or intent of proper task performance are clearly explained.

m. Where the task to be performed requires maintenance personnel and/or MSE, an LSAR shall be completed to document these requirements, substituting the Form B for the LSAR data sheet D_1.

n. Task action verbs shall be used. Those listed in AFP 50-58, volume II, table 3-2 are the perferred action verbs.

50.2.1.10.2 Column C2, Air Force specialty code (AFSC). Entries shall consist of previously approved AFSCs required to accomplish the function/task.

50.2.1.10.3 Column C3, team. Provide team codes according to definitions established by the contractor in coordination with SAMSO.

50.2.1.10.4 Column C4, clock hours. Enter the elapsed clock hours required to accomplish the function/task (fractions of hours shall be expressed in hundredths).

50.2.1.10.5 Column C5, number of personnel. Enter the number of personnel required to perform each function/task listed.

50.2.1.10.6 Column C6, task characterization (task char). Entries shall be a four place alpha-numeric code as follows:

a. First entry - task criticality. Entries shall be a single letter indicative of the criticality of task performance to mission accomplishment.

(These entries differ from function criticality, 50.2.1.5, in that they are concerned only with the actions of the human involved.) Criticality regarding safety will be identified as a part of safety analyses conducted by the contractor in accordance with SAMSO STD-68-8. Letter codes will be applied as follows:

(1) N - (Noncritical) - Tasks noncritical to the operation of the system or subsystem. Improper performance of the tasks may have some effect on a subsystem operation but will not jeopardize the overall performance, mission success or safety.

(2) S - (Semicritical) - Tasks critical for subsystem operation that may result in some system degradation if not correctly performed. Improper performance of the task would cause a degradation to operational effectiveness, but the mission can succeed by using alternate modes and no safety problems are created.

(3) C - (Critical) - Tasks that must be performed correctly because they are critical to system operation (e.g., if the task were not performed correctly the system may not work, the operational effectiveness would be degraded to an unacceptable level and/or a safety hazard may be induced).

b. Second entry - task newness. Entries shall be single digit indicative of task newness in accordance with the following definitions:

(1) 1 - Standard to the Air Force at the time weapon system development is initiated and requiring no new knowledge or skills to perform;

(2) 2 - Tasks requiring no new skills but requiring familiarization with the location, use, and/or installation;

(3) 3 - Tasks involving standard equipment that has been reconfigured or repackaged, or applications that are new. Special knowledge of the particular subsystem or component, or use of the equipment may be required and there may be a requirement for the acquisition of new skills;

(4) 4 - Tasks involving new equipment for which new skills and/or knowledge are required or which involve abnormal conditions, unusual criteria or unique manipulative skills.

c. Third entry - skill demand. Entries shall be single letter indicative of task skill demands in accordance with the following definitions:

(1) A - Unskilled. The perceptual and motor demands can be met by all Air Force personnel, the requirements are within the capabilities of all personnel.

(2) B - The perceptual ability required is the sensing of a nonprecision indication, distinguishing primary colors, a coarse texture, odor or no odor, taste or no taste, hot or cold, noise or no noise, movement or no movement. The perceptions are of a coarse, noncritical type which are readily learned. The physical dexterity is of nonprecision manipulations and can be readily learned. These acts consist of noncritical and coarse motions for adequate results.

(3) C - The perceptual ability required is the accurate and/or coordinated sensing of one or more fixed or variable indications, such as quantity indications of an instrument, distinguishing relative positions of objects, shapes of objects, kinds of odor, kinds of taste, differences of weight, relative frequency, and rates of movement. The physical dexterity required is of a coordinated and/or precise type that must be learned and may require practice. These acts consist of accurate, coordinated, and timely motions to achieve the optimum results.

(4) D - The perceptual ability required is a critical, precise, and/or coordinated sensing of one or more fixed or variable indications, such as distinguishing quality indications of an object; relative motion; degrees of comparison; simultaneous or time critical events; differences in pressure; amounts and kinds of odor; amounts and kinds of taste; shades and brillance of colors; volume of sound; and the frequency, rates, and direction of movement. The physical dexterity required is of a critical, exact, coordinated and/or variable type of activity that must be practiced to maintain the proficiency to achieve the necessary results. This can be learned by training and repetitive practice. These acts consist of precise, timely, coordinated and/or variable type of motions resulting in crucial responses.

d. Fourth entry - knowledge demand. Entries shall be a single digit indicative of task knowledge demands in accordance with the following definitions:

(1) 1 - Common knowledge - The knowledge demands can be met by all Air Force personnel.

(2) 2 - Associating - Associating, naming, or responding to a specific input. The person associates a response with a specific input only. The response may be vocal, subvocal, written or motor. Examples: naming objects, people, or events; "go" on green light.

(3) 3 - Chaining, verbal - Recalling of long verbal sequences which must be recalled in a specific sequence, and no other sequence and may require practice. Examples: memorizing numbers, verbatim learning of textual materials, stating rules or regulations.

(4) 4 - Chaining, motor - Chaining of individual inputs, actions, and outputs in a specific sequence, and no other sequence. These sequences involve nonverbal motor responses. They generally require some degree of hand-eye coordination and manipulative abilities and may require practice. Examples: starting a car; unlocking a door; shooting at a target; swinging a golf club; or any other performance involving use of legs, arms, hands, or other parts of the body.

(5) 5 - Discriminating - Making different responses to the different members of a particular class. Being able to distinguish among inputs, and respond differently to each and may require practice. Examples: having to tell the differences among similar gauges on an instrument panel.

(6) 6 - Classifying - Responding in a single way to all members of a particular class of observable events. Seeing the essential similarity among a class of objects, people, or events which call for a single response (generalizing). Seeing the essential differences between those inputs which are members of a class and those which are not (discriminating) and requires practices. Examples: classifying aircraft as being tactical, fighter, etc.; classifying behavior conforming to military protocol as appropriate behavior; and classifying behavior which fails to conform as inappropriate.

(7) 7 - Rule using - Applying a rule to a given situation or condition by responding to a class of inputs with a class of actions. Relating two or more similar concepts in the particular manner of a rule. A rule states the relationship among

concepts and requires practice. It is helpful to think of rules or principles as "if-then" statements. Examples: "If an object rolls, then it is round; if you can convert a statement into an 'if-then' statement, then it is a rule or principle."

(8) 8 - Problem solving - Solving a novel problem by combining previously learned rules to create a higher-order rule and requires practice. May involve generating new rules which receive trial-and-error use until the one which solves the problem is found. Example: finding a new way out of a building when the only exit you know is locked.

50.2.1.10.7 Column C7, training characterization (training char). Entries shall be a three place alpha-numberic code as follows:

a. First entry - practice required. Entries shall be a single digit indicative of the task practice required in accordance with the following definitions:

(1) 0 - No practice required. This entry shall also be made for tasks classified as being unskilled and requiring only common knowledge.

(2) 1 - Skill practice required.

(3) 2 - Knowledge practice required.

(4) 3 - Knowledge and skill practice required.

b. Second entry - knowledge training level. Entries shall be a single letter to indicate the task knowledge training level required in accordance with the following definitions:

After training and/or with job experience, student will be able to

(1) a - Nomenclature - Recall nomenclature, simple facts, or simple procedures involved in the task.

(2) b - Procedure - Determine step-by-step procedures for sets of tasks or for accomplishing important decisions.

(3) c - Operating principles - Explain why and when each task must be done.

(4) d - Complete theory - Predict, identify, and resolve problems related to the task.

(5) n - Is used to indicate that knowledge training is not required for the task.

c. Third entry - skill training level. Entries shall be a single digit to indicate the task skill training level required in accordance with the following definitions:

After training and/or with job experience, student will be able to

(1) 0 - Is used to indicate that skill training is not required for the task.

(2) 1 - Extremely limited - Accomplish task only by being told or shown how.

(3) 2 - Partially proficient - Accomplish most of the requirements of task but not necessarily to desired levels of speed or accuracy.

(4) 3 - Competent - Accomplish performance of task at minimum acceptable levels of speed or accuracy.

(5) 4 - Highly proficient - Accomplish performance of task at highest levels of speed or accuracy, and be able to tell or how others how to do the task.

50.3 Preparing timeline forms. (see figure A-3.) For equipment functions, timing diagrams (not illustrated) shall be used for personnel functions, timeline drawings shall be used to plot tasks. The "source" of each function (flow diagram, function numbers, and titles) shall be identified in the proper column. The elapsed time in hours, minutes, seconds and decimal fractions thereof shall be entered for each function; the smallest increment of time shall be commensurate with criticality. In entering these times, consideration shall be given to which tasks should or must be performed sequentially and which can, from a technical or physical standpoint, overlap or be performed in parallel.

50.4 Implementation of interface control. Interface control drawings, between configuration items as identified in the flows and Form Bs process, will be created in accordance with SAMSO STD 75-2. Interface control drawings are working tools which define interassociate contractor and/or government agency agreements that lead to the final design of configuration items as defined in applicable specifications and drawings. Interface control drawings are not to be used for manufacturing quality control or assembly. An associate contractor responsible for the design and development of a configuration item that interfaces with another associate contractor's configuration item shall establish interface control and participate in the interface control working group per MIL-STD-483.

50.5 Completing end item design requirements

50.5.1 Configuration item specifications. The SRA process results in a development, product, process and/or material specification documented in accordance with MIL-STD-490, and computer program configuration item (CPCI) specifications documented in accordance with MIL-STD-483. These specifications shall utilize requirements identified in system functional analysis Form Bs and LSAR data sheet D_1 (described later).

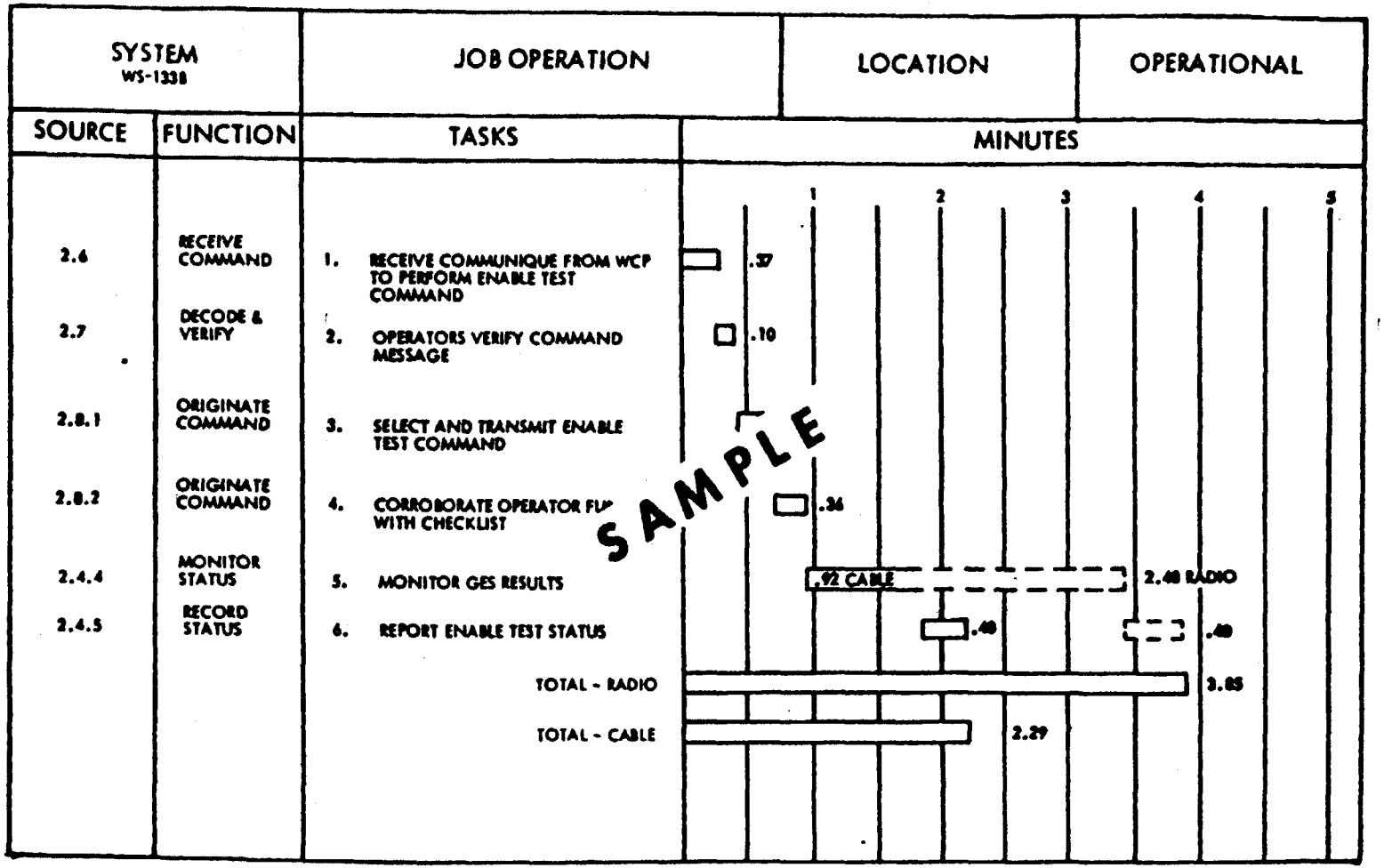


FIGURE A-3. Timeline Drawings

50.6 Failure mode analysis

50.6.1 General. Figure A-4 is a diagram showing simplified relationships of failure mode analysis with other system engineering requirements outlined in this document. Failure mode analysis as an integral part of design is intended to reduce the frequency of failure, reduce the time and resources required to restore normal operations, provide source data required for other definition and acquisition functions and to support the provisioning of system elements for maintenance operations. The failure mode and effects analysis shall be updated whenever design changes are incorporated or whenever testing reveals a failure mode that was not included in the analysis.

50.6.2 Block A. This analysis is conducted as a pre-preliminary design review (PDR) hardware design requirements effort and a post-critical design review (CDR) technical manual development effort. Each functional requirement is reviewed to determine if its failure would impact the ability of the hardware to meet the design requirements.

50.6.2.1 Significant functional failure. If it is determined that the functional failure is significant to the hardware meeting the design requirement, further analysis is conducted in accordance with the requirements and procedures of this document. A functional failure is considered "significant" whenever it will influence detailed design requirements for any element. Its failure may have been considered in criteria or in the initial functional analysis (e.g., master flow diagrams that consider failure of the readiness mission function).

50.6.2.2 Functional failure analysis conclusions. Investigation of functional failures will result in one or more of the following conclusions:

a. Perform redesign to eliminate the functional failure.

b. Design and analysis includes optimum capability to restore normal operation (detect, control, isolate, fix, etc.).

c. Design reliability provides optimum failure prevention.

d. System engineering analysis needs to be expanded to ascertain optimum operational and/or maintenance requirements.

e. The results of block A analysis shall be recorded in flow diagrams, Form Bs, LSAR sheets and specifications. The basic functions are (1) detect, (2) control, (3) isolate, (4) repair, (5) checkout and (6) resume normal operations.

50.6.3 Blocks B, C, and D - General. The analysis conducted under blocks B, C, and D requires development of internal documentation by contractors to record and correlate results of the analysis. The documentation approach including formats to be used will be described in detail in the program plan, if one is provided or in a specific failure mode analysis plan for submittal and approval in

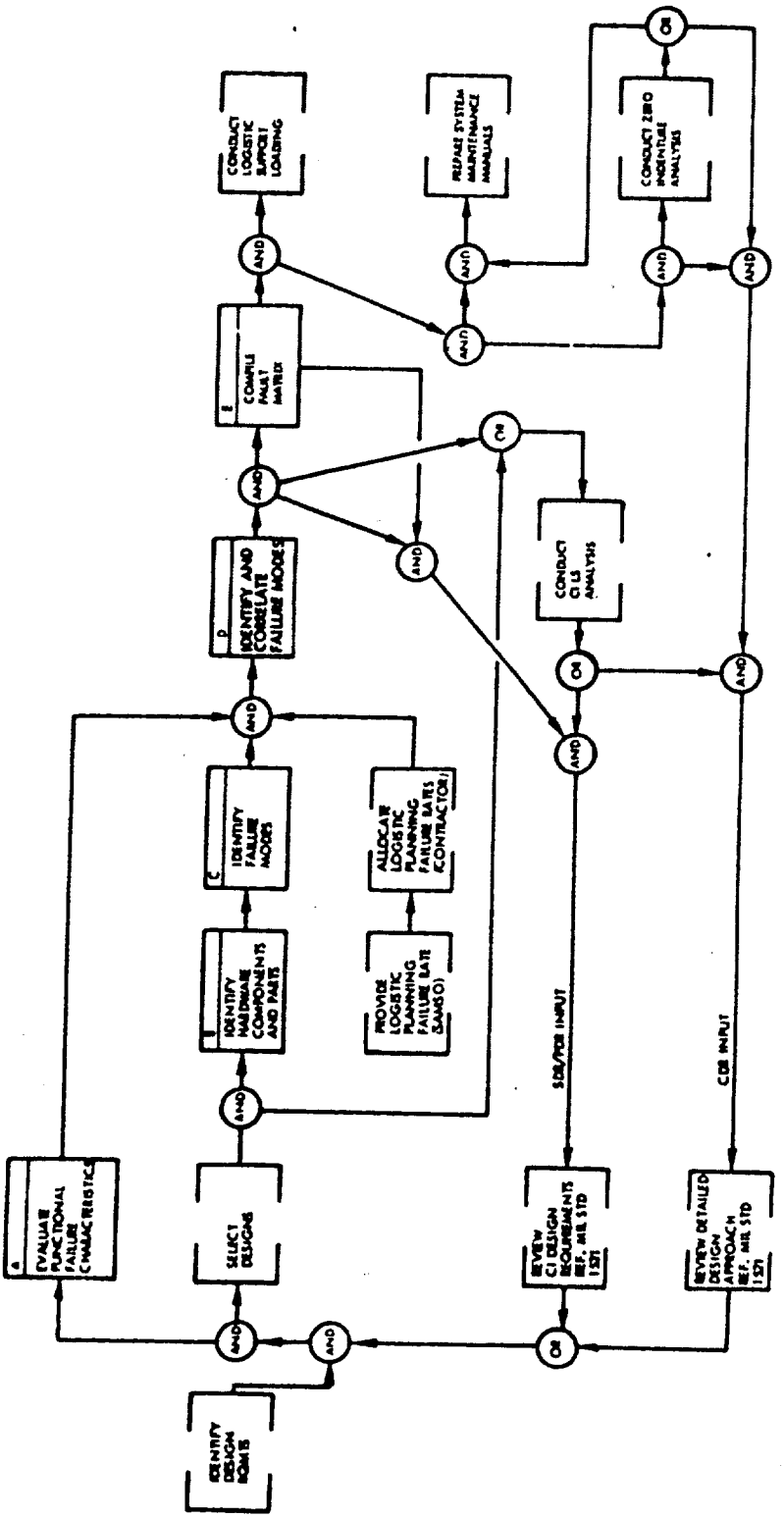


FIGURE A-4. Failure Mode and Fault Matrix Analysis

accordance with the CDRL. MSE failure mode analysis is used as source data for MSE end item maintenance analysis and evaluation of impacts that MSE failures would have on AVE/OSE. It is completed for new items of MSE including depot MSE. A fault matrix per block E, is however, not required.

50.6.3.1 Block B. This function initiates the detailed process of correlating equipment failures with fault indications. It shall be initiated whenever a specific hardware part or part type is selected for potential use in a CI item design. It shall be an analysis of each component part failure in all applicable modes including flight. It is completed concurrent with the selection of the final design. Parts shall be identified to the "bit and piece" level. This includes identification of the parts of printed circuit cards; mechanical coding devices; fluid regulating and control assemblies; automatic sensing and switching assemblies; ordnance safe and arming devices; accelerometer, velocity or position measuring units; electro-mechanical control units; filter assemblies (electrical or fluid); electrical connectors, electrical motors; voltage or current regulators; surge arrestors; mechanical actuators; etc. Parts identifications are correlated to modules, modules to assemblies, assemblies to end items through as many levels as are applicable. The scoping of the analysis to this detail is required to assure that all failure mode detection patterns are considered.

50.6.3.2 Block C

50.6.3.2.1 Cascading failures. All failure modes will be analyzed. A single failure mode includes cascading failures until a steady state fault mode exists. Cascading failures may be divided into separate failures whenever one or both of the following hold:

a. Combat crew remote commands or other control center action will prevent cascading.

b. Combat crew fault reporting, maintenance dispatch and maintenance action will prevent cascading.

c. Cascading failures that involve equipment designs of two or more contractors will be coordinated and recorded in the basic analysis data of each contractor.

50.6.3.2.2 Nonfailure stress. Nonfailure stress occurring in other parts during a part failure mode need not be identified as part of the failure unless such stress results in unique indications or requires replacement of the stressed part to protect system security, safety or launch and flight reliability.

50.6.3.2.3 Phases. Initial failure mode analysis shall be conducted as an integral design task as soon as the preliminary design effort permits part identification. This initial effort is conducted to evaluate and identify these failure modes for the PDR design requirements baseline. The PDR to CDR design phase parts selections are continuously analyzed to complete the failure mode analysis as a prerequisite to completing the end item maintenance analysis, fault

matrix, zero indenture and maintenance task analysis sheets (described later) reviewed for approval at the CDR.

50.6.3.3 Block D

50.6.3.3.1 Failure indications. The primary task of block D involves the correlation of indications occurring because of a specific part failure mode. To support the intended usage of these data, the indications must be considered from several aspects as follows:

a. Indications occur over a time span. The character of activity before and during that time span shall be considered for each part fault mode, to assure identification of discriminating detection patterns.

b. The operating modes for the AVE/OSE system include (1) normal status monitoring, direct launch control equipment displays and the automatic status responses to operating status indicators, and (2) specific operator-induced operations. The operating modes include operations involving partial systems when provided for.

c. MSE operating modes include the various normal "in-use" operating modes, self test, manual checkout, etc.

d. Each unique fault detection pattern (one or more indications that a fault condition exists) shall be correlated with each applicable operating mode. In addition, any discriminating operating mode sequences that results in a unique detection pattern shall be recorded.

e. Detection patterns for AVE/OSE shall be established for each launch control center (LCC) to reveal unique conditions or confirm that identical patterns exist in each missile launch control center (MLCC).

50.6.3.3.2 Fault detection patterns. The following shall be considered:

a. During identification of fault detection patterns, it is necessary to consider normal missile combat crew (or maintenance operator) activities as refelected in source data being developed for the operating publications/data or instructions contained in existing publications. In addition, combat crew operations directed by the SMSB maintenance control activity shall be considered.

b. The fault detection patterns revealed by the above effort will range from no detection whatsoever to those anomalies which are complex and unpredictable. The extreme cases are evaluated as a part of the design activity to determine whether or not a design change can be made to correct and/or simplify the pattern.

c. Complex detection patterns that must be provided as source data for maintenance manuals will be provided in fault matrix data.

d. The process of identifying and evaluating detection patterns inherently reveal methods of fault isolation. This information is used to establish the recommended fault isolation procedures during the compilation of the fault matrix (block E of figure A-4).

e. Identical fault detection mode patterns may occur for different part failures. The failure mode analysis data shall include summary identifications of all unique patterns and a listing of all part failure modes causing each pattern. These data shall be evaluated to determine whether or not the design requirements or design approach should be revised to eliminate ambiguities.

f. Failure mode analysis shall include identification or current failure rates for each part failure. The part failure mode rates, shall sum to reflect the total rate budgeted to the end item being analyzed.

50.6.3.3.3 Undetected failures. Undetected failures shall be summarized by end item. The total undetected OSE/AVE failures shall be further summarized to reflect the following:

a. Failures detected during scheduled/unscheduled on-site maintenance activities. The residual undetected fault condition remaining in an operational wing shall be calculated.

b. Failures critical to launch operations correlated to launch preparation and launch.

50.6.3.3.4 Evaluation of failure mode. To support the preparation of the fault matrix, during the failure mode analysis, each failure mode shall be evaluated as to whether operational or maintenance response is required. The evaluation conditions are:

a. Fault conditions which are critical to safety or equipment will cause a critical no-go to be generated. This will initiate the termination of system power. Those fault conditions which are not critical to safety or equipment, but may prevent a successful launch will cause a standby no-go mode.

b. Faults that require dispatch to provide MLF access, security, launch safety, ordnance safety, or which require dispatch to monitor for, or prevent, equipment damage shall be classified as emergency.

c. Other faults shall be classified as alarm.

50.6.4 Block E. The development of the fault matrix supports the identification of equipment design requirements as well as logistic support analysis. It is initiated during the pre-PDR system engineering phase. The initial analysis, which is an integral part of the failure mode analysis, involves (a) review of monitors system status indicators, and diagnostics results; (b) investigation of the impact

that the failure mode characteristics may have upon fault indicators/responses; and (c) identification of design studies required to optimize the design. The general rules for development are:

a. During the pre-PDR (AVE/OSE) phase, the analysis shall resolve the design approach and define design requirements for status processing software requirements, status message formats, display requirements, controls for post-fault control and/or isolation of the failure. The preliminary fault response forms prepared shall be reviewed at AVE/OSE PDRs.

b. The completed (integrated with other contractors when appropriate to cover interfaces) analysis for a configuration item shall be reviewed for approval at the CI(s) CDR. The data, as provided, shall be provided to the contractor for preparation of maintenance loading and to applicable contractors preparing system maintenance manuals.

c. During development of the fault matrix zero indenture requirements are identified and responsibility for their development and review is established by mutual agreement between the contractors involved. The zero indentures are completed for review and approval during the CDR(s) of the configuration items involved.

d. Integrated fault matrix and zero indenture maintenance analysis forms shall be provided by the preparing contractor to support other applicable CDRs.

e. Integrated fault matrices are prepared to show each wing unique configuration. SAMSO or a designated contractor will include introductory information required to interpret the fault matrix such as indexes, definitions, explanation of codes, schematic diagrams showing equipment functional relationships and monitors. Once the integrated matrix is developed, it shall be used by all contractors as the baseline for changes.

f. A "typical" fault matrix form is shown in figure A-5. To be ideal, the design of these forms varies with different weapon system needs. The specific form used will be designed and provided by SAMSO. Each contractor conducting AVE/OSE failure analysis shall coordinate formats to be used with the SAMSO.

50.6.5 Selection of primary fault response indicators. (Fault XXX of figure A-5.). Theoretically, if the fault monitoring were ideal from a maintenance response standpoint, all fault modes within an on-site replaceable item would key to one and only one indication. In general, however, the fault modes within a replaceable item key several different sets of multiple indication patterns, some of which may be common to other replaceable items.

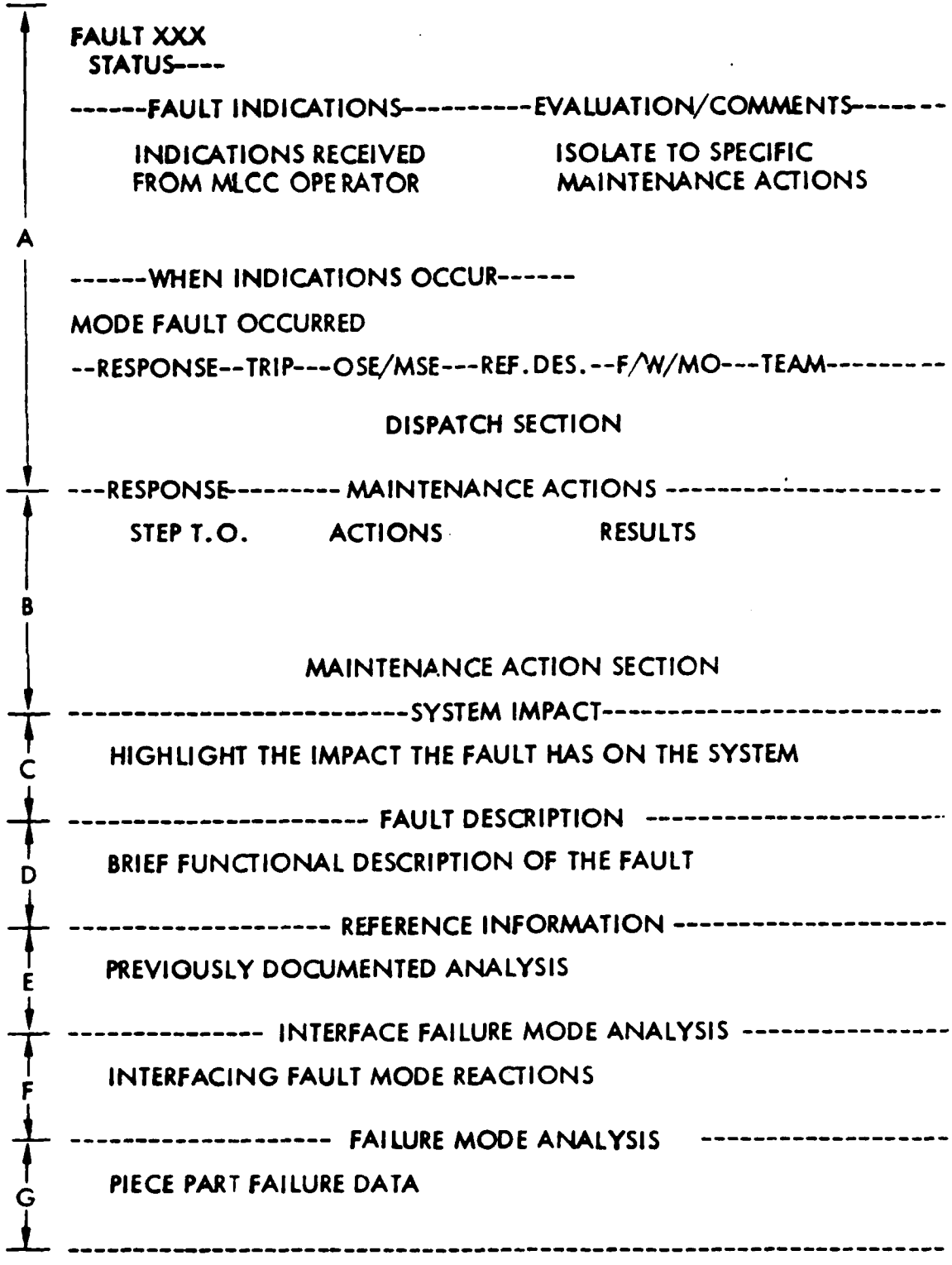


FIGURE A-5. Fault Response Figure

50.6.5.1 Indication patterns. Fault detection mode indication patterns include system operating indications as well as fault monitor outputs. System operating indications are of various categories including (a) operating status response-type, (b) computer derived system conditions such as "traffic in time slot," "no response to an interrogation," "standby mode," etc., or (c) operator observations of abnormal operations such as failure of the equipment to respond to a manual input.

50.6.5.2 Indication translation. The approach taken to translate detection-mode indication patterns into primary fault response groupings involves indexing and observation of the following:

a. The method of indexing the baseline fault matrices shall be retained whenever possible.

b. Primary fault numbers are subdivided whenever the detection mode patterns are similar but not identical and result in different fault responses.

50.6.6 Preparation of the fault response figure. (see figure A-5.)

50.6.6.1 Section A. These data correlate all failure mode contributors to a given detection mode pattern. The indications are listed in time occurrence or condition sequence beginning at the top. A dashed horizontal line is drawn to indicate a step involved in accumulating the indications. Notes and diagnostic entries are used to clarify the steps. Dispatch information, including failure rates and sequence of dispatching will also be provided in this section. These data will be in preliminary form for review at the OSE PDR. Final update will be provided after the completion of the MSE CDR.

50.6.6.1.1 Fault XXX. These numbers are established during the part failure mode analysis using system indications and printouts.

50.6.6.1.2 Status. This section will reflect the operational status of the fault such as "alarm, standby no-go, critical no-go, etc."

50.6.6.1.3 Fault indications. This section reflects the fault indications received at the control center including status indicators, printouts, lack of status, including status indications conditional on the mode of operation.

50.6.6.1.4 Evaluation/comments. These entries are provided for the purpose of interpreting the detection mode patterns and conditions. The contractor will consolidate inputs from two or more initiating contractors for a given fault number. Diagnostic procedures will be used to identify a specific maintenance response for the given fault indications.

50.6.6.1.5 When indication occurs. This entry will reflect the operating mode of the system when the fault occurred, such as normal monitoring, start up, alignment, missile test, tape loading, etc.

50.6.6.1.6 Dispatch section. These entries record all the on-site replaceable items contributing to the fault patterns recorded under "fault indications" and "evaluation/comments." The response and dispatch sequencing is determined by the "evaluation/comments" section. The remainder of the dispatch section includes OSE/MSE required to repair the fault the maintenance team required to perform the maintenance action and drawer number for each OSE item, and fault frequency for each OSE/AVE item. If the failure rate is less than the SAMSO designated failures per unit per month, "Neg" may be entered.

50.6.6.2 Section B, maintenance actions. These entries include the actions required by the maintenance team to correct the fault. This includes the technical order (TO) to be used, CI number of the OSE to be replaced, and the specific maintenance action required. These data will be completed at the technical data review of the fault matrix.

50.6.6.3 Section C, system impact. This section will be used to highlight the impact the fault has on the system operation. This includes impact on status monitoring, launch, and conditional impact based on the results of fast diagnostics and "evaluation/comments" per Appendix A, 50.6.6.1.4. This section will be in preliminary form at the OSE PDR and updated after the completion of the MSE CDR.

50.6.6.4 Section D, fault description. This section will contain a brief functional description of the fault. This description shall be detailed enough to explain the comments contained in the "system impact" section. This section will be in preliminary form at the OSE PDR and updated after the completion MSE CDR.

50.6.6.5 Section E, reference information. This section will contain reference to any previous analysis documentation such as associate contractor fault matrix source data, or previously completed failure mode analysis data.

50.6.6.6 Section F, interface failure mode analysis. This section will be used to document the summarized results of the interface fault mode reactions that were evaluated per 5.1.4.3.

50.6.6.7 Section G, failure mode analysis. This section will document the specific failures by end item piece part that are associated with the unique fault indications (Appendix A, 50.6.6.1.3) and results of evaluation/comments (Appendix A, 50.6.6.1.4). This section will be completed at the OSE CDR with final update after the completion of the MSE CDR.

50.6.7 Indenture list/failure rate summary chart. (see figure A-6.) Summarize the fault data for retrieval by end item and for maintenance loading. These charts are included with the introductory material in the integrated fault matrix. (Chart is prepared by SAMSO for a designated contractor.)

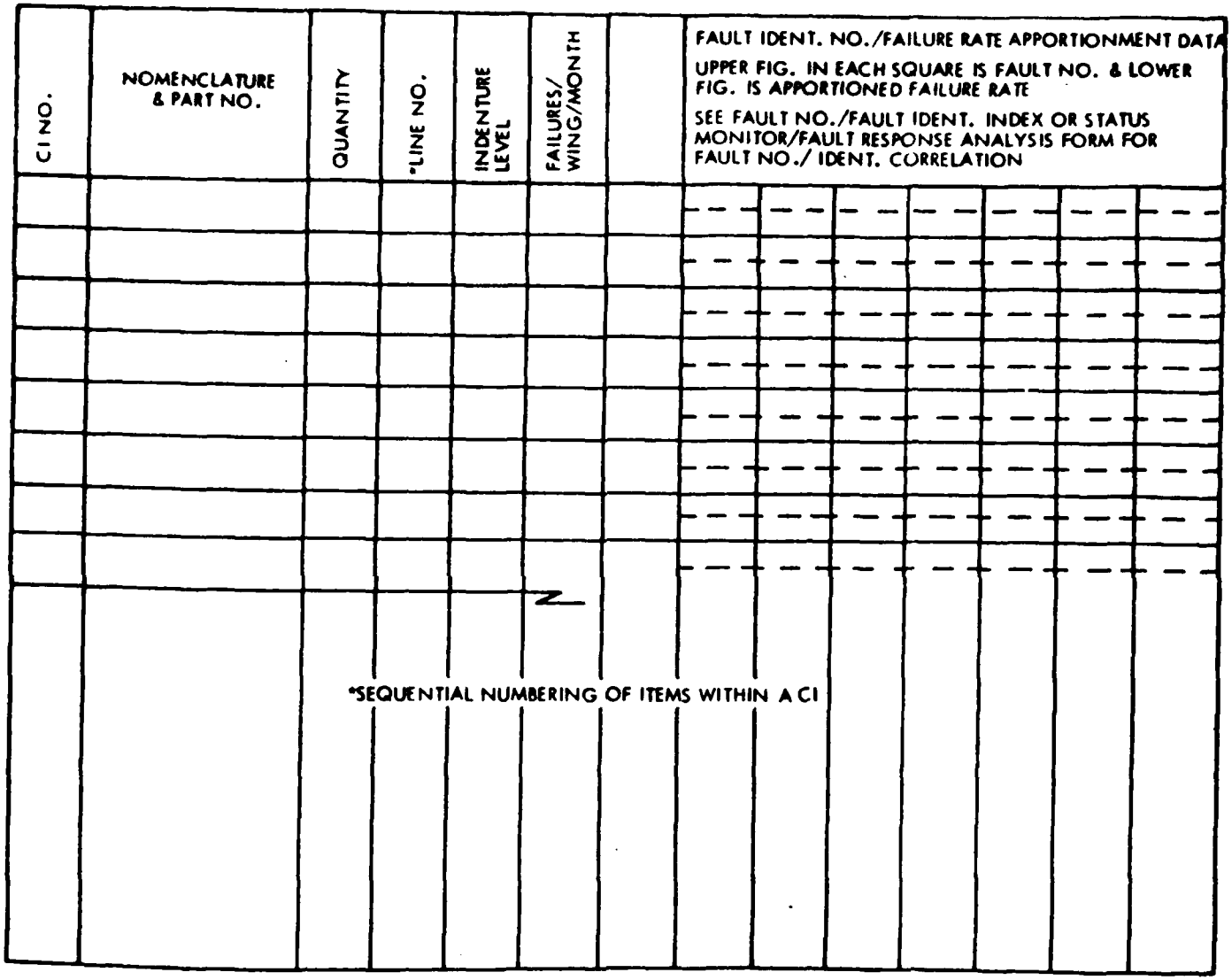


FIGURE A-6. Indenture List/Failure Rate Summary Chart

APPENDIX B

INSTRUCTIONS FOR THE PREPARATION OF LOGISTICS SUPPORT ANALYSIS (LSA) DATA

10. SCOPE

10.1 Purpose. This appendix provides instructions for documenting the results of a logistics support analysis. The data formats used for this purpose are Functional Flow Diagrams, Maintenance Forms B, Logistics Support Analysis Records (LSARs), and Maintenance Timelines.

The LSAR data sheets have been designed to support data automation and it is the intent of BMO to utilize computer processing wherever practical. The data file management software (edit/update), and selected data processing/reporting will be provided by BMO to assure standardized data record formats. The primary purpose of the data sheet formats, shown in Section 50.3 of this appendix, is to illustrate specific data elements for computer input as opposed to a format for "hard copy" data submission. In this way each M-X associate contractor has the option of using these formats or his own "system" for documenting and managing their LSAR data so long as a) the data elements are uniquely identifiable, and b) the data is submitted in the format prescribed by the data file management software provided by BMO.

10.2 Application. Compliance with this appendix by all M-X associate contractors is mandatory.

20. REFERENCED DOCUMENTS

20.1 Issues of Documents. The following documents of the issue in effect on date of invitation for bids or requests for proposal, form a part of this standard to the extent specified herein:

SPECIFICATIONS

DOD-D-1000	Drawings, Engineering and Associated Lists
MIL-M-008910	Military Specification Manual Technical Illustration Parts Breakdown, Preparation of

STANDARDS

MIL-STD-12	Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents
DOD-STD-100	Engineering Drawing Practices
MIL-STD-470	Maintainability Program Requirements (for Systems and Equipment)
MIL-STD-789B	Procurement Method Coding of Replenishment Spare Parts

MIL-STD-1517	Phased Provisioning
MIL-STD-1552	Provisioning Technical Documentation, Uniform DOD Requirements for
MIL-STD-1561	Provisioning Procedures, Uniform DOD
SAMSO STD 77-8	Nuclear Hardness and Survivability Program Requirements for ICBM Weapon Systems
SAMSO STD 79-1	Integrated System Safety Program for the M-X Weapon System

PUBLICATIONS

DOD 4100.39M	Defense Integrated Data System (DIDS) Procedures Manual.
DOD 4130.2M	Federal Catalog System Policy Manual
DOD 5000.12M	Data Elements and Data Codes Standardization Procedures (C)
AFP 50-58	Handbook for Designers of Instructional Systems
AFR 36-1	Officer Classification Regulation
AFR 39-1	Airman Classification Regulation
AFR 57-6	DOD High Dollar Spare Parts Breakout Program
AFM 300-4	Data Elements and Codes
AFR 800-26	Spares Acquisition Integrated with Production (SAIP)
AFLCR 65-5	Air Force Provisioning Policies and Procedures
AFLC/AFSCR 800-31	Government Furnished Equipment/Contractor Furnished Equipment (GFE/CFE) Selection Process, GPE Acquisition and GFE Management
TO 00-25-195	Source, Maintenance, and Recoverability Coding of Air Force Weapons, Systems, and Equipment

20.2 Other Publications. The following documents form a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

CATALOGING HANDBOOK

H4-1	Name to Code (Federal Supply Code for Manufacturers U.S. and Canada)

H4-2	Code to Name (Federal Supply Code for Manufacturers U.S. and Canada)
H6-1	Federal Item Name Directory for Supply Cataloging (Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402).

INDUSTRY DOCUMENTS

ANSI Y32.16 IEEE STD 200	Reference Designations for Electrical and Electronics Parts and Equipment (Application for copies should be addressed to the American National Standards Institute, Incorporated, 1430 Broadway, New York, New York 10018).

30. DEFINITIONS

The following definitions are provided for purposes of interpreting the format used in LSAR data sheets and the data element dictionary (DED). (Reference 50.3.10.)

30.1 Data chain. A name or title given to the use of a combination of two or more logically related standard data elements, data use identifiers, or other data chains. For example, the data chain "Complete Calendar Date" is made from the combination of three data elements "Year, Month, and Day."

30.2 Data code. A number, letter, character, symbol, or any combination thereof used to represent a data item in facilitating machine processing. For example, the data codes, "A," "D," and "C" represent the data items "Addition," "Deletion," and "Change" under the data element "Update code."

30.3 Data element. A grouping of informational units which has a unique meaning and subcategories (data items) of distinct units or values. Examples of data elements are "Sex, Race, Countries of the World, Department of Defense Component, Contract Number, National Item Identification Number, and Quantity."

30.4 Data element dictionary (DED). A narrative definition of the data element in sufficient detail to present a clear and complete understanding of the precise data or element of information that the data element represents. (See 50.3.10 of this appendix.)

30.5 Data item. A sub-unit of descriptive information or values classified under a data element. "Countries of the World" contains data items such as "Afghanistan, Albania, Algeria"; the data element "Department of Defense Component" contains data items such as "Department of the Army, Office of Civil Defense."

30.6 Field format. A specification for the length, type and justification, and decimal placement of data element or subunit (data item) thereof:

a. Length. The number of character positions in the data element. In the event the length is variable, the maximum length is specified.

b. Type. A specification of the character type, wherein:

(1) "A" specifies that all characters of the data entry are alpha.

(2) "N" specifies that all characters of the data entry are numeric.

(3) "X" specifies that characters of the data entry are alpha, numeric, special, or any combination thereof.

c. Justification. Specifies from which side of the field the characters of the data element are entered. Those starting at the left are left justified (L), those at the right are right justified (R). Those which always occupy the entire field are fixed (F), as shown below. Left justified data entries shall leave unused character spaces blank. Right justified entries shall be prefixed with zero(s) to fill any blank character spaces.

(L)	3	1	Ø	2			
(R)	Ø	Ø	Ø	3	1	Ø	2
(F)	1	3	1	Ø	2	Ø	5

d. Decimal placement. Specifies the number of character positions to the right of the assumed decimal point when the data element is numeric in all character positions. A dash (-) will be used if this column is not applicable. AS means "as specified" and the detailed instructions in 50.3.10.4 will indicate location of decimal points.

30.7 Standard data element title. The actual noun phrase name assigned to the data element. Sufficient adjectival modifiers are used with the noun name to insure title uniqueness.

40. GENERAL REQUIREMENTS

40.1 Logistics support analysis (LSA). LSAs shall be performed to a) identify logistics support functional requirements of the M-X Weapon System, b) provide detailed logistics support requirements for "system level" activities (i.e., those support activities which do not relate to the maintenance of individual items or subsystems, and c) scheduled and unscheduled maintenance requirements of all reparable equipment identified for use in the M-X Weapon System. The LSA is performed in close coordination with the other analytical activities of the SRA and is an iterative process, beginning with the definition of system/equipment concepts and continuing until all logistics support requirements/resources are identified for the operational M-X Weapon System.

50. DETAILED REQUIREMENTS

50.1 Maintenance flow diagrams.

50.1.1 Maintenance functional flow diagrams. The flow diagrams for identifying and documenting maintenance functions shall be prepared in accordance with the instructions contained in Appendix A, 50.1.

50.1.2 Depot level flow diagrams. Flow diagram identification shall be in accordance with Appendix A, paragraph 50.1.6.1 except that the item/assembly level LSA control number shall be identified as the diagram/flow number in the flow diagram title block (reference Appendix A, figure A-1, sheet 5).

50.1.2.1 Flow diagram mechanics and symbology. The depot maintenance flow diagrams shall be prepared in accordance with the rules, symbols and conventions of Appendix A, paragraph 50.1.6.2 except as modified below and illustrated in figure B-1.

a. Depot maintenance flow blocks shall be as shown in figure B-1.

b. A flow diagram legend block (figure B-2) shall be included on each flow diagram.

c. There shall be a one-to-one correlation between each functional flow block and an attendant Data Sheet D_1.

d. The flow diagram shall portray only those maintenance tasks applicable to the assembly defined by the control number in the title block.

e. Input/output occurrence factors shall be reflected for each gate or functional flow block.

f. The average time in hours (elapsed time) and the manhours required for a single performance of the function shall be entered in each functional flow block.

g. The average elapsed time and average manhours shall be entered in each functional flow block and shall be the product of the input maintenance occurrence factor and the elapsed time and manhours respectively.

h. A "Flow Diagram Total" block, as shown in figure B-1 shall be reflected on each functional flow diagram providing the arithmetic sum of the data defined in f and g of all blocks on the diagram. When detailed diagrams are required, the top level flow diagram will reflect the total of all diagrams for a given control number.

i. The Task Code from the corresponding Data Sheet D_1 shall be entered in the flow block.

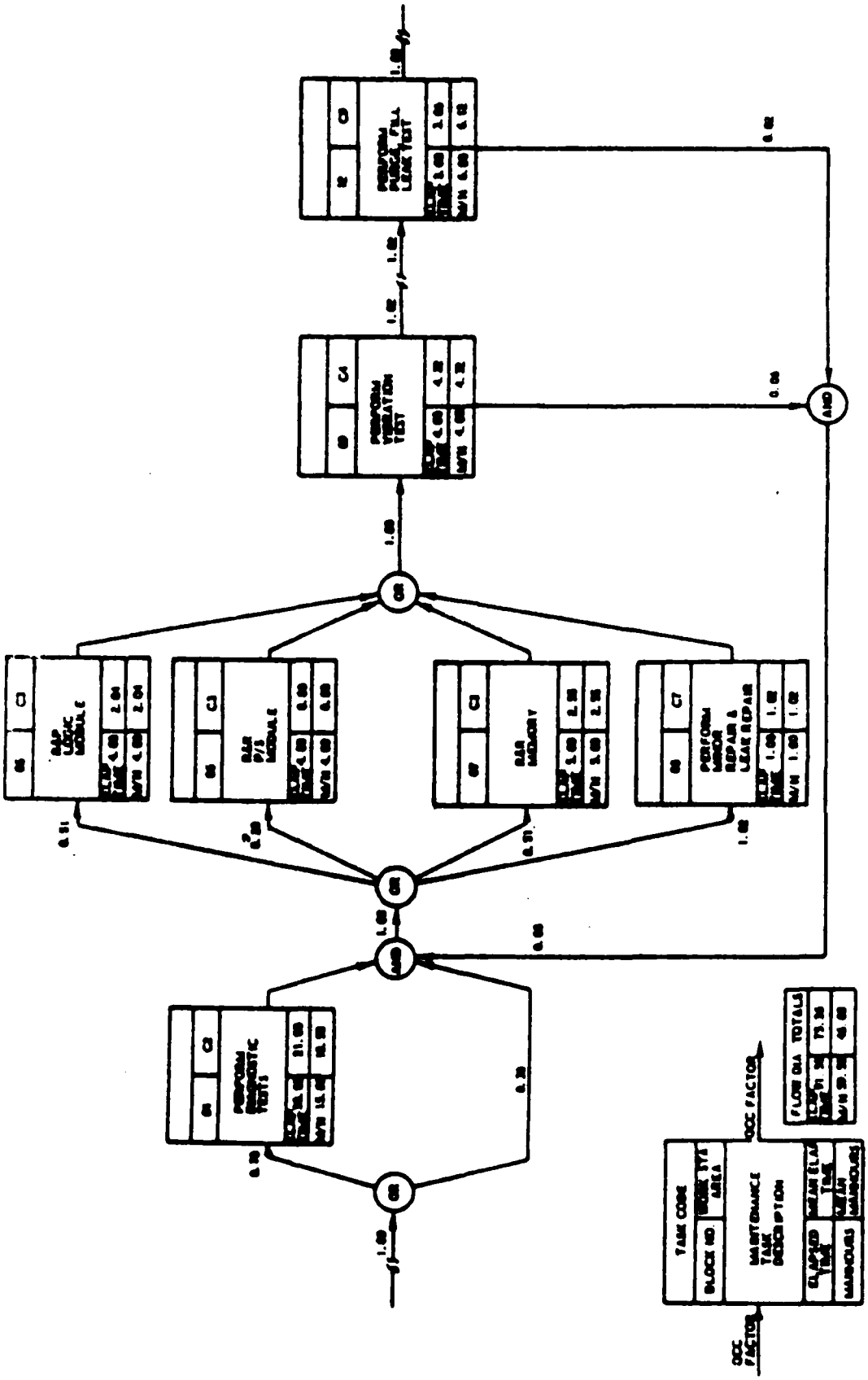


Figure B-1.

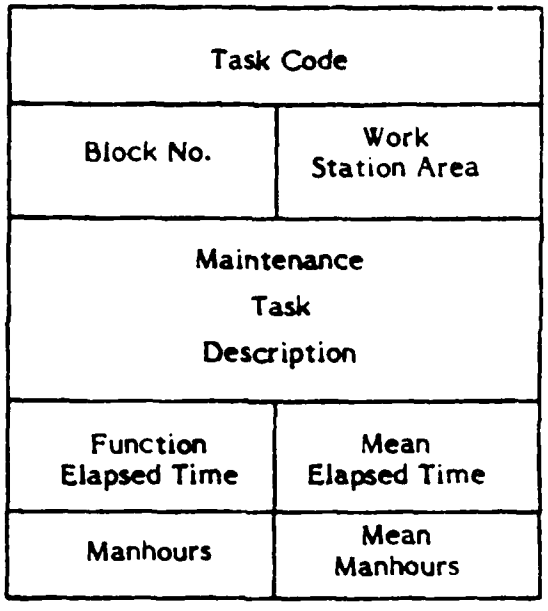


Figure B-2. Item Depot Flow Diagram Legend Block

50.1.2.2 Occurrence factors. Occurrence factors are required for a majority of logistic resource computations; i.e., manloading, equipment loading, and consumable requirements. Whereas failure factors are a ratio of supply demands to operating program unit (hours, months, year, etc.), occurrence factors are a ratio of event occurrences per average repair cycle. Depot maintenance flow diagrams provide a functional description of an average repair cycle. Through the assignment of control numbers to designate reparable assemblies, the functional flow diagrams then represent the average repair cycle of each assembly portrayed. The assignment of occurrence factors to each maintenance task defined on the Data Sheet D, provides the average number of times each maintenance task is accomplished during the assembly's average repair cycle.

50.1.2.2.1 Occurrence factor computations. Computed occurrence factors are depicted in figure B-1. Although their computation can be accomplished by more sophisticated methods, the following method is described to illustrate an acceptable technique using figure B-1 as an example.

a. The input and output occurrence factors are established at 1.00 (reference Figure B-1),

b. Function 12, Performs Purge Fill Leak Test, has a predicted yield rate of 98%. Two percent of the items must be recycled for additional repair. Therefore, the function occurrence factor must be 1.02 (1.00 0.98).

c. The vibration test station, function 09 has a minimum yield rate of 94%; therefore, its function occurrence factor must be 1.08 (1.02 0.94), resulting in 6% of the items being recycled for additional repair.

d. The input and output occurrence factors of the parallel network formed by functions 05, 06, 07 and 08 of figure B-1 must be equal that of the succeeding function 09. Therefore, the input and output occurrence factors for the parallel network is 1.08.

e. The occurrence factors of the parallel network represent a predicted normalized distribution of actions required of the 1.08 input units. Those occurrence factors (the sum of which must be equal to or greater than 1.08) are assigned on the basis of the following types of considerations:

   1. Relative module failure rates

   2. Estimated potential of multiple failures

   3. Fault isolation capability of the diagnostic tests

   4. Potential for more than one (1) module replacement for failures which cannot be diagnosed

   5. The percentage of items requiring minor repair (could be independent of failure)

   6. The anticipated functions required of the 8% that are recycled.

   7. Time-shared ATE test stations/interface test adapters.

f. The parallel network formed by function 04 and the by-pass line are functionally mutually exclusive. Therefore, the occurrence factors represent the predicted distribution which must sum to the input occurrence factor of 1.0. In the illustration, only 70% of the items requiring repair are expected to require diagnostic test for fault isolation.

50.2 Logistics Forms B. The Logistics Form B is used to document support functional requirements identified by the LSA. These forms shall be prepared in accordance with the instructions contained in Appendix A, 50.2 with the following exceptions:

a. The first entries in the "Task" column shall be as follows:

Logistics Control Number (LCN):

(Enter the assigned LSAR control number per 50.3.1.1a of this appendix.)

Task Code (T/C):

(Construct and enter an LSAR task code per 50.3.3.2a of this appendix.)

Task Description (T/D):

(Enter an abbreviated description of the task per 50.3.5.2b of this appendix.)

The format for these entries shall be:

Task
(1)

LCN: XXXXXXXXXXX
T/C: XXXXXXXXX
T/D: XXXX XXXXXX XXXXXX

(NOTE: LSAR data sheets B through H shall also be prepared to document the logistics resource requirements, substituting the Form B for the D_1 sheet to provide the functional requirements and task analysis.)

b. In column C1 (Appendix A, 50.2.1.10.1) the task analysis will be numbered in the sequence in which they must be performed to satisfy the functional requirement.

.0.3 Logistics support analysis record (LSAR) data. The LSAR is structured to document the detailed M-X logistics support requirements in terms of resources, the utilization of those resources and the maintenance/repair task analysis which forms the basis for technical orders and training requirements. The function of the LSAR data sheets is to provide a common data input format to be used as the basis for communicating these logistics support requirements between the M-X associate contractors and BMO.

As previously stated, the LSAR data will be automated to support a more cost effective method for data handling and integration. Software for data file

management (edit/update) will be provided by BMO. The data file management software will include the generation of a data base for delivery to BMO in accordance with contract CDRL requirements.

50.3.1 Data Sheet A, Support System Maintenance Requirements. (see figure B-3) Data Sheet A is structured to consolidate the pertinent information related to the anticipated operation of the subsystem or CI and the allocation of maintenance requirements to the subsystem or CI being analyzed. Data Sheet A shall be used to document maintenance requirements for each subsystem and each CI in the M-X Weapon System. System level/functional analyses which do not relate to the equipment repair activities do not require the preparation of Data Sheet A.

50.3.1.1 Card A01.

a. Block 1. Control number (CN) DED 038, 11X. Enter the CN for the subsystem or CI under analysis.

Control Number Structure.

The CN is the primary key for indexing the LSAR data and must be structured and assigned with extreme care. The CN initially assigned to a subsystem or CI on the Data Sheet A forms the basis for the CN assignments at each level within the subsystem or CI to show the hierarchical relationship of each reparable assembly.

To conform to the two types, or phases of support analyses (system level functional activities and equipment repair activities), there are differently structured CNs for each type of LSA. The basic formats of these CNs are shown in figure B-4. Each associate contractor will be assigned CNs, individually or in blocks, upon submitting a request to BMO/MNLA, Norton AFB, CA 92409.

b. Block 2. Configuration Item (CI) Number, DED 023, 6X. Enter the last six digits of the CI number assigned by BMO.

c. Block 3. Service Designator Code, DED 099, 1A. Enter "F" to designate Air Force as the acquisition manager.

d. Block 4. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the code for the manufacturer of the item for which the sheet is being prepared.

e. Block 5. Alternative Action Code (Alt Act Cd), DED 003, 1A. Upon completion of the Repair Level Analysis (RLA), separate and distinct support alternatives may be considered for a given item of equipment. In these cases, an alpha code is entered in Block 5 to differentiate between these analyses. A separate data package will be prepared for each alternate action considered.

f. Block 6. Revision Code (Rev Code), DED 094, 1A. Indicates, in alphabetical sequence, the revision status of the input data sheet. Enter an "A" for the first change, "B" for the second change, etc.

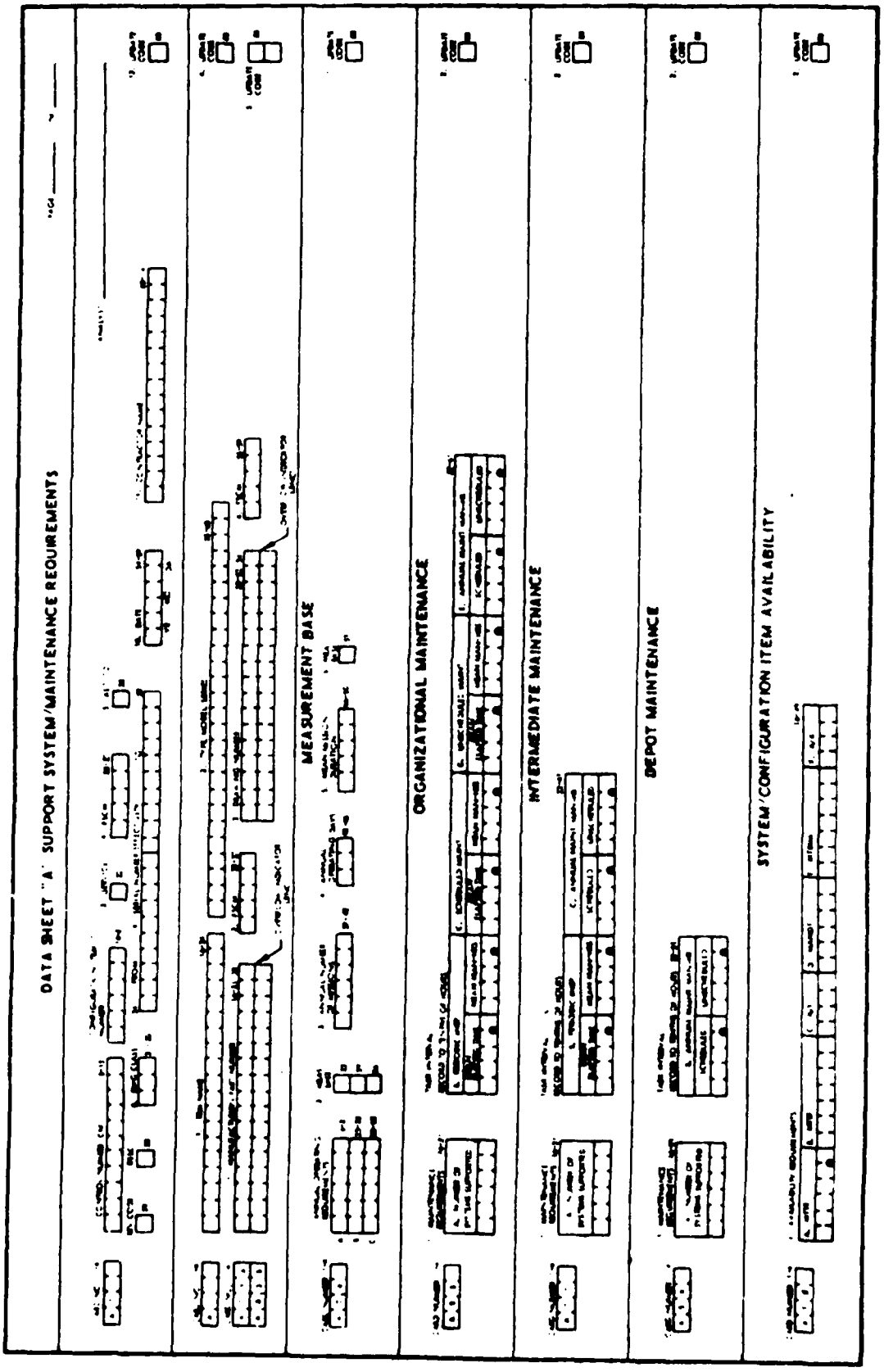
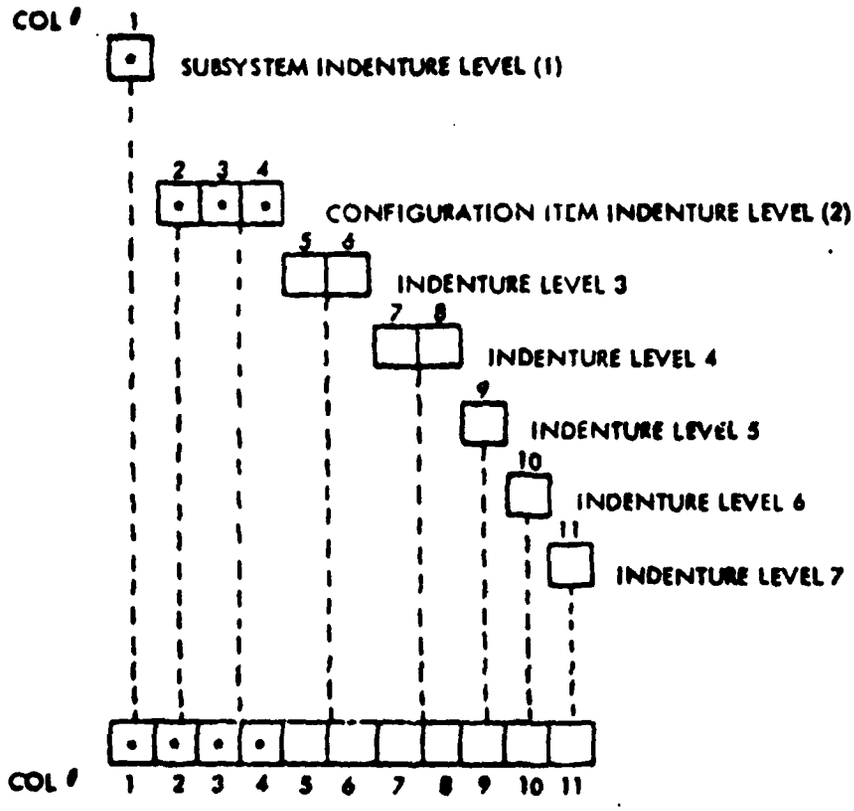

DATA SHEET "A" SUPPORT SYSTEM/MAINTENANCE REQUIREMENTS
MEASUREMENT BASE
ORGANIZATIONAL MAINTENANCE
INTERMEDIATE MAINTENANCE
DEPOT MAINTENANCE
SYSTEM/CONFIGURATION ITEM AVAILABILITY

Figure B-3.

EQUIPMENT CONTROL NUMBER



* CONTROLLED AND ASSIGNED BY BMO

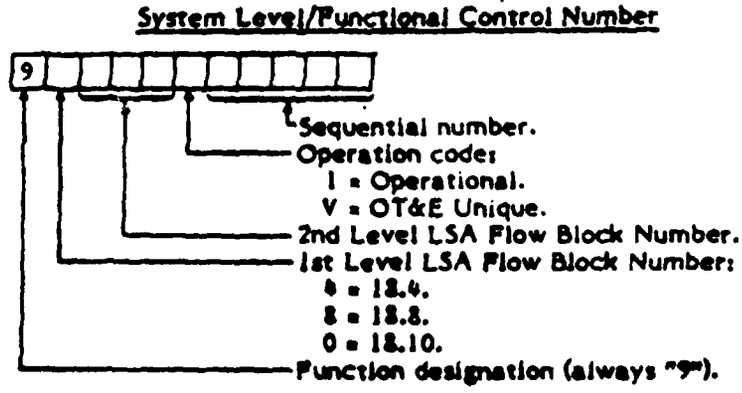


Figure B-4. LSA Control Number Structure

g. Block 7. Data Sheet Status Code (DSSC), DED 018, 1A. Enter "W" if the data sheet is incomplete and in-process, "A" if the sheet has been concurred with by the BMO ILS/LSAR team (or other designated government authority), "C" if the data sheet is complete but not yet approved, or "R" if the data sheet is in-process review.

h. Block 8. Drawing Classification (Dwg Class), DED 020, 3X. Enter the Intended Use Category in the first position, and the Drawing Level as identified in DOD-D-1000 in the second position. Enter a proprietary status code in the third position.

i. Block 9. Serial Number Effectivity, DED 098, 20X. Enter the serial number of the first and last affected assembly, to which the data sheet applies, in the "from" and "to" blocks. If only a single item applies, the same serial number will be entered in both blocks. When the ending number is unknown, "SUB" (subsequent) will be entered in the serial number "to" data field.

j. Block 10. Date, DED 019, 6N. Enter the date as follows: First two spaces - last two digits of the calendar year, third and fourth spaces - numerical sequence of the month (i.e., Ø1, Ø2, ...12), fifth and sixth spaces - day of the month. Example: 5 Mar 77 is entered as 77Ø3Ø5.

k. Block 11. Contractors Name, DED 145, 15A. Enter the name of the M-X Associate Contractor preparing the data sheet.

l. Block 12. Update Code, DED 134, 1A. Enter the status of the particular card: "A," "D," or "C" denote a card addition, deletion, or change respectively. Update code appears on each card in column 80 on all data sheets. The update code appears in column 80 of all LSAR card formats and these instructions apply where ever the update code is used.

50.3.1.2 Card A02

a. Block 1. Item Name, DED 045, 19X. Enter the item name assigned in accordance with Federal Cataloging Handbook H6-1 or DOD-STD-100. Abbreviations for item name will be in accordance with MIL-STD-12.

b. Block 2. Type, Model, Series Designator, DED 127, 26X. RESERVED.

50.3.1.3 Card A03 A/B .

a. Block 1. Manufacturer's Part Number, DED 056, 32X. Enter the part number of the item for which the data sheet is being prepared. If the part number is over 16 digits, the remaining digits are put on card A03B, block 1. Enter an "A" in column 32 on the A03A to indicate a part number overflow. (Reference DED 049.)

b. Block 2. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the code that identifies the source of manufacturer's part number.

c. Block 3. Drawing Number, DED 021, 32X. Enter the drawing number of the item for which the data sheet is being prepared. If the drawing number exceeds 16 digits, the remaining digits are put on card A03B,

block 3. Enter an "A" in column 54 of the A03A card and a "B" in column 54 of the A03B card if the drawing number exceeds 16 digits. (Reference DED 049.)

d. Block 4. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the code that identifies the manufacturer that produced the drawing number.

50.3.1.4 Card A04. The A04 card provides a measure of operating requirements of the subsystem/equipment being analyzed. These requirements shall be reported for one unit only. Those subsystems/equipment which are static in the normal operating mode shall be reported as operating continuously.

a. Block 1. Annual Operating Requirements, DED 007, 6N. Enter the estimated or required yearly usage of the item. Three blocks are provided to record the requirements when they are expressed in more than one measurement base.

b. Block 2. Measurement Base Code (Meas Base), DED 063, 1A. Enter the measurement base code(s) for the number(s) on card A04, block 1.

c. Block 3. Annual Number of Missions, DED 005, 6N. Enter the specified or estimated number of missions performed annually.

d. Block 4. Annual Operating Days, DED 006, 3N. Enter average number of days per year that a mission demand will be placed on the item.

e. Block 5. Mean Mission Duration, DED 059, 5N. Enter the average length of the mission.

f. Block 6. Measurement Base Code (Meas Base), DED 063, 1A. Enter the code to identify the measurement base for card A04, block 5.

50.3.1.5 Card A05

a. Block 1. Maintenance Requirements for Organizational Level, no DED. A group title for data elements to specify the maintenance requirements by maintenance level.

(1) Block 1A. Number of Systems Supported, DED 068, 6N. Enter the number of systems supported by the organizational level maintenance organization. For mission equipment this will be the number of units fielded.

(2) Block 1B. Periodic Inspection, DED 022, 055, 5N. Enter the mean annual elapsed time and man-hours, in tenths of hours, required for periodic inspection of one unit. When it is standard practice to include "service" type tasks (i.e., lubricate, clean, etc.), as part of the periodic inspection function, the times required to perform these tasks shall be included in this entry.

(3) Block 1C. Scheduled Maintenance, DED 144, 5N. Enter the mean annual elapsed time and man-hours, in tenths of hours, required to perform scheduled (preventative) maintenance on one unit. These

entries shall not include those "service" type tasks covered by periodic inspection.

(4) Block 1D. Unscheduled Maintenance, DED 133, 5N. Enter the mean annual elapsed time and man-hours, in tenths of hours, required to perform unscheduled (corrective) maintenance on one unit.

(5) Block 1E. Annual Maintenance Man-Hours, DED 004, 5N. Enter the total annual man-hours required for scheduled (including periodic inspection) and unscheduled maintenance, in tenths of hours, for one unit.

50.3.1.6 Card A07

a. Block 1. Maintenance Requirements for Intermediate Maintenance, No DED. Blocks are to be completed as described on card A05, but for maintenance activities designated as Intermediate Level Maintenance.

50.3.1.7 Card A09

a. Block 1. Maintenance Requirements for Depot Maintenance, no DED. Blocks are to be completed as described on card A05, but for maintenance activities designated as depot level maintenance.

50.3.1.8 Card A10. System/CI Availability, No DED.

a. Block 1. Availability Requirements.

(1) Block 1A. Mean Time to Repair (MTTR), DED 062, 6N. Enter the required MTTR for the subsystem/CI under analysis.

(2) Block 1B. Mean Time Between Failures (MTBF), DED 060, 7N. Enter the required MTBF for the subsystem/CI under analysis.

(3) Block 1C. Availability Inherent (AI), DED 009, 4N. Enter the calculated inherent availability in accordance with the procedures defined in DED 009. The result will be expressed as a percentage with the capability of recording to hundredths of a percent.

(4) Block 1D. Mean Active Maintenance Downtime (MAMDT), DED 058, 6N. Enter the MAMDT for the subsystem/CI under analysis.

(5) Block 1E. Mean Time Between Maintenance Actions (MTBMA), DED 061, 7N. Enter the MTBMA for the subsystem/CI under analysis.

(6) Block 1F. Availability Achieved (AA), DED 009, 4N. Enter the calculated achieved availability in accordance with the procedures defined in DED 009. The results will be expressed as a percentage with the capability of recording to hundredths of percent.

50.3.2 Data Sheet B, Item Reliability (R) and Maintainability (M) Characteristics. (see figure B-5) A Data Sheet B is required for each system level/functional analysis, documented on a maintenance Form B and for each indenture level (reparable assembly) of the equipment repair analysis.

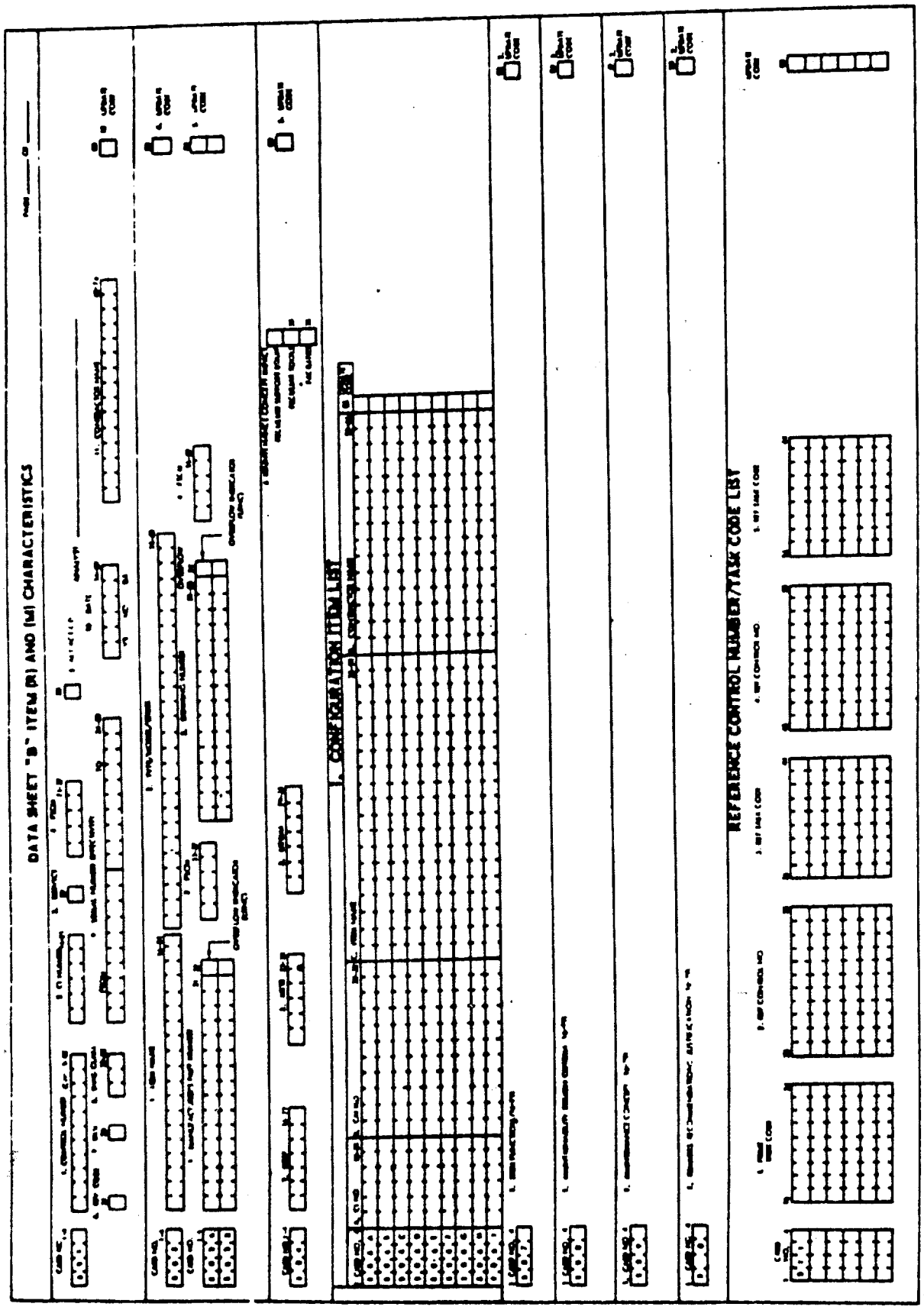

DATA SHEET "B" ITEM (R) AND (M) CHARACTERISTICS
CONFIGURATION ITEM LIST
REFERENCE CONTROL NUMBER/TASK CODE LIST

Figure B-5.

50.3.2.1 Cards B01, B02, and B03A/B. For equipment repair analyses the instructions for the preparation of the B01, B02 and B03A/B cards are the same as the instructions for cards A01, A02 and A03 with the exception that the CN may be expanded to identify a lower indenture of equipment. For system level/functional analyses not all data fields are applicable (i.e., part number, serial number effectivity, etc.). Using the instructions for the cards A01, A02 and A03A/B, enter the applicable data in the corresponding cards B.

50.3.2.2 Card B04

a. Block 1. Mean Time Between Failures (MTBF), DED 060, 7N. Enter the MTBF of the item for which the data sheet is being prepared, based on the failure mode analysis of that item. This data field shall be left blank for system level/functional analyses.

b. Block 2. Mean Time to Repair (MTTR), DED 062, 6N. Enter the weighted average of all repair times entered on card C04, Block 4. For system level/functional analyses, this entry shall be the total time to perform the functional task.

c. Block 3. Mean Time Between Maintenance Actions (MTBMA), DED 061, 7N. Enter the MTBMA of the item for which the data sheet is being prepared.

d. Block 4. Maintenance Impact, DED 053, 1A. Enter "Y" or "N" to indicate whether the items listed are required for performing maintenance. Details shall be provided on card B09.

50.3.2.3 Card B06. The B06 cards will be completed at the system/subsystem level only and will list all configuration items which make up the system/subsystem in both operational and operational test configurations.

a. Block 1. Configuration Item List, No DED.

(1) Block 1A. Configuration Item (CI) Number, DED 023, 6X. Enter the CI number for each CI which make up the system/subsystem.

(2) Block 1B. Control Number (CN), DED 038, 11X. Enter the CN assigned to the CI shown in block 1A.

(3) Block 1C. Item Name, DED 045, 19X. Enter the item name for the CI shown in block 1A.

(4) Block 1D. Contractor Name, DED 145, 15X. Enter the name of the M-X associate contractor responsible for the development of the CI shown in block 1A.

50.3.2.4 Card B07

a. Block 1. Item Function, DED 044, 4000X. Enter a brief description of the function of the item or system level/functional activity being analyzed. Sufficient detail shall be provided to permit evaluation of the support analysis. It is not necessary to use the data sheet format when additional space is required to complete this entry.

50.3.2.5 Card B08

a. Block 1. Maintainability Design Criteria, DED 080, 4000X. Where applicable, list the maintainability design criteria established by the support analysis and the design features incorporated to meet the criteria. It is not necessary to use the data sheet format when additional space is required to complete this entry.

50.3.2.6 Card B09

a. Block 1. Maintenance Concept, DED 052, 4000X. Enter a concise and clear statement of the contractors interpretation of the M-X maintenance and support concept as applied to his system/equipment. This statement will identify maintenance approaches such as methods of detecting and isolating failures, planned location of maintenance capabilities, and special maintenance or logistic procedures. This statement shall reflect consideration of the nature and frequency of principal preventive and corrective maintenance tasks, the assignment of SMR (source, maintenance, and recoverability) codes, and the related special and common support equipment requirements. The effects of the maintenance environment on the item are also considered. Pertinent human factor engineering principles and criteria should be included. Information presented shall be the basis for follow-on decisions and provide guidance for detailed approaches set forth on Data Sheets C and D. This maintenance concept shall be prepared only once by each M-X associate contractor, at the highest level of indenture for which he is responsible, and shall cover all levels of maintenance. It is not necessary to use the data sheet format if additional space is required to complete this entry.

50.3.2.7 Card B10

a. Block 1. Remarks/Recommendations/Justification, DED 088, 2000X. Enter maintainability recommendations if the current maintenance concept needs revision. Enter justification when recommendations are made to revise the current maintenance concept. This justification will be of historical value to establish the rationale in the decision.

50.3.2.8 Card B11. Reference Control No./Task Code List, No DED.

a. Block 1. Prime Task Code, DED 114, 9X. Select the prime tasks from Data Sheet C, "Maintenance Task Analysis Summary," associated with the Data Sheet B control number being analyzed.

Prime tasks are defined as those tasks identified by this segment of the LSA which require some common functional tasks (i.e., dispatch preparation, travel, site penetration, etc.), to be performed before or after the prime task. The purpose of the B11 card is to permit referencing these common tasks rather than redefining the functions and resources required in the performance of these common tasks. Primarily used for organizational level maintenance activities.

b. Blocks 2, 4. Reference Control Number, DED 038, 11X. Tasks that are supportive in nature which place a demand upon the support resources and are common to more than one CI. Such functions are normally reflected

in these Forms B and are assigned control numbers in accordance with Appendix B, paragraph 50.3.1.

c. Blocks 3, 5. Reference Task Code, DED 114, 9X. Task codes are assigned to the common supportative functions in accordance with Appendix B, paragraph 50.3.3.2. Once identified initially, the common function may be defined on all subsequent analysis by reference only.

50.3.3 Data Sheet C, Maintenance Task Analysis Summary (see figure B-6) The Data Sheet C summarizes selected data (man-hours, elapsed time, etc.) from the D_1 Maintenance Task Analysis data sheet for equipment repair analyses or from the maintenance Form B for system level/functional analyses.

50.3.3.1 Cards C01, C02, and C03A/B. Instructions for the preparation of cards C01, C02, and C03A/B are the same as the instructions for cards B01, B02, and B03A/B.

50.3.3.2 Card C04

a. Block 1. Task Code, DED 114, 9X. The task code is made up of nine (9) individually coded digits. The definition of the individual codes is shown in figure B-7. Select the appropriate code for each digit and enter the resulting task code in block 1 of the C04 card.

b. Block 2. Task Frequency, DED 115, 5N. For equipment repair analyses enter, to hundredths, the task frequency based on the annual subsystem/CI operating requirements indicated on card A04, block 1. For example: the frequency of monthly inspection would be indicated as 012.00; another example, assume 600 hours is the annual operating requirements (card A04, block 1) and a task function is to be performed every 1200 hours (once every two years) then the task frequency would be 000.50. The annual operating requirements contained on card A04, block 1 must be used to compute the frequency of all tasks identified with the end item. If more than one card is required to define a task, the task frequency is duplicated on all cards for the particular task. For system level/functional analyses enter, in hundredths, the annual frequency that the task must be performed. If more than one card is required to define the task, the task frequency is duplicated on all cards for that task.

c. Block 3. Measurement Base Code (MB), DED 063, 1A. Enter the appropriate measurement base code from card A04, block 2.

d. Block 4. Mean Elapsed Time, DED 022, 5N. Record the total mean elapsed time, in hundredths of hours, required to perform the task. If more than one card is required to define a task, the total mean elapsed time is duplicated on all cards for the particular task.

(1) Block 4A. Allocated (Time), DED 022, 5N. Enter the time allocated for the task. This entry will be based on specification requirements and/or the contractors preliminary estimate of the total time to repair the item under analysis.

(2) Block 4B. Predicted (Time), DED 022, 5N. Enter the predicted task time. The predicted time is based on a detailed task analysis (Data Sheet D_1).

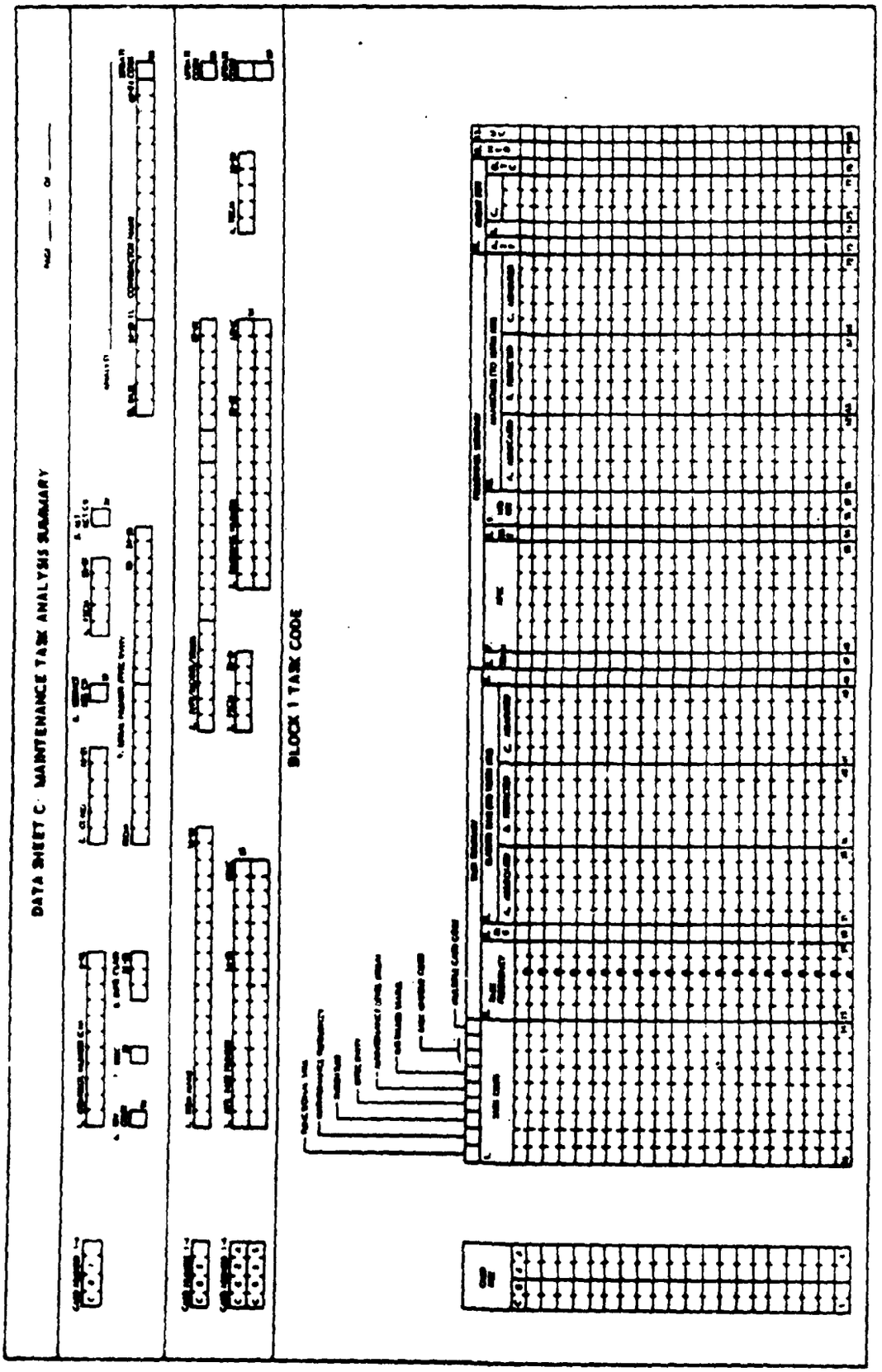

DATA SHEET C MAINTENANCE TASK ANALYSIS SUMMARY
BLOCK 1 TASK CODE

Figure B-6.

MAINTENANCE FUNCTION CODES (Column 1)	
T	Test
C	Checkout
R	Remove
N	Install
E	Calibrate
A	Adjust
P	Protect
S	Service
B	Inspect
D	Repair
F	Clean
G	Alignment
J	Composite Test
K	Purge
H	Handle
L	Overhaul
M	Store
Q	Assemble/disassembly
V	Transport
W	Brief/debrief
X	Maintenance Preparation

MAINTENANCE FREQUENCY CODES (Column 2)	
S	Scheduled (no hardness criticality)
U	Unscheduled (no hardness criticality)
1	Scheduled (hardness critical)
2	Unscheduled (hardness critical)

INDENTURE CODES (Column 3)	
0 thru 9	Equipment/function indenture

EFFECTIVITY CODES (Column 4)	
T	Trainers
V	Vandenberg AFB
O	Operational Base
B	Both VAFB and OB

(Note: Additional codes will be supplied by BMO as required.)

MAINTENANCE LEVEL (AREA) CODES (Column 5)	
ORGANIZATION LEVEL	
A	Cluster Maintenance Facility
B	Remote Surveillance Site
C	Horizontal Shelter Site
D	Resident OSE Enclosure
E	Protective Structure
F	Power Substation
G	Intersite
INTERMEDIATE LEVEL	
M	Airborne Launch Control Center
N	Missile Assembly Building
P	Operational Control Center
Q	Operational Base
R	Operational Base Test Site
DEPOT LEVEL	
Y	Depot

INSTALLED STATUS CODES (Column 6)	
A	System inoperative during equipment maintenance
B	System operative during equipment maintenance
Y	Off equipment maintenance

TASK UNIQUE CODE (Columns 7-8)
Enter alphanumeric characters to differentiate and sequence tasks having common entries in columns 1 through 6.

MULTIPLE CARD CODE (Column 9)	
A thru Z	Used to identify multiple line entries for the same task.

Figure B-7. LSA Task Codes

(3) Block 4C. Measured (Time), DED 022, 5N. Enter the task time measured during physical teardown demonstration or maintenance performed during other testing.

e. Block 5. Not applicable.

f. Block 6. Team Code, DED 117, 1A. Enter the appropriate code to describe the organizational level maintenance team required to perform this task.

g. Block 7. Air Force Speciality Code (AFSC), DED 102, 7X. Enter the speciality code for each technician performing the task. When more than one AFSC is used on the task, each AFSC is entered on a separate card. The same rule applies if different AFSCs are assigned because of multiple service use of the item.

h. Block 8. Skill Specialty Evaluation Code (SS EVAL), DED 103, 1A. Enter a code to indicate the adequacy of the AFSC entered in block 7. Enter an "A" for adequate, "M" for needs modification, or "E" for new skill specialty. The evaluation may use the following criteria:

(1) Adequate (A). The AFSC is assumed to be adequate if the present training program (revised only to include an orientation on the item under development, without extending the course length) is satisfactory to teach new, inexperienced personnel the skills required to perform the task. In this case, personnel must be capable of performing the specified task with the designated tools, support and test equipment, and equipment publications coded "A".

(2) Modification (M). The skill specialty requires modification if the training program for the AFSC requires revision to teach new, inexperienced personnel additional skills, and if the present training program must be extended. In this case, personnel who received training prior to introduction of the new equipment will require additional training Coded "M".

(3) New skill (E). If the training program requires extensive modification and substitution of materiel, or if there is no present training program, the SS evaluation should be coded "E."

i. Block 9. Number of Personnel (No. Per), DED 067, 2N. Enter the number of personnel having the same AFSC (block 7) required to perform the maintenance task. When the task requires only one (1) technician but safety regulations require two (2), or when the task will be performed by a maintenance team which is made up of more than one (1) technician of the same AFSC, enter the total number of personnel having that AFSC.

j. Block 10. Mean Man-hours, DED 055, 5N. Record the mean manhours allocated, predicted, and measured, in hundredths of hours, for each AFSC. The same bases for differentiating between allocated, predicted, and measured times will be observed as defined in the elapsed time instructions, card C04, block 4.

k. Block 11. Requirements for, DED 093, 6A. This block is used to identify special facility requirements, new training equipment, support equipment, and a code for tool requirements, needed to perform this task.

(1) Column A. Support Facilities (SF), DED 029, 1A. Enter the code "Y" for yes, and "N" for no to indicate whether special or additional facilities are required. If code "Y" is entered, Data Sheet F must be completed to describe and justify each facility requirement.

(2) Column B. RESERVED.

(3) Column C. RESERVED.

(4) Column D. Tool Requirement Code (TC), DED 123, 1A. Enter an "S," "C," "B," or "N" to denote if peculiar tools, common tools, both peculiar and common tools, or no tools are required to do the task, respectively. If either "S" or "B" is entered, a Data Sheet E is prepared to describe and justify each peculiar tool.

l. Block 12. New Technical Data (NTD), DED 118, 1A. Enter a code "Y" for yes or "N" for no to indicate whether new technical data is required by the technician to perform this task.

NOTE:

Cards C04A through C04Z and C040 through C049 may be used for each control number if required. Multiple C04 cards will be required if more than one AFSC (block 7) is assigned to the task. When more than one card is required to define a single task, the following rules apply:

(1) The task code (block 1), task frequency (block 2), measurement base (block 3), and elapsed time (block 4) are repeated (duplicated) on each subsequent card.

(2) If an additional card(s) is required for identifying an AFSC, enter the team code (block 6), AFSC (block 7), SS evaluation (block 8), number of men per task (block 9), and man-hours (block 10) on the appropriate card.

50.3.4 Data Sheet D, Maintenance Task Tool/Equipment/Part List (see figure B-8)

50.3.4.1 Card D01

a. Block 1. Control Number (CN), DED 038, 11X. Repeat the control number used in card C01, block 1.

b. Block 2. Configuration Item (CI) Number, DED 023, 6X. Repeat the configuration item number used in card C01, block 2.

c. Block 3. CI Description, DED 014, 19X. Enter the name of the configuration item.

d. Block 4. Revision Code (Rev Code), DED 094, 1A. See card A01, block 6 for instructions.

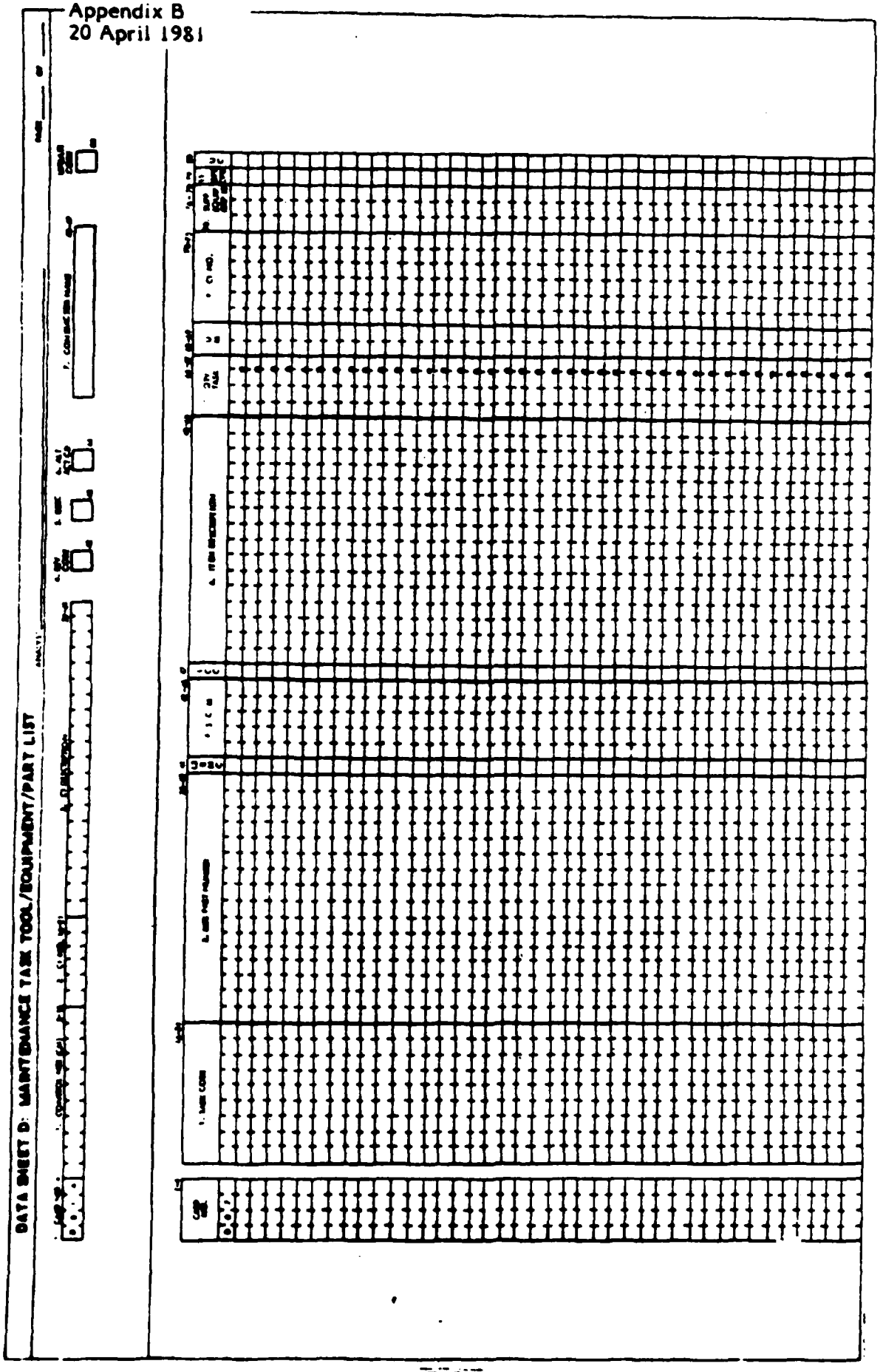


Figure B-8.

e. Block 5. Data Sheet Status Code (DSSC), DED 018, 1A. See card A01, block 7 for instructions.

f. Block 6. Alternative Action Code (Alt Act Cd), DED 003, 1A. See card A01, block 5 for instructions.

g. Block 7. Contractor name, DED 145, 15A. Enter the name of the associate contractor preparing the data sheet.

50.3.4.2 Card D07

a. Block 1. Task Code, DED 114, 9X. Enter the applicable task code from card C04, block 1. The Data Sheet D has been designed to permit entries for more than one task when multiple tasks are summarized on the Data Sheet C.

b. Block 2. Manufacturers Part Number, DED 056, 32X. Enter the manufacturers part number for item being identified on the D07 card. All items which are required to perform the maintenance task will be listed, including tools, test equipment, repair parts, bulk items, support items, etc. If the part number is over 16 digits, enter the remaining portion of the part number on the next sequential D07 card. When an additional D07 card is required to complete a part number, the control number, task code and update code shall be entered – no other entries will be made on this D07 card.

c. Block 3. Long Reference Number Code (LRNC), DED 049, 1A. When a part number exceeds 16 digits, enter an "A" in this block on the same line as the initial P/N entry. Enter a "B" in this block on the same line as the overflow P/N entry.

d. Block 4. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the FSCM for the manufacturer of the item being described.

e. Block 5. Item Category Code (ICC), DED 043, 1X. Enter the code which best describes the item being identified on the D07 card.

f. Block 6. Item Description, DED 045, 16X. Enter the Item Name assigned in accordance with Federal Cataloging Handbook H6-1 or DOD-STD-100. Abbreviations of item names will be in accordance with MIL-STD-12.

g. Block 7. Quantity per Task (Qty/Task), DED 081, 4N. Enter the number of the item required to perform the task. For tasks where the item is not used for every occurrence of the task, enter the expected average number per task. (Example: An item is used, on the average, for every second occurrence of the task - the quantity per task is 00.5).

h. Block 8. Unit of Measure (UM), DED 130, 2A. Enter the code for the units in which the quantity is expressed.

i. Block 9. Configuration Item (CI) Number, DED 023, 6X. When the item being described has been assigned a CI number, enter that CI number. If no CI number has been assigned, leave this column blank.

j. Block 10. Support Equipment Grouping Identification Number, DED 110, 3X. Enter the code which generically categorizes MSE, test equipment, and/or tool requirements for analytical purposes. The Support Equipment Grouping Identification Numbers will be developed and provided by BMO.

k. Block 11. GFE/CFE, DED 140, 1A. Each item of equipment identified as government furnished equipment (GFE) shall be coded with the letter "A." Each item identified as contractor furnished equipment (CFE) shall be coded with the letter "C."

50.3.5 Data Sheet D_1, Maintenance Task Analysis (see figure B-9) The Data Sheet D_1, like the maintenance Form B, is basically a narrative statement of requirements and a detailed description of the maintenance tasks necessary to satisfy those requirements. The Data Sheet D_1 will be automated, using a word processing system, which imposes some format requirements to permit retrieval of selected portions of the data.

50.3.5.1 Card D01. This card is identical to the Data Sheet D, card D01 and the same instructions apply.

50.3.5.2 Card D04A

a. Block 1. Task Code, DED 114, 9X. Develop a task code in accordance with the instructions in Appendix B, 50.3.3.2a. Enter the task code in block 1.

b. Block 2. Task Description, DED 116, 40X. Enter a brief descriptive title for the task.

c. Block 3. Safety Hazard Level Code, DED 095, 1N. Enter the code to indicate an existing or potential hazardous condition while performing the task. Enter a "1," "2," or "3" to denote a hazard state of catastrophic, critical, or serious, respectively. See SAMSO STD 79-1 for definitions.

50.3.5.3 Card D04B

a. Block 1. Repeat the task code from card D04A, block 1.

b. Block 2. Maintenance Flow Block Number, DED 139, 14X. Enter the block number from the maintenance flow diagram which identifies this maintenance task requirement.

50.3.5.4 Card D05. Functional Task Analysis, No DED. This card has been designed to record the requirements for each maintenance/operator task. Preparation of this card is accomplished in two parts. First, the identification of the technical requirements for each maintenance/operator function and second, the solution of these requirements by identifying equipment, facilities, personnel, and the step-by-step procedure to be followed. Correlation of the Data Sheet C, task summary (card C04), and card D05, functional task analysis, shall be by the task code recorded in block 1 of the card D04. See figure B-9 for format requirements.

a. Block 1. Functional Requirement, No DED. The functional requirements block shall be used to identify the equipment item or system level/function; describe the maintenance function; and to define specific

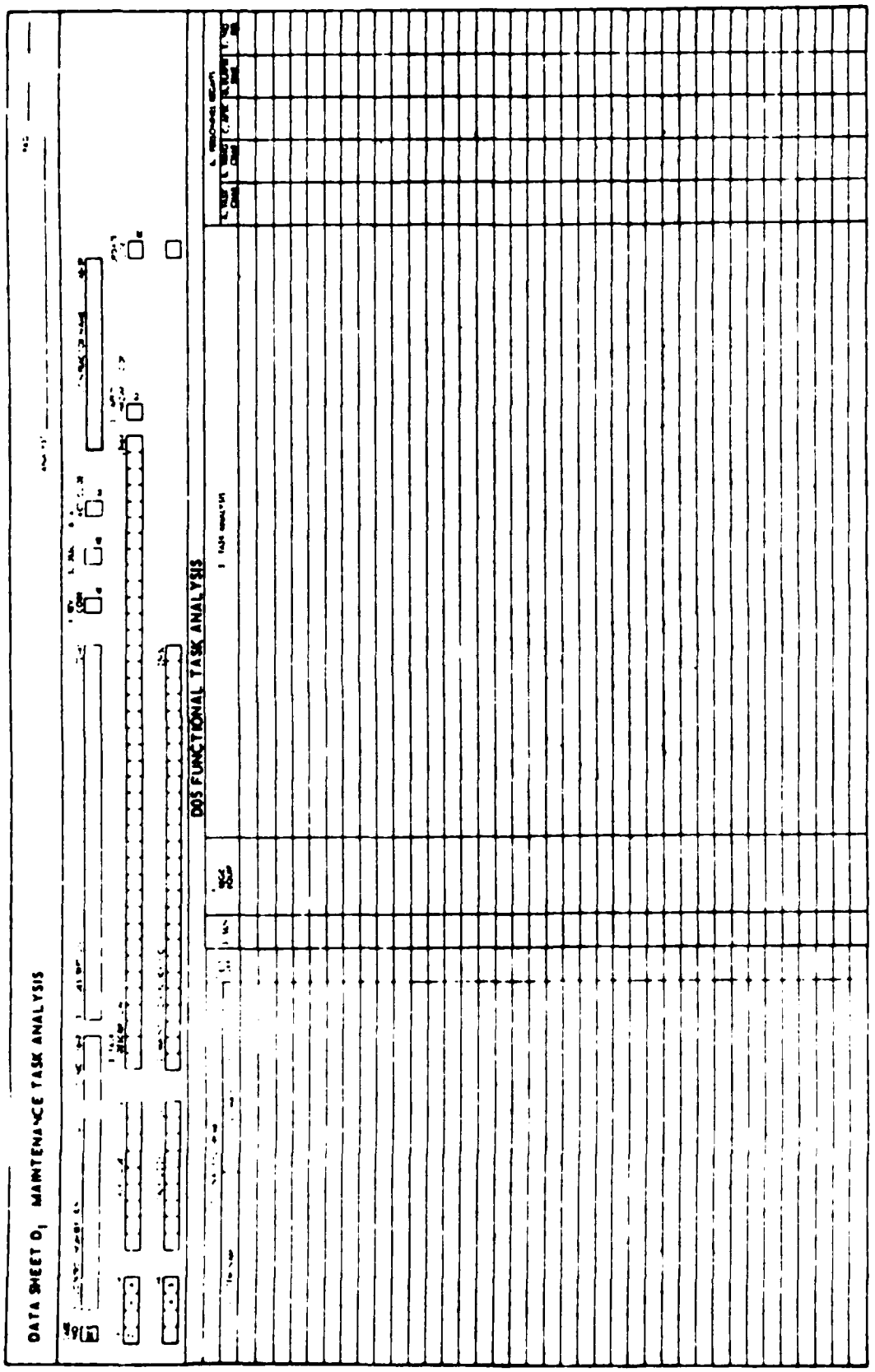

DATA SHEET D_1 MAINTENANCE TASK ANALYSIS
DOS FUNCTIONAL TASK ANALYSIS

Figure B-9.

requirements related to the task, MSE and/or facilities. The format of entries in this block must follow the example shown in figure B-9.

(1) A. Item Name, DED 045, 19X. Enter the item name for the equipment or system level/function under analysis.

(2) B. Maintenance Function, No DED. Enter the specific functional task being considered. This functional task must be the same as that identified in the first position of the task code in card D04, block 1.

(3) Requirements. No DED. Enter the requirements involved in the maintenance function. Where applicable indicate the design requirements, limitations and essential operating characteristics which the function imposes upon MSE/DSE. Entries shall state specific values, and where applicable, the allowable tolerances; entries shall not describe the existing equipment or the personnel tasks. Functional requirements when later collected may provide the basic design criteria for end items of support equipment. Functional requirements surrounding preventative maintenance functions shall be provided in sufficient detail to permit technical evaluation of the preventative maintenance and the frequency. The requirements inherent in getting from the initial fault indication to the specific malfunctioning module shall be analyzed. When a time replacement action is recommended, specify the controlling item. Requirements will be numbered in the same manner as the Form B requirements.

b. Block 2. Equipment/Facility (E/F), DED 008, 1A. An entry will be made in block 3 whenever a new requirement for support facilities or maintenance support equipment is identified during a maintenance task analysis. Enter the letter "F" for new facility requirements and a letter "E" for new MSE requirements. An entry in this block will result in the preparation of a Data Sheet F or E, respectively.

c. Block 3. RESERVED.

d. Block 4. Required Equipment, No DED. Where applicable enter the CI or GFE number assigned to the item of equipment required to satisfy the requirement. Also enter an abbreviated description of the equipment item.

e. Block 5. Task Analysis, No DED. Enter the personnel actions necessary to accomplish the functional requirements described in block 1. The scope and level of detail shall be governed by the following:

(1) Data should show the results of the designs evaluation for operability and maintainability, identify human engineering requirements and justify recommended skills. Multiple crew operations shall be included.

(2) Procedural compatibility with system and CI design characteristics and system policies should be maintained.

(3) Complete correlation must exist between functional requirements, personnel recommendations, equipment, accommodations, and facilities requirements and the listed tasks.

(4) Critical procedural requirements regarding safety must be defined.

(5) Single thread step-by-step continuity for all end-to-end actions required by the function (no gaps), should be maintained.

(6) Tasks should be detailed and sequenced to eliminate possibilities of technically incorrect procedures.

(7) Unique procedural considerations that would not otherwise be available to technical writers through design data should be detailed.

(8) Task sequences shown shall permit timelining and evaluation of time required to complete operations.

(9) Critical procedural requirements regarding nuclear hardness and survivability (NH&S) must be defined.

(10) Complex task descriptions should include identification of the input stimulus, cues, signals and indications that call for the action or reaction; identification of the action (the individual's observable performance); and identification of the output stimulus, cues, signals and indications that the action is (or is not) completed, correct or accurate.

(11) Where performance to a particular standard is required, this standard and tolerance must be stated in the task description if it is not stated in the functional requirements (block 2).

(12) Appropriate cautions, warnings and notes shall be provided to assure that the consequences or intent of proper task performance are clearly explained.

(13) Task action verbs shall be used. Those listed in AFP 50-58, volume II, table 3-2 are the preferred action verbs.

f. Block 6. Personnel Requirements, No DED.

(1) Column A. Task Characterization Code (Task Char), DED 113, 4X. Develop a task characterization code by selecting the most appropriate individual code for task criticality, task newness, skill demand, and knowledge demand. Enter the completed characterization code in column A.

(2) Column B. Training Characterization Code (Trng Char), DED 126, 3X. Develop a training characterization code by selecting the most appropriate individual codes for practice required, knowledge and skill level, and skill training level. Enter the completed characterization code in column B.

(3) Column C. Air Force Specialty Code (AFSC), DED 102, 7X. Enter the previously approved AFSC which defines the capability, experience and training required to perform this task. When more than one specialty is required, make separate entries in column C for each AFSC.

(4) Column D. Elapsed Time, DED 022, 5N. Enter the total mean elapsed time (in hundredths) required by the AFSC (column C) to perform the maintenance task described in block 5.

(5) Column E. Number of Personnel (No. Per), DED 067, 2N. Enter the number of personnel, having the same AFSC, required to perform the maintenance task described in block 5.

50.3.6 Data Sheet E, Support and Test Equipment (see figure B-10) The Data Sheet E is required for each item of support and test equipment (SE/TE) identified by the LSA. The LSA provides a comprehensive identification of the SE/TE requirements. It is the goal of the Program Office to hold the development of new SE/TE to an absolute minimum. Where it is technically and economically feasible existing equipment will be used to meet these requirements. The order of precedence for selecting SE/TE is:

a. Air Force Designated Standard Item.

b. Air Force Preferred Items.

c. Items in the government inventory or being developed under government contract.

d. Commercially available items that meet the technical and logistics requirements.

e. Modifications to any of the above.

f. New items to be developed.

The contractor shall base their identification of SE/TE upon the above criteria.

A primary data source in the determination of equipment requirements is the Maintenance Functional and Maintenance Task Analyses which also define the Maintenance Level, Personnel Requirements and Utilization of the SE/TE.

50.3.6.1 Card E01. Instructions for the preparation of card E01 are the same as the instructions for card B01.

50.3.6.2 Card E02

a. Block 1. Item Name, DED 045, 19X. Enter the item name of the SE/TE item in accordance with Federal Cataloging Handbook H6-1 or DOD-STD-100. Abbreviations for item name will be in accordance with MIL-STD-12.

b. Block 2. Type, Model, Series Designator, DED 127, 26X. RESERVED.

c. Block 3. Estimated Date 1st Article, DED 147, 6N. Enter the estimated date that the first SE/TE item must be delivered to support the M-X program requirements.

d. Block 4. Source, Maintenance, and Recoverability (SMR) Code, DED 104, 6A. Enter the recommended SMR code for the SE/TE item. Leave the

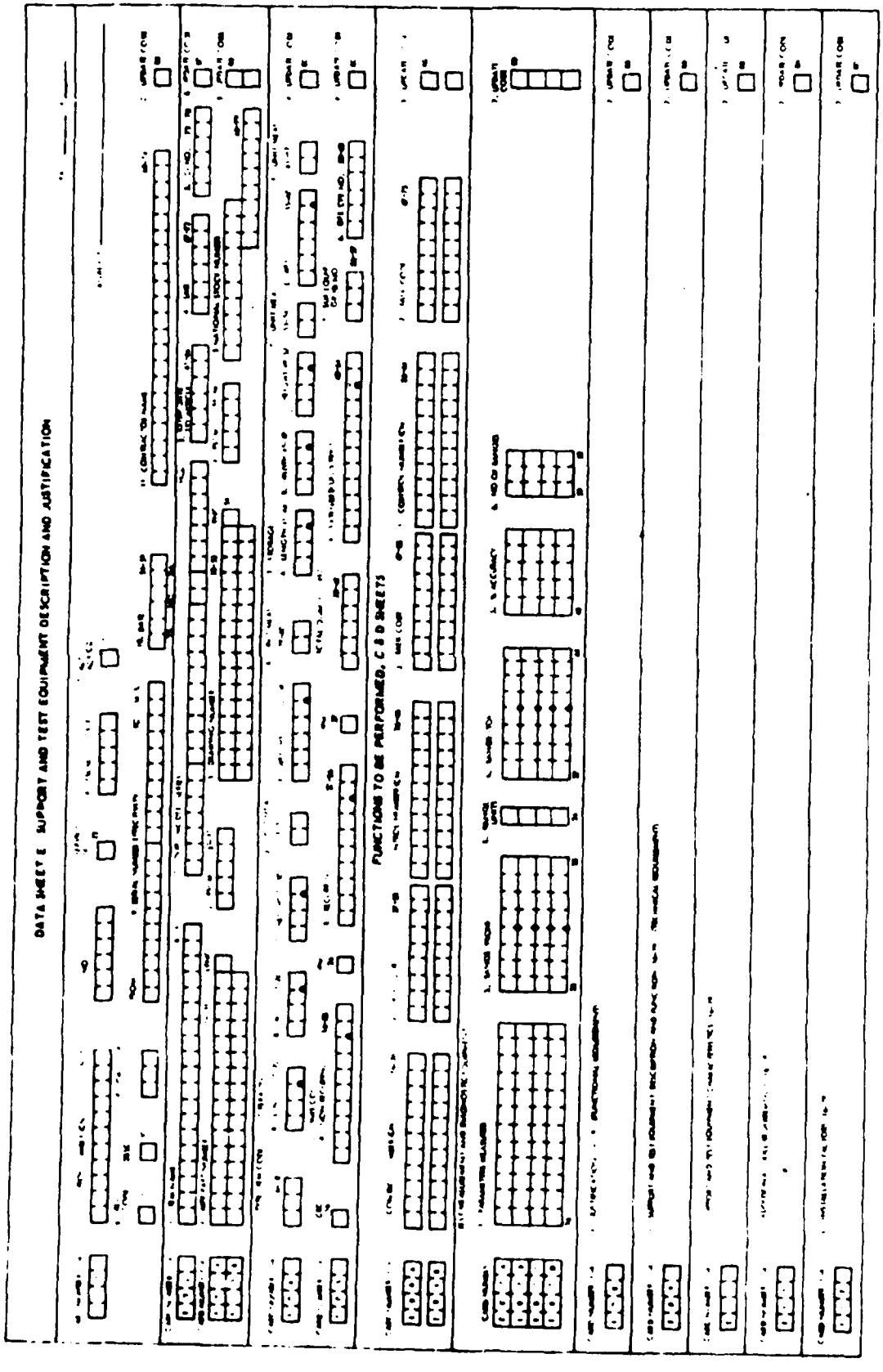

DATA SHEET E SUPPORT AND TEST EQUIPMENT DESCRIPTION AND JUSTIFICATION
FUNCTIONS TO BE PERFORMED, C & D SHEETS

Figure B-10.

second position of the recoverability code blank unless otherwise directed by the procuring activity.

e. Block 5. Configuration Item Number (CI No.), DED 023, 6X. Enter the last six digits of the CI number assigned to the SE/TE.

50.3.6.3 Card E03A/B

a. Block 1. Manufacturers Part Number, DED 056, 32X. Enter the manufacturers part number for the SE/TE item. If the part number is over 16 digits, the remaining digits are entered in the E03B card in Block 1 and an "A" is entered in column 32 of the E03A card as a long reference number code (reference DED 049).

b. Block 2. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the code that identifies the source of the manufacturers part number.

c. Block 3. Drawing Number, DED 021, 32X. Enter the drawing number for the SE/TE item. If the drawing number exceeds 16 digits, the remaining digits are entered in the E03B card, Block 3, and an "A" is entered in the E03A card column 54 as a long reference number code (reference DED 049).

d. Block 4. Federal Supply Code for Manufacturers, DED 036, 5X. Enter the code which identifies the source of the drawing number.

e. Block 5. National Stock Number (NSN), DED 064, 20X. Enter the 13 digit NSN starting in column 63 of this block. The procuring activity will specify additional entries within the block when management prefix or suffix codes are applicable.

50.3.6.4 Card E04

a. Block 1. Type Item Code, DED 128, 3A. Develop and enter a 3 part code which best describes the item. The first digit is the special materiel content code; the second digit is the provisioning list category code; and the third digit is the special maintenance category code.

b. Block 2. Operating Dimensions and Weight, No DED.

(1) Column A. Length, DED 048, 4N. Enter the length of the item in its operating condition. When the operating volume of the item is more appropriate than length, width, and height, enter volume (DED 136) in the length block, and enter the appropriate unit of measure code in block 2D.

(2) Column B. Width, DED 138, 4N. Enter the width of the item in its operating condition.

(3) Column C. Height, DED 039, 4N. Enter the height of the item in its operating condition.

(4) Column D. Unit of Measure Code (UM), DED 130, 2A. Enter the code for the units in which length, width, and height (or volume) are expressed.

(5) Column E. Weight, DED 137, 6N. Enter the weight of the item in its operating condition.

(6) Column F. Unit of Measure (UM) Code, DED 130, 2A. Enter the code for the units in which the weight is expressed.

c. Block 3. Storage Dimensions and Weight, No DED. The instructions for block 3 are identical to block 2, except the shipping or storage dimensions are entered.

50.3.6.5 Card E05

a. Block 1. Contractor Screening Code, DED 075, 1 X F. Enter the code which best describes the result of the contractors DOD and/or commercial screening activity performed in accordance with DOD 4100.39M. Direction from the responsible project contracting officer is required before a contractor is authorized to start development of any new SE/TE item.

b. Block 2. Unit Cost, DED 017, 10X.

(1) Column A. Nonrecurring (Cost), DED 017, 10X. Enter the estimated total cost of development, tooling for manufacture, and other nonrecurring costs. Enter the unit price marker (UPM, DED 132) in column 27.

(2) Column B. Recurring (Cost), DED 017, 10X. Enter the estimated recurring costs per item. Recurring cost is the manufacturing cost (parts, labor and material) for a single unit of the item.

c. Block 3. Total Quantity Recommended, DED 125, 6N. Enter the total number of the item recommended to support all levels of maintenance.

d. Block 4. Extended Unit Price, DED 026, 12N. Enter the estimated total cost of the item. The total cost is the product of the recurring cost (block 2B) and the total quantity recommended (block 3) plus the nonrecurring cost (block 2A).

e. Block 5. Support Equipment Grouping Identification Number (Sup Equip Grp Id No), DED 110, 3X. Enter the code which generically identifies the item of SE/TE. This code must agree with the corresponding entry in the D07, block 10.

f. Block 6. GFE/CFE Number, DED 148, 6X. Enter the GFE/CFE number assigned by BMO to the SE/TE item.

50.3.6.6 Cards E06A/B

a. Block 1. Control Number (CN), DED 038, 11X. Enter each CN number that requires the use of the recommended support or test equipment. This

is to provide a check that all technical requirements have been addressed and identified.

b. Block 2. Task Code, DED 114, 7X. Enter the appropriate task code associated with each CN entered in block 1.

50.3.6.7 Card E07. When test measurement and diagnostic equipment are recommended by the contractor the E07 card is used to report the type of measurement(s), range(s) and accuracy of the equipment. The entries in the E07 card must comply with the technical requirements reported by the E09 card (reference 50.3.6.9).

a. Block 1. Parameters measured, DED 149, 12 X L. Enter the name of the parameter(s) measured by the equipment.

b. Block 2. Range (from), DED 150, 8 N R 4. Enter the low extreme of the measurement range of the equipment.

c. Block 3. Range units, DED 151, 1 A F. Enter the first character of the measurement unit name (i.e., V for voltage, A for ampere, etc.).

d. Block 4. Range (to), DED 150, 8 N R 4. Enter the high extreme of the measurement range of the equipment.

e. Block 5. Accuracy (%), DED 152, 5 X R. Enter a measure of the accuracy of the equipment expressed as a percent ( ) of the total measurement range.

f. Block 6. Number of Ranges, DED 153, 3 N R. Enter the number of ranges which the equipment provides to report the parameters measured.

50.3.6.8 Card E08. For the E08, E09, E10, E11 and E12 cards it is not necessary to use the data sheet format when additional space is required to complete the entry.

a. Block 1. Justification, DED 088, 4000X. List the functional requirements that defined the need for the SE/TE. The functional requirements shall be taken from each Form B and/or Data Sheet D_1 which identifies the use of the SE/TE item. If the contractors recommended source for the SE/TE is other than GFE, enter a narrative description of the screening process(es) performed and results obtained.

50.3.6.9 Card E09

a. Block 1. Support and Test Equipment Description and Function, DED 112, 1000X. Enter a narrative description of the SE/TE item and the detailed technical requirements from the Form B or Data Sheet D_1.

50.3.6.10 Card E10

a. Block 1. Support and Test Equipment Characteristics, DED 111, 1000X. Enter a narrative description of the item's performance characteristics and capabilities. Describe any calibration and unique maintenance requirements. For GFE items include the specification number, altered item drawing, specification control drawing, or source control drawing for the item.

50.3.6.11 Card E11

a. Block 1. Additional Skill Requirements, DED 002, 1000X. Enter a description of the training or skills required to operate and maintain the item. Skill specialty code may be used if it is adequate to describe the skill requirements.

50.3.6.12 Card E12

a. Block 1. Installation Factors, DED 041, 500X. Enter vibration and shock mounting requirements, special foundations, utility connections, input and limiting environmental factors which influence the installation of the item. List any equipment necessary to install the item; e.g., cranes, hoists, etc.

50.3.7 Data Sheet F, Support System Facility Requirements (see figure B-11) The Data Sheet F is designed to be used as a checklist for defining unique facility requirements identified by the LSA. These requirements are directed to the appropriate facility management organization for incorporation into the facility (B-4) specification. Like the Data Sheet E, this record is used to communicate requirements. There is no intent to automate this record and the forms will be purged from the data system when the requirement has been approved and incorporated into the facility specification.

50.3.7.1 Card F01

a. Block 1. Control Number (CN), DED 038, 11X. Enter the CN from Data Sheet D_1 which identified this facility requirement.

b. Block 2. Configuration Item (CI) Number, DED 023, 6X. Enter the CI number for the item indicated on card D01, block 2.

c. Block 3. Task Code, DED 114, 7X. Enter the task code from the D04 card, block 1, assigned to that task which identified the requirement for new and/or additional requirements.

d. Block 4. Facility Category Code, DED 028, 6N. Enter the appropriate facility code.

e. Block 5. Facility Description, DED 027, 19X. Enter a brief description of the facility requirement.

f. Block 6. Date, DED 019, 6N. Enter the date in accordance with the card A01, block 10 instruction.

g. Block 7. Alternative Action Code (Alt Act Cd), DED 003, 1A. Enter the alternative action code in accordance with the card A01, block 5 instruction.

h. Block 8. Revision Code, DED 094, 1A. Enter the data sheet revision code in accordance with the A01, block 6 instruction.

i. Block 9. Data Sheet Status Code (DSSC), DED 018, 1A. Enter the status code in accordance with the card A01, block 7 instruction.

DATA SHEET F · SUPPORT SYSTEM FACILITY REQUIREMENTS

PAGE ______ OF ______

CONTRACTOR NAME ______ ANALYST ______

CARD NBR **F01** 1. CONTROL NUMBER ☐ 2. CHNG ☐ 3. TASK CODE ☐ 4. FACILITY CODE ☐ 5. FACILITY DESCRIPTION ☐ 6. DATE ☐ ACT ☐ CC ☐ ☐ UPDATE CODE ☐

F02 GENERAL DESCRIPTION

F03 JUSTIFICATION:

F04 CIVIL REQUIREMENTS: ☐N/A
1. AXLE/WHEEL LOADS
2. SPCL LANE WIDTHS
3. PUSH & WEIGHT PROVISIONS VEHICLES
4. JACK LOADS - TRANSFER REQMTS
5. PARKING (NBR OF VEHICLES)
6. ROAD GRADE/TYPE PAVEMENT/TYPE WALKS
7. SPCL WATER/SERVICE REQMTS
8. SPCL FIRE PROTECTION
9. FENCE/SECURITY REQMTS
10. EXISTING UTILITIES: LOCATION, TYPE

F05 ARCHITECTURAL REQUIREMENTS: ☐N/A
1. PERSONNEL OCCUPANCY - TYPES & HOURS
2. USE OF AREA
3. SPCL DOOR REQMTS
4. FLOOR REQMTS
5. WINDOW REQMTS
6. CONTROLLING DIMENSIONS
7. CLEAR CEILING REQMTS
8. INTERIOR TREATMENT
9. EXPLOSIVE SAFETY REQMTS

F06 STRUCTURAL REQUIREMENTS: ☐N/A
1. CRANE/HOIST - LOCATION, LOAD, CONTROL
2. FLOOR/ROOM LOAD
3. CLEAR AREA REQMT
4. BLAST LOAD/SHIELD REQMTS
5. LADDER/ELEVATOR REQMTS
6. DOCK LOADS
7. GENERAL BLDG CONFIGURATION
8. BARRICADE/SHIELD REQMTS

F07 MECHANICAL REQUIREMENTS: ☐N/A
1. INTERIOR POTABLE WATER
2. ENVIRONMENTAL LIMITS
3. COMPRESSED AIR
4. FIRE PROTECTION
5. VIBRATION/ACOUSTICAL REQMTS
6. EQUIPMENT COOLING REQMTS

F08 ELECTRICAL REQUIREMENTS: ☐N/A
1. POWER REQMTS
2. LIGHT INTENSITIES
3. COMMUNICATION REQMTS
4. GROUNDING REQMTS

F09 OTHER REQUIREMENTS: ☐N/A

F10 INTERFACE REQUIREMENTS: ☐N/A
1. YES/NO
2. DESCRIPTION

Figure B-11.

50.3.7.2 Card F02. General Description, No DED. Enter a general description of the new and/or additional facilities recommended.

50.3.7.3 Card F03. Justification, DED 047. Enter a brief technical justification for the new and/or additional facilities being recommended.

50.3.7.4 Cards F04 through F09. No DED. Enter a brief description of the specific facility requirements to be met.

NOTE:

This data sheet does not provide the level of detail required for appendix V of MIL-STD-490, type B4, facility or ship development specification. It does however, collect selected elements of the required information, identified during the design/support tradeoff analysis, and will be used to verify that any new or additional facility requirements are properly documented in the appropriate facilities requirement document. It is not necessary to use the data sheet format for narrative entries when additional space is required to complete the entry.

50.3.7.5 Card F10. No DED. Enter a brief description of any facility interface requirements identified during the analysis.

50.3.8 Data Sheet G, Skill Evaluation and Justification. RESERVED.

50.3.9 Data Sheet H, Supply Support Requirements. (see figure B-12)

50.3.9.1 Card H01. Supply Support Requirements. This data sheet shall identify supply support requirements for operation and maintenance of the system. A Data Sheet "H" shall be prepared for each item in the system/equipment.

50.3.9.1.1 Card H01A

a. Block 1. Manufacturer's Part Number, DED 056, 32X. Enter the manufacturer's part number. If the number exceeds 16 characters, enter the overflow on card H01B, block 17. If the overflow portion of the part number contains significant characters that uniquely identify the item (e.g., symbols that describe diameters, lengths, material, or finish), then the following guidelines should be followed:

   (1) Place the last 16 characters of the part number in block 1.

   (2) Place the remaining prefix characters in block 16 left justified.

   (3) Place an X in card H01B, block 18, the Significant Character Code, DED 101, 1X, to indicate that the part number has been reversed.

b. Block 2. Long Reference Number Code (LRNC), DED 049, 1A. When the manufacturers part number is more than 16 characters and the part number overflow block (block 17) is used, enter an "A" in this block.

c. Block 3. Reference Number Category Code (RNCC), DED 085, 1X. Enter the code which indicates the category or relationship of the part number in block 1 to a national stock number or other reference number.

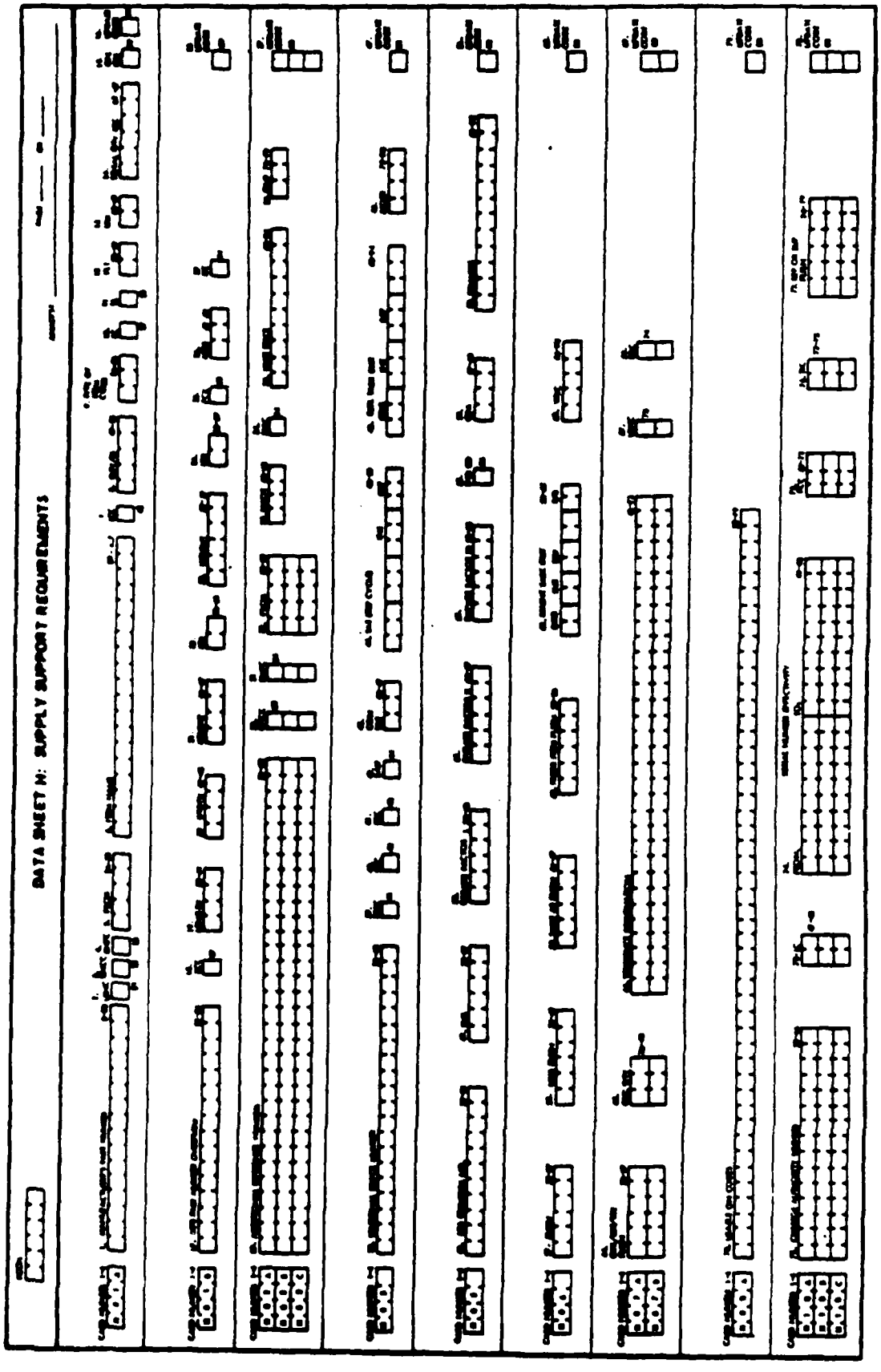


Figure B-12.

d. Block 4. Reference Number Format Code (RNFC), DED 086, 1N. Enter code "1," "3," or "4" as appropriate to indicate the format of the part number in block 1.

e. Block 5. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the manufacturer's code as contained in Federal Cataloging Handbook H4 series for the part number appearing in block 1.

f. Block 6. Item Name, DED 045, 19X. Enter the name of the item whose part number appears in block 1. Abbreviations contained in MIL-STD-12 shall be used where applicable.

g. Block 7. Item Category Code (ICC), DED 043, 1X. Enter the code that best describes the item for which the H data sheet is being prepared.

h. Block 8. Quantity per End Item (Qty/EI), DED 081, 5N. Enter the total quantity of items installed in the end item.

i. Block 9. Type Item Code, DED 128, 3A. Enter the code for each of the three subfields (special material content code, provisioning list category code, and special maintenance category code) which best describes the item for which the data sheet is being completed.

j. Block 10. Essentiality Code (EC), DED 025, 1N. Enter a code to describe the effect of the item's failure on end item operation.

k. Block 11. Shelf Life Code (SL), DED 100, 1X. Enter the code that indicates when the item will be considered unusable from age or deterioration.

l. Block 12. Production Lead Time (PLT), DED 077, 2N. Enter the time in months between placement of a new contract and shipment of the first deliverable quantity.

m. Block 13. Unit of Measure Code (UM), DED 130, 2A. Enter the unit of measure code for the quantity indicated in the quantity per end item, quantity per assembly, and unit of measure price blocks.

n. Block 14. Total Quantity Recommended (Total Qty Rec), DED 125, 6N. Enter the recommended quantity of the item required to support a specific number of applications for a specific period of time as specified by the procuring activity. The applications may be to a weapon system, CI, component or combinations thereof which are contained in the applicable contract. Unless otherwise specified by the procuring activity, the support period shall be for one year beginning with the scheduled delivery of the first system/CI.

o. Block 15. Government Furnished Equipment/Contractor Furnished Equipment (GFE/CFE), DED 140, 1A, Enter the appropriate code: "A" if the item is GFE, "C" if the item is CFE.

50.3.9.1.2 Card H01B

a. Block 19. Length, DED 048, 4N. Enter the length of the item either with or without packing material as specified by the procuring activity. When the volume of the item is more appropriate than length, width, or height, enter volume (DED 136) in the length block, and enter the appropriate unit of measure code in block 21.

b. Block 20. Width, DED 138, 4N. Enter the width of the item either with or without packing material as specified by the procuring activity.

c. Block 21. Height, DED 039, 4N. Enter the height of the item either with or without packing material as specified by the procuring activity.

d. Block 22. Unit of Measure Code (UM), DED 130, 2A. Enter the code for the units in which length, width, and height (or volume) are expressed.

e. Block 23. Weight, DED 137, 6N. Enter the weight of the item with or without packing material as specified by the procuring activity.

f. Block 24. Unit of Measure Code (UM), DED 130, 2A. Enter the code for the units in which the weight is expressed.

g. Block 25. Packing Code (PCK), DED 070, 1A. Enter "U" if the dimensions and weight represent the item without packing material. Enter "P" if the dimensions and weight include packing material.

h. Block 26. Method of Support (MOS), DED 142, 3X. This block is reserved for Air Force use.

i. Block 27. Hardness Critical (HC), DED 146, 1A. The HC indicator performs two functions in the Supply Support Record; first, it identifies those items which have hardness critical requirements for the procurement activities and, second, it provides a positive indication that the hardness requirements have been considered for each item. Enter a "Y" when an item is hardness critical, enter an "N" if the item is not hardness critical.

50.3.9.2 Card H02

a. Block 29. Additional Reference Numbers, DED 001, 32X. Enter the drawing number on card H02A, the specification control number on card H02B, and two-way interchangeable part numbers on subsequent H02 cards. This order must be maintained in order to insure proper processing (i.e., if there is not a specification control number then card H02B would not be completed).

b. Block 30. Reference Number Category Code (RNCC), DED 085, 1X. Enter the code which indicates the category or relationship of the reference number to a national stock number or other reference number.

c. Block 31. Reference Number Format Code (RNFC), DED 086, 1N. Enter the code which identifies the format mode of the reference number in block 29.

d. Block 32. Federal Supply Code for Manufacturers (FSCM), DED 036, 5X. Enter the code that identifies the manufacture of the reference number in block 29.

e. Block 33. Maximum Allowable Operating Time (MAOT), DED 057, 4X. Enter an expressed period of time after which the item will be maintained in accordance with the maintenance action code, block 34. In the first two positions enter the applicable program units, i.e., 01 through 99. In the third position enter the appropriate multiplier code and in the fourth position enter the measurement base code.

f. Block 34. Maintenance Action Code (MAC), DED 051, 1A. Enter the code which indicates the required action to be taken at the expiration of the maximum allowable operating time.

g. Block 35. Unit Price, DED 131, 10N. Enter the best estimated price per unit of the item identified in block 1. The estimated price per unit should be based on an end item production quantity as specified by the procuring activity. The last two positions are cents with the decimal understood.

h. Block 36. Quantity Unit Pack (QUP), DED 081, 3N. Enter the number of units of measure or units of issue to be packaged in a unit pack.

50.3.9.3 Card H03

a. Block 38. National Stock Number (NSN), DED 064, 20X. Enter the 13 digit NSN starting in column 24 of this block. The procuring activity will specify an entry within the block when management prefix or suffix codes are applicable.

b. Block 39. Physical Security/Pilferage Code (PSPC), DED 073, 1A. Enter the security classification code for the item identified in block 1.

c. Block 40. Special Handling Code (SHC), DED 105, 1X. Enter a code if special handling is required because of pilferage or delicacy. The code(s) will be provided by the procuring activity.

d. Block 41. Phased Provisioning Code (PPC), DED 072, 1A. When MIL-STD-1517 applies, enter the letter P if the item is recommended for phased provisioning.

e. Block 42. Spares Acquisition Integrated with Production (SAIP), DED 076, 1X. Enter an "S" to denote that item is considered as a candidate for spares acquisition commensurate with production orders. Criteria for SAIP candidates are defined in AFR 800-26 and DED 076, otherwise leave blank.

f. Block 43. Contractor Turnaround Time (CON TAT), DED 015, 3N. Enter the time in days that will elapse from time of receipt of the failed item at the contractor's facility until the item is returned to the designated receiving point.

g. Block 44. Repair Cycle Turnaround Time (TAT REP CYCLE), DED 089, 12N. If the item in block 1 is recoverable, enter the elapsed time in days

from the receipt of the failed item at the applicable repair activity until the item is ready for reissue.

h. Block 45. Replacement Task Distribution (REPL TASK DIST), DED 092, I2N. Enter the percentage of time each maintenance category will remove and install the item identified in block 1. The values must sum to 100 percent.

i. Block 46. Major Organizational Entity (MOE) Rule, DED 143, 4X. The MOE rule code will be entered during the provisioning conference and/or during the processing of the PTD by the cataloging technicians.

50.3.9.4 Card H05

a. Block 48. Control Number (CN), DED 038, 11X. Enter the control number which uniquely identifies the analysis that generated the requirement for the item in block 1 of card H01. If the item is used in more than one next higher assembly, a separate set of H05 through H20 cards will be completed to record each LSA control number and the corresponding application dependent information.

b. Block 49. Source, Maintenance, and Recoverability (SMR) Codes, DED I04, 6A. Enter the recommended SMR codes for the item. Leave the second position of the recoverability code blank unless otherwise specified by the procuring activity.

c. Block 50. Failure Factor I, DED 033, 6N. Develop and enter Failure Factor I code in accordance with AFLCR 65-5, Attachment 7. Failure Factor I is defined as the anticipated average maintenance replacement rate per operating program increment.

d. Block 51. Failure Factor II, DED 033, 6N. Develop and enter a Failure Factor II code in accordance with AFLCR 65-5, Attachment 7. This code will define (1) the overhaul replacement percent, and (2) the base condemnation percent.

e. Block 52. Failure Factor III, DED 033, 6X. Develop and enter a Failure Factor III code in accordance with AFLCR 65-5, Attachment 7. This code will define (1) not reparable this station (NRTS), and (2) depot condemnation percent.

f. Block 53. Indenture Code (Ind Cd), DED 040, 1A. Enter the code which best describes the breakdown relationship of the item identified in block 1 to the end item.

g. Block 54. Quantity per Assembly (QPA) DED 081, 4N. Enter the total number of times the item is used in the assembly of which it is a part.

h. Block 55. Remarks, DED 087, 12X. Enter explanatory type data which is considered essential to the provisioning process. This block shall not be used to procure additional data elements.

50.3.9.5 Card H06

a. Block 57. Provisioning List Item Sequence Number (PLISN), DED 079, 6X. Enter the sequential line item control number for the item identified in block 1.

b. Block 58. Next Higher Assembly PLISN (NHA PLISN), DED 065 (see DED 079), 6X. Enter the PLISN of the next higher assembly or installation in which the item is used.

c. Block 59. Same as PLISN, DED 096, 6X. For subsequent appearance (applications) of the part numbered item on the same provisioning list, enter the PLISN assigned to the first appearance of the item on the list.

d. Block 60. Prior Item PLISN, DED 074, 6X. Enter the PLISN which was assigned to the item on the interim repair parts list, long lead items list, or the previous provisioning list prior to resequencing.

e. Block 61. Maintenance Task Distribution (Maint Task Dist), DED 054, 10N. Enter the percentage of repair that can be made at each level of support on a repairable item. The percentage at each level is based on a total of 100 items entering the repair loop. The replacement (condemnation) rate (R/R) is the percentage of items that cannot be repaired in the loop.

f. Block 62. Work Unit Code (WUC), DED 141, 5X. Enter the WUC for the item.

50.3.9.6 Card H07

a. Block 64. Overhaul/Kit/Set PLISN (OHL/KIT/SET PLISN), DED 069 (see DED 079), 6X. Enter the PLISN of the component/assembly for which the item in block 1 would be required to accomplish overhaul. Enter the kit/set PLISN if the item in block 1 is part of a kit or set.

NOTE:

Both types of entries can be made using multiple H07 cards.

b. Block 65. Overhaul Quantity (OHL Qty), DED 081, 3N. If the PLISN entered in block 64 represents an overhaul component then enter the quantity of items identified in block 1 required to overhaul 100 of the equipments or components. If the PLISN entered in block 63 represents a kit/set then this block is left blank.

c. Block 66. Reference Designation, DED 083, 32X. For electronic components, enter the reference designation number in accordance with ANSI Y32.16. If the entry is greater than 16 characters, enter the overflow on card H07B.

d. Block 67. Long Reference Number Code (LRNC), DED 049, 1A. Enter the code "A" in block 67 if the entry made in block 66 is greater than 32 characters.

e. Block 68. Reference Designation Code (RDC), DED 084, 1A. Enter the code which best defines the type data entered in block 66.

50.3.9.7 Card H08

a. Block 70. Usable on Code, DED 135, 600X. Enter the codes (provisioning control code (PCC) and a comma) which identifies assemblies, systems, or CIs on which the item can be installed.

50.3.9.8 Card H10

a. Block 72. Change Authority Number, DED 013, 15X. Enter the engineering change authority number when a design change affects the item in block 1.

b. Block 73. Interchangeability Code (IC), DED 042, 2A. Enter an alphabetic code to indicate interchangeability when an item previously listed is being replaced by a new item because of a design change or other change.

c. Block 74. Serial Number Effectivity, DED 098, 20X. Enter the starting serial number (from) and the ending serial number (to) for the end items affected by the design change. If only a single item applies, the same serial number will be entered in both blocks. When the ending number is unknown "SUB" (subsequent) will be entered in the serial number "to" data field.

d. Block 75. Provisioning Control Code (PCC), DED 078, 3X. When a design change affects a specific end item/model, enter the PCC assigned to the end item model.

e. Block 76. Total Item Changes (TIC), DED 124, 2N. Enter the total number of times the item is affected by the design change.

f. Block 77. Replaced or Superseding PLISN (Rep or Sup PLISN), DED 091, 6X. Enter the PLISN of the replaced or superseding item.

50.3.10 Data element dictionary (DED)

50.3.10.1 Purpose. This section identifies and describes LSA data elements which shall be used in preparing the LSAR data sheets for the M-X Weapon System.

50.3.10.2 Application. This dictionary applies to any system/equipment acquisition program which incorporates LSA implemented in accordance with this standard. Individual data elements, with related data items and data codes, shall be selected from this dictionary whenever qualitative and quantitative data, to be employed in a particular analysis, match the given data element definitions. Additional data elements, peculiar to a specific acquisition, may be authorized by the procuring activity. Sources are cited for standardized data elements and data codes.

50.3.10.3 List of data element titles

DED No.	Standard Element Titles
001	Additional Reference Numbers.
002	Additional Skill Requirements.
003	Alternative Action Code (Alt Act Cd).
004	Annual Maintenance Man-Hours.
005	Annual Number of Missions.
006	Annual Operating Days.
007	Annual Operating Requirements.
008	Equipment/Facility (E/F).
009	Availability (A).
010	RESERVED
011	RESERVED
012	RESERVED
013	Change Authority Number.
014	Configuration Item (CI) Description (see Item Name, DED 045).
015	Contractor Turnaround Time (CON TAT).
016	Conversion Factor (Conv Factor).
017	Cost.
018	Data Sheet Status Code (DSSC).
019	Date.
020	Drawing Classification (Dwg Class).
021	Drawing Number.
022	Elapsed Time, Mean.
023	Configuration Item (CI) Number.
024	RESERVED
025	Essentiality Code (EC).
026	Extended Unit Price.
027	Facility Description.
028	Facility Category Code.
029	Support Facilities (SF) (see Requirements (for), DED 093).
030	RESERVED
031	RESERVED
032	RESERVED
033	Failure Factor.
034	RESERVED

035	RESERVED
036	Federal Supply Code for Manufacturers (FSCM).
037	RESERVED
038	Control Number (CN).
039	Height.
040	Indenture Code (Ind Cd).
041	Installation Factors.
042	Interchangeability Code (IC).
043	Item Category Code (ICC).
044	Item Function.
045	Item Name.
046	RESERVED
047	Justification (see Remarks/Recommendations/Justification, DED 088).
048	Length.
049	Long Reference Number Code (LRNC).
050	Maintainability Considerations.
051	Maintenance Action Code (MAC).
052	Maintenance Concept.
053	Maintenance Concept Impact.
054	Maintenance Task Distribution (Maint Task Dist).
055	Man-Hours, Mean.
056	Manufacturer's Part Number.
057	Maximum Allowable Operating Time (MAOT).
058	Mean Active Maintenance Downtime (MAMDT).
059	Mean Mission Duration.
060	Mean Time Between Failures (MTBF).
061	Mean Time Between Maintenance Actions (MTBMA).
062	Mean Time To Repair (MTTR).
063	Measurement Base Code (Meas Base).
064	National Stock Number (NSN).
065	NHA PLISN (see Provisioning List Item Sequence Number (PLISN) DED 079).
066	Nonrecurring (see Cost, DED 017).
067	Number of Personnel (No. Per).
068	Number of Systems Supported.

069	OHL/KIT/SET PLISN (see Provisioning List Item Sequence Number (PLISN), DED 079).
070	Packing Code (PCK).
071	RESERVED
072	Phased Provisioning Code (PPC).
073	Physical Security/Pilferage Code (PSPC).
074	Prior Item PLISN (see Provisioning List Item Sequence Number (PLISN), DED 079).
075	Contractor Recommended Code (CRC).
076	Spares Acquisition Integrated with Production (SAIP).
077	Production Lead Time (PLT).
078	Provisioning Control Code (PCC).
079	Provisioning List Item Sequence Number (PLISN).
080	Maintainability Design Criteria.
081	Quantity.
082	Recurring (see Cost, DED 017).
083	Reference Designation.
084	Reference Designation Code (RDC).
085	Reference Number Category Code (RNCC).
086	Reference Number Format Code (RNFC).
087	Remarks (See DED 088).
088	Remarks/Recommendations/Justification.
089	Repair Cycle Turnaround Time (TAT REP CYCLE).
090	RESERVED
091	Rep or Sup PLISN (see Provisioning List Item Sequence Number (PLISN), DED 079).
092	Replacement Task Distribution (REPL TASK DIST).
093	Requirements (For).
094	Revision Code (Rev Code).
095	Safety Hazard Level Code.
096	Same as PLISN (see Provisioning List Item Sequence Number, DED 079).
097	Sequential Line Number (SLN).
098	Serial Number Effectivity.
099	Service Designator Code.
100	Shelf Life Code (SL).
101	Significant Character Code (SCC).
102	Air Force Specialty Code (AFSC).

103	Skill Specialty Evaluation Code (SS EVAL).
104	Source, Maintenance, and Recoverability Code (SMR).
105	Special Handling Code (SHC).
106	Specification Range of Readouts.
107	Specification Tolerance of Readouts.
108	Specification Type of Readouts.
109	RESERVED
110	Support Equipment Grouping Identification Number (Sup Equip GP ID No) (see Requirements (for), DED 093).
111	Support and Test Equipment Characteristics.
112	Support and Test Equipment Description and Function.
113	Task Characterization (Task Char).
114	Task Code.
115	Task Frequency.
116	Task Description.
117	Team Code.
118	New Technical Data (NTD).
119	RESERVED
120	RESERVED
121	RESERVED
122	RESERVED
123	Tool Requirement Code (TC) (see Requirements (for), DED 093).
124	Total Item Changes (TIC).
125	Total Quantity Recommended (Total Qty Rec).
126	Training Characterization (Trng Char).
127	Type, Model, Series Designator.
128	Type Item Code.
129	Unit Cost (see Cost, DED 017).
130	Unit of Measure Code (UM).
131	Unit Price.
132	RESERVED
133	Unscheduled Maintenance (Time) (see Elapsed Time or Man-Hours, DED 022 or 055).
134	Update Code.
135	Usable on Code.
136	Volume (see Length, DED 048).
137	Weight.

138	Width.
139	Maintenance Flow Block Number.
140	Government Furnished Equipment/Contractor Furnished Equipment (GFE/CFE).
141	Work Unit Code (WUC).
142	Method of Support (MOS).
143	Major Organizational Entity (MOE) Rule.
144	Scheduled Maintenance.
145	Contractor Name.
146	Hardness Critical (HC).
147	Estimated First Article Date.
148	GFE/CFE Number.
149	Parameters Measured.
150	Range.
151	Range Units.
152	Accuracy (%).
153	Number of Ranges.

50.3.10.4 Logistic Support Analysis Data Element Dictionary

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

001 Additional Reference Number — 32 X L -

Numbers which provide additional information/cross referencing of a specific item. Additional Reference Numbers include: first precedent reference numbers, second precedent reference numbers, specification control numbers, drawing numbers and two-way interchangeable part numbers as defined in MIL-STD-1552.

002 Additional Skill Requirements — 1000 X L -

A description of the new skills that are required in order to operate and/or maintain the equipment.

003 Alternative Action Code (Alt Act Cd) — 1 A F -

This code identifies separate and distinct support alternatives considered after the completion of ORLA for a given item of equipment. Use sequential alpha characters. Separate data sheets must be prepared for each alternate action recommended.

004 Annual Maintenance Man-Hours — 5 N R 1

The total maintenance man-hours expended per year, per item, segregated into scheduled and unscheduled time.

005 Annual Number of Missions — 6 N R -

The estimated or specified mean number of missions an item will be expected to accomplish in a year. For items which are normally dormant (i.e., Stage I) or which operate continuously, the number of missions will be 1.

006 Annual Operating Days — 3 N R -

The mean number of days per year that a mission demand will be placed on an item.

007 Annual Operating Requirements — 6 N R -

The estimated or required yearly rate of usage of an item. Use with the data element measurement base code.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

008 Equipment/Facility (E/F) 1 A F -

This data field provides a reference to the more detailed requirements information for special support facilities and/or support equipment provided on Data Sheets F and E, respectively. The following codes shall be used:

Special support facilities	F
Support equipment	E

009 Availability (A)

The degree (expressed as a probability) to which an item is in the operable and commitable state at the start of the mission, when the mission is called for at an unknown (random) point in time. Availability is considered synonomous with operational readiness.

Data Use Identifiers

a. Availability, Achieved (AA) 4 N R 2

The probability that a system or equipment when used under stated conditions in an ideal support environment; i.e., available tools, parts, manpower, manuals, etc., will operate satisfactorily at any given time. Availability (achieved) excludes supply downtime and waiting or administrative downtime. It may be expressed as:

$$AA\% = \frac{MTBMA \times 100}{MTBMA + MAMDT},$$

where

MTBMA = mean time between maintenance actions and MAMDT = mean active maintenance downtime. For MTBMA entries expressed in measurement units other than operating hours, convert the units to operating hours per maintenance action.

b. Availability, Inherent (AI) 4 N R 2

The probability that a system or equipment, when used under stated conditions without consideration for any scheduled or preventive maintenance action and in an ideal support environment; i.e., available tools, parts, manpower, manuals, etc., will operate satisfactorily at any given time. Availability (inherent) excludes ready time, preventive maintenance action downtime, and waiting or administrative downtime. It may be expressed as:

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

$$A\ \% = \frac{MTBF \times 100}{MTBF + MTTR},$$

where

MTBF = mean time between failure, and MTTR = mean time to repair

010 RESERVED

011 RESERVED

012 RESERVED

013 Change Authority Number — 15 — X — L — -

A number which uniquely identifies an engineering order (EO), engineering change proposal (ECP), or modification work order (MWO).

014 Configuration Item (CI) Description

(See Item Name, DED 045).

015 Contractor Turnaround Time (CON TAT) — 3 — N — R — -

An expressed period of time measure in days from receipt of a failed item at the contractor's facility until the item is returned to the designated receiving point.

016 Conversion Factor (Conv Factor) — 4 — N — R — 2

Records the multiplier used to convert the operating time of the item under analysis to the operating time of the major subsystem.

017 Cost — 10 — X — R — 2

The amount in US dollars paid, given, charged or engaged to be paid or given for item(s) and service.

When a unit of measure is thousands of dollars, an indicator "K" may occupy the right hand position. When a unit of measure is millions of dollars, an indicator "M" may occupy the right hand position.

018 Data Sheet Status Code (DSSC) — 1 — A — F — -

Indicates the completion status of an individual input data sheet.

Approved	Concurred with by BMO ILS/LSAR team	A

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

Completed	Data sheet complete, but not approved	C
In-process/revision	Data sheet incomplete and in process	W
Reviewed	In-process review action	R

019 Date — 6 N F -

A notation which specifies a given day of the Gregorian Year. This notation provides for the identification of the year, the month, and the day in that sequence. DOD 5000.12M, reference number DA-FA.

020 Drawing Classification (Dwg Class) — 3 X F -

Indicates the category and form of the engineering drawings used in the analysis. The Intended Use Category is indicated in the first position, the Drawing Level in the second position, and the third position indicates whether the drawing is proprietary. Codes for drawing level are the numeric identifications indicates in DOD-D-1000A. The proprietary status and intended use will be as indicated below.

Intended Use Categories	
Design evaluation	A
Government manufacture	I
Installation	G
Interchangeability control	J
Interface Control	B
Logistic support	D
Maintenance	H
Procurement (identical items)	E
Procurement (interchangeable items)	F
Service Test	C

Levels of Drawings	
Conceptual and developmental design	1
Production prototype and limited production	2
Production	3

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Proprietary Status

Nonproprietary - No	N
Proprietary - Yes	Y

021 Drawing Number 32 X L -

Assigned to a particular drawing by the design activity for identification purposes. Consists of letters, numbers or combinations of letters and numbers which may, or may not, be separated by dashes. See Chapter 400, DOD-STD-100B for numbering procedures and limitations shown below. Drawing numbers will normally not exceed 16 characters. Long reference number spacing is provided for drawing numbers which exceed 16 characters (LRNC).

The number is assigned to a particular drawing for identification purposes by the design activity with the following limitations:

a. Letters "I," "O," "Q," "S," "X," and "Z" shall not be used. Letters shall be upper case (capital).

b. Numbers shall be arabic numerals. Fractional, decimal, and Roman numerals shall not be used.

c. Blank spaces are not permitted.

d. Symbols such as: ( ), *, /, +, - shall not be used, except when referencing the government or industry document whose identification contains such a symbol.

022 Elapsed Time, Mean 5 N R AS

Time expended, regardless of the number of personnel working simultaneously. This does not include logistic delay time. The clock time in hours associated with an individual task step or substep may be categorized as follows:

a. Allocated. The maximum time allowed to accomplish a task.

b. Predicted. The estimated time required in the performance of a task.

c. Measured. The actual total clock time recorded in the completion of a task from start to finish.

Data Use Identifiers:

Intermediate inspection

Periodic inspection

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Post-operative inspection

Preoperative inspection

Scheduled maintenance

Unscheduled maintenance

Total elapsed time

023 Configuration Item (CI) Number — 6 X L -

A code which uniquely identifies a CI within a subsystem or other CI. This code will be assigned by the procuring configuration management activity. It will remain constant throughout the item's life cycle. A CI is defined as an aggregation of hardware/computer programs or any of its discrete portions, which satisfies an end-use function and is designated by the government for configuration management. CIs may vary widely in complexity, size, and type. During manufacturing and development of the initial (prototype) production configuration, CIs are those specification items whose function and performance parameters must be defined and controlled to achieve the overall end-use function and performance. Any reparable item required for logistic support and designated for separate procurement. Identification control numbers assigned to CIs are provided by the BMO Configuration Management Division.

024 RESERVED

025 Essentiality Code (EC) — 1 N F

This code indicates the degree to which the failure of the part affects the ability of the configuration item to perform its intended operation. Codes are assigned in accordance with MIL-STD-1552 as follows:

Failure to this part will render the configuration item inoperable.	1
Failure to this part will not render the configuration item inoperable.	3
Item does not qualify for the assignment of code 1, but is needed for personnel safety.	5
Item does not qualify for assignment of code 1 but is needed for legal, climatic, or other requirements peculiar to the planned operational environment of the configuration item.	6
Item does not qualify for the assignment of code 1 but is needed to prevent impairment of or the temporary reduction of operational effectiveness of the configuration item.	7

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

026 Extended Unit Price — 12 — N — R — 2

The total proposed or estimated price for an item found by multiplying the Total Quantity Recommended by the Recurring Cost and adding the Nonrecurring Cost to the product.

027 Facility Description — 19 — X — L — -

A brief description of the facility requirements

028 Facility Category Code — 6 — N — L — -

Provides a method for identifying and classifying real property from the initial planning stages through the complete cycle of programming, budgeting, accounting, and reporting in the areas of acquisition, construction, inventory, and maintenance. Every reportable item of real property is considered a facility. A parcel of land is a facility, as is each building, structure, and utility constructed on or in the land. The three digit DOD basic category codes have been extended within the services by additional digits. The more definitive categorization is authorized by DOD for internal use within the DOD components. (See AFM 300-4, Vol IV for codes).

029 Support Facilities (SF)

(See Requirements (for), DED 093).

030 RESERVED

031 RESERVED

032 RESERVED

033 Failure Factor

Failure Factor I — 6 — N — R — 4

a. This block will contain the maintenance factor (M/F). The first position of this 6-digit field will not be used. The M/F will always be expressed as a five position number (i.e., 0.0500). A decimal point will be understood to be between the first and second digit of the five position number.

b. The M/F is defined as the anticipated average maintenance replacement rate per operating program increment, i.e., per 100 hours (H). The replacement of the item must further create a demand on supply for a like item. The demand on supply or Mean Time Between Demand (MTBD) criteria excludes maintenance actions such as on equipment repair and other nondemand failures, which are not correctly a part of

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

the maintenance factor. The derivation of a maintenance factor must encompass the ratio of demands to failures and demands to maintenance actions.

c. Maintenance factors are not required for items authorized for depot use only. The initial requirements for these items will be computed from the overhaul replacement factor.

d. To develop the maintenance factor for single application quantity per article (QPA-1) within a single next higher assembly (NHA):

(1) Estimate the time the item will experience between failure removals which places a demand on supply (MTBD) and divide into the appropriate operating program unit. This figure must represent the rate at which a single installed item will fail, requiring removal and replacement regardless of the level of repair at which the replacement is made, since requirements determined utilizing this type of maintenance factor include the tool (OFM, overhaul of NHA, and engine overhaul) item replacement. It must include consideration for:

Design performance limitations.

Maintainability and reliability analysis data.

Similar or like item comparison and usage data.

Contractor and vendor estimates.

Mandatory removal intervals.

Replacement due to repair of NHA.

Test data and experience.

Operational environment.

(2) If the applicable program is in program units of 100 hours (H), develop the factor by dividing 100 by the estimated MTBD. For example, when the MTBD is estimated at 1,000 hours, the factor is as follows:

100 hours (program unit) / 1,000 hours (MTBD) = 0.1000 maintenance factor expressed as: 0.1000 failure removals per 100 hours of program.

(3) The program to which the factor is applied must be in program units compatible with the factor. In computing gross removals for the initial requirements support period, the factor may be applied to aggregate end article/recoverable item programs as shown below:

DED No.		Field Format*				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

25,000 hours (program)
100 hours (program unit) = 250 program units of 100 hours each 250 units x 0.1000 (maintenance factor) = 25 each gross removals.

The conversion from total hours to 100-hour increments will be accomplished during preparation of the programming checklist and is shown here only for the purpose of clarity.

e. To develop the maintenance factor for multiple applications (multi-QPA) within a single NHA, determine the rate of each single application and divide the added rates by the total QPA. For example:

The MTBD is estimated at 400 hours, first application; 1800 hours, second application; and 2300 hours, third application, the factor is derived as follows:

First application:

400 hours (MTBD)
100 hours (program unit) = 0.2500 maintenance factor

Second application:

1800 (MTBD)
100 hours (program unit) = 0.0555 maintenance factor

Third application:

2300 hours (MTBD)
100 hours (program unit) = 0.0435 maintenance factor

0.3490

0.3490 ÷ 3 = 0.1163 average maintenance factor expressed as: 0.1163 average failure removals per QPA per 100 hours of the program.

f. To develop the rate for multiple applications (multi-QPA) and multiple NHAs: Step 1 – Multiply the QPA of the items times the number of NHA installed. Step 2 Determine the rate within a single NHA and multiply that figure times the results of step 1. Step 3 Total the results and divide by the sum of all installed QPAs. For example: The F105 has installed 2 gyros, 5 actuators, and 10 pumps. Bearing "XX" is used (QPA); 5 times each gyro, 4 times in each actuator, and 3 times in each pump. Establish an average maintenance factor for bearing "XX" as follows:

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

	Bearing QPA	x	No. of NHA Installed	=	Installed QPA	x	Average Maintenance	=	Factor per QPA
Gyro	5		02		10		0.2500		02.500
Actuator	4		05		20		0.5000		10.000
Pump	3		10		30		0.4000		12.000
					60				24.500

24.500 ÷ 60 = average maintenance factor expressed as: 0.4083 failure removals per QPA per operating program increment.

Failure Factor II 6 N R 2

This block has been modified into two separate blocks.

a. Overhaul Replacement Percent

(1) These three positions will be utilized for assignment of the overhaul replacement percent (O/H). A decimal point will be understood to be between the first and second position (i.e., 0.40).

(2) The O/H represents the replacement rate of a spare or repair part in the overhaul of the next higher recoverable assembly (NHRA). The maintenance decision for the item being factored or for its next higher assembly determines the need for the assignment of an overhaul replacement percent. This relationship also determines if the overhaul replacement percent is used to compute an initial requirement or to determine asset distribution. The following rules will apply in the assignment of overhaul replacement percents:

(a) Subassemblies and bit and piece for items repair coded L and D will require an overhaul replacement percent.

(b) Subassemblies and bit and piece for items repair coded F will not require an overhaul replacement percent. It is imperative that indenture integrity be maintained to insure proper parts projection and that initial computations are based upon the projected maintenance program of the next higher assembly.

(c) Overhaul replacement factor examples follow:

1. Repair part "X" installed in recoverable items "Y" is one application, or a QPA of one each. The equipment specialist estimates 10 replacements for part "X" or 10

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

percent of the total next higher assemblies overhaul program.

2. Repair part "Z" is installed in three varied functional applications in items "Y" for QPA of three each. The equipment specialist estimates those replacements at 10 percent, 80 percent and 30 percent respectively. The average replacement percentage is 120 percent divided by 3 or 40 percent. The overhaul replacement percent will be expressed as 0.40 on the PTD.

b. Base Condemnation Percent

(1) These three positions will be utilized for assignment of the base condemnation percent (BCR). A decimal point will be understood to be between the first and second positions (i.e., 0.10).

(2) The BCR is a percentage assigned to items repair coded F which represents that portion of the failed items removed and processed for intermediate level repair which will be condemned at that level due to wear-out or economical repair limitations.

(3) A base condemnation percent for items coded B or Z (no repair authorized) is not required in that the maintenance factor assigned to the item establishes the issue requirement for that item. For items repair coded F, this entry is used during the requirement computation and is vital to the accuracy of the initial procurement quantities.

Failure Factor III 6 N F 2

This block has been modified into two separate blocks.

a. Not Repairable This Station (NRTS)

(1) These three positions will be utilized for assignment of the NRTS percent. A decimal point will be understood to be between the first and second position (i.e., 0.10).

(2) The NRTS percent represents that portion of the estimated repairable generations which the intermediate repair shops will be unable to repair and therefore will be processed to a Technical Repair Center.

(3) During initial provisioning this will apply only to items repair level coded F, P or S.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

(4) This factor in conjunction with one or more of the other factors will assist in providing, for example, percent base processed/repaired, percent depot processed/repaired, estimated quantities of depot condemnations, estimated repairable generations, and the overhaul recovery percent.

(5) The reason for not requiring NRTS percents for items maintenance repair coded D is that these items are planned 100 percent depot.

b. Depot Condemnation Percent

(1) These three positions will be utilized for assignment of the depot condemnation percent (DCR). A decimal point will be understood to be between the first and second position (i.e., 0.06).

(2) The DCR represents the percentage of repair parts, recoverable assemblies, or end items which will be condemned during depot overhaul. For repair parts (repair coded B or Z) condemnations will always equal replacements and the DCR percent will equal 100 percent.

(3) For assemblies (non-job routed) use in repair of an NHRA or end item (undergoing depot level overhaul), the depot condemnation percent will be that percentage of the replaced assemblies which will be condemned.

Example:

Next higher assemblies undergoing depot overhaul = 100 ea

Estimated number of items "X" replaced = 50 ea

Estimated number of items "X" replacement condemned = 10 ea

DCR = 10 ÷ 50

DCR = 20 percent

(4) For recoverable assemblies or end items established separately (job routed) as depot overhaul items, enter the percentage of the recoverable assemblies or end items which will be condemned during overhaul. This percentage, when added to the overhaul recovery percent, will equal 100 percent.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Example:

End items scheduled for depot overhaul	100 ea
End items repaired by overhaul (OHR percent)	94 percent ea
Depot condemnation	6 percent

034 RESERVED

035 RESERVED

036 Federal Supply Code for Manufacturers (FSCM) 5 X F -

Provides a nonsignificant code assigned to identify manufacturers. See Federal Cataloging Handbook H4-1 and H4-2 for codes.

037 RESERVED

038 Control Number (CN) 11 X L -

A standardized indexing system which uniquely identifies elements of the Logistics Support Analysis. The CN structure is shown in Figure B-4 of this appendix. System level/functional CNs provide uniqueness through a sequential numbering scheme within the high-level maintenance functional flow diagram references. For subsystem/CI applications the CN will be structured in a logical, hierarchial sequence which will permit a top-down association of LSA elements. The latter CN shows the relationship of the line item to the system or end item and illustrates a lateral and descending "family tree" relationship of each line item to and within the system or end item and its discrete components, assemblies and subassemblies. Care should be taken to insure that these CNs are assigned in a disassembly sequence.

039 Height 4 N R 1

The height of the item in units, defined by the data element Unit of Measure Code.

040 Indenture Code (Ind Cd) 1 A F -

Indicates the relationship of a line item to the system or configuration item. The letter A, B, C, etc., is used to illustrate the lateral and descending "family tree" relationship of each line item to and within the system or configuration item and its discrete components (units), assemblies, sub-assemblies, and sub-subassemblies. This coding is used when the sequence of

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

listing is in top-down or disassembly order. The breakdown listing will be specified by the procuring activity.

041 Installation Factors 500 X L -

Any considerations required for the installation of support and test equipment, or training material, such as vibration and shock mounting requirements, special foundations, utilities connections, and environmental factors. Include any equipment necessary to install the item; e.g., cranes, hoists, lift trucks, transits, etc.

042 Interchangeability Code (IC) 2 A F -

Identifies an item which: (1) possesses such functional and physical characteristics as to be equivalent in performance, reliability, and maintainability, to another item of similar or identical purpose, and (2) is capable of being exchanged for the other item (a) without selection for fit or performance, and (b) without alteration of the items themselves or of adjoining items except for adjustment. Normally used when an item previously listed is being replaced by a new item.

Signifies one-way interchangeability as follows: OW

(1) When used for a change to the original item, OW means that the original item may be used until exhausted.

(2) When used for a replacement item, OW means that the new item may be used to replace the original item.

Signifies that the original item and the replacement item are interchangeable with each other. TW

Signifies that the item is not interchangeable as follows: NI

(1) When used for the original item, NI means that the item is not interchangeable with the replacement item.

(2) When used for the replacement item, NI means that the replacement item is not interchangeable with the original item.

Signifies that the original item is interchangeable with the replacement item only if modified to the replacement item configuration and only in the new application. OM

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Signifies that the original item is interchangeable in both the old and new application only if the original item is modified to the replacement configuration. TM

043 Item Category Code (ICC) 1 X F -

Categorizes the type of support item identified during analysis. Indicates categories into which support and test equipment, spares, repair parts, etc., may be divided.

a. Peculiar support equipment and tools not currently in the DOD inventory assigned to units by authorization documents

Peculiar support equipment	A
Peculiar tools	B
Peculiar test equipment	C
Peculiar handling equipment	D

b. Common support equipment and tools currently in the DOD inventory assigned to units by authorization documents.

Common support equipment	J
Common tools	K
Common test equipment	L
Common handling equipment	M
c. Bulk items	Q
d. Training material not currently in the DOD inventory	S
e. Training material currently in the DOD inventory	T
f. Configuration item	W
g. Spare	X
h. Repair part; component; assembly	Y
i. Kit/set	Z

044 Item Function 4000 X L -

A brief description of the function of the item or system level/functional activity being analyzed. Sufficient detail must be provided to permit evaluation of the support analysis.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

045 Item Description 16 X L -

The item name, as contained in Federal Cataloging Handbook H6-1, or the name assigned by the manufacturer in accordance with DOD-STD-100 if an applicable item name is not contained in the handbook. This data element also covers facilities. Abbreviations for item names will be in accordance with MIL-STD-12.

046 RESERVED

047 Justification

(See Remarks/Recommendations/Justification, DED 088)

048 Length 4 N R 1

The length of the item in units, defined by the data element Unit of Measure Code. When the volume, and not the dimensions, of the item is known, enter the volume in the length block and enter the appropriate Unit of Measure Code.

049 Long Reference Number Code (LRNC) 1 A F -

Provides for continuity when a reference number; e.g., Manufacturer's Part Number, Drawing Number, etc., exceeds 16 characters. The letter "A" will be used to indicate the first portion of the reference number.

050 Maintainability Considerations 1 A F -

Indicates which guidelines were considered during design.

Considered	C
Not Considered	N

051 Maintenance Action Code (MAC) 1 A F -

Indicates the required action to be taken at expiration of the maximum allowable operating time. The codes are as follows:

Condemn	C
Repair	R
Test and repair	T

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

052 Maintenance Concept 4000 X L -

The broad, planned approach to be employed in sustaining the system/equipment at a defined level of readiness or in a specified condition in support of the operational requirement. Initially stated by the government for design and support planning purposes, and expanded by contractor prepared inputs during full-scale development. Usually includes guidelines pertaining to projected maintenance tasks, levels, and locations; organic-contractor maintenance workload mix; condition monitoring, fault isolation and testing approach; compatibility with existing support and test equipment, etc. May be influenced or modified by economic, technical or logistic considerations as the system/equipment development proceeds.

053 Maintenance Concept Impact 1 A F -

Indicates whether the maintenance concept will have an impact on the existing or planned facilities or cause a requirement for peculiar support and test equipment or tools.

Item affected - Yes Y

Not affected- No N

054 Maintenance Task Distribution 10 N F -
(Maint Task Dist)

Indicates the percent of a reparable item expected to be repaired and returned to stock by a specified maintenance level. The first three fields represent the standard Air Force maintenance levels and the fifth field is the condemnation rate. The sum of the fields should equal 100 percent.

055 Man-Hours, Mean 5 N R AS

The sum of the working time of each individual required to perform a task step or substep, expressed in whole hours, and decimals (as specified). May be categorized as follows:

a. Allocated. The maximum number of man-hours allowed to accomplish a task.

b. Predicted. The estimated man-hours that will be required in the performance of a task.

c. Measured. The actual total man-hours expended in completion of a task.

Data Use Identifiers:

Daily inspection
Preoperative inspection

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Post-operative inspection
Intermediate inspection
Periodic inspection
Unscheduled maintenance.

056 Manufacturers Part Number 32 X L -

Numbers assigned to uniquely identify a specific item. It may or may not be the same as the drawing number. Normally used with the data element Federal Supply Code for Manufacturers (FSCM).

057 Maximum Allowable Operating Time (MAOT) 4 X F -

Indicates the expressed period of time or number of events after which certain items will be replaced, overhauled, recalibrated, repaired, or inspected. Indicates the specific service life of an item. Use with the data element Maintenance Action Code. The block is divided as follows:

a. First two positions — Applicable program units, i.e., 01-99

b. Third position — Appropriate multiplier code

1 x Meas Base	BLANK
10 x Meas Base	X
100 x Meas Base	C
1000 x Meas Base	M

c. Fourth position — Measurement Base Code (see DED 063)

058 Mean Active Maintenance Downtime (MAMDT) 6 N R 1

The statistical mean of the individual elapsed times for all maintenance tasks, during a given period of time. The Mean Active Maintenance Downtime (MAMDT) or M is the weighted average of the mean corrective maintenance action time (Mean Time To Repair, MTTR) and the Mean Preventive Maintenance Action Time (MTPM). When the number of corrective maintenance actions (NC) and the number of preventive maintenance actions (NP) have been determined for a common reference time, the following formula may be used to calculate the mean active maintenance downtime:

$$M = MAMDT = \frac{(MTTR \times NC) + (MTPM \times NP)}{NC + NP}$$

DED No.	Standard Data Element Title / Definition / Data Item(s)	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

059 Mean Mission Duration — 5 — N — R — -

Identifies the average length of a mission for the item under analysis expressed in units defined by the data element measurement base code. In the LSA the term "mission" refers the normal "strategic alert" operations for all AVE and OSE or the normal operating requirements for MSE and DSE. Systems/subsystems which are normally dormant in their operational mode (i.e., Stage I) will be considered as operating continuously for the purpose of determining mission duration.

060 Mean Time Between Failures (MTBF) — 7 — N — R — -

For a particular interval, the total functional life of a population of an item divided by the total number of failures within the population during the measurement interval. The definition holds for time, rounds, miles, events, or other measure of life units.

061 Mean Time Between Maintenance Actions (MTBMA) — 7 — N — R — -

The mean of the distribution of the time intervals between maintenance actions, either preventive, corrective, or both.

062 Mean Time To Repair (MTTR) — 6 — N — R — 1

The total corrective maintenance time divided by the total number of corrective maintenance actions during a given period of time.

063 Measurement Base Code (Meas Base) — 1 — A — F — -

Defines the unit of measure for a particular operating time period or number of events.

Hours	H
Days	D
Months	T
Years	Y
Miles	V
Kilometers	M
Cycles	P
Starts	S

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

064 National Stock Number (NSN) 20 X F -

A number assigned by the government and obtained by the contractor through prescreening action, reference DOD 4130.2M and DOD 4100.39M, which provides a unique identification of an item of supply within a specified federal supply classification. A data chain consisting of the four digit federal supply classification and nine digit national item identification number in that order. It may also have a two-character dual cognizance code and one-character material control code prefix, and a two-character special material identification code suffix. The configuration of the total NSN would be:

a.	Drawing code	1	X	F	-
b.	Demilitarization code	1	X	F	-
c.	RESERVED	1	X	F	-
d.	Federal supply classification (FSC)	4	N	F	-
e.	NATO code	2	X	F	-
f.	National Item Identification Number (NIIN)	7	N	F	-
g.	Material Management Aggregation Code (MMAC)	2	A	F	-
h.	Inventory Management Code	1	X	F	-
i	Special Item Code	1	X	F	-

065 NHA PLISN

(See Provisioning List Item Sequence Number (PLISN), DED 079)

066 Nonrecurring

(See Cost, DED 017)

067 Number of Personnel (No. Per) 2 N R -

The number of personnel having the same AFSC required to perform the maintenance task being analyzed. An entry is required to each task listed.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

068 Number of Systems Supported 6 N R -

For the purposes of the LSA the number of systems supported will be the number of systems operationally fielded in the case of AVE and OSE, or for MSE and DSE it will be the number of systems required to support the operational weapon system.

069 OHL/KIT/SET PLISN

(See Provisioning List Item Sequence Number, (PLISN) DED 079)

070 Packing Code (PCK) 1 A F -

Indicates whether or not the measurements and weight of an item include packing. The codes are as follows:

Includes packing	P
No packing	U

071 RESERVED

072 Phased Provisioning Code (PPC) 1 A F -

Indicates whether an initial support item (spare or repair part) is recommended for phased provisioning under MIL-STD-1517 and MIL-STD-1561.

Recommended	P
Not recommended	BLANK

073 Physical Security/Pilferage Code (PSPC) 1 A F -

A one position alphabetic code which indicates the security classification or pilferage control for physical assets. Only unclassified items may be recorded to reflect that pilferage controls are required. See subsection DOD 4100.39M, Volume 10, Chapter 4, Table 61 for codes.

Confidential	C
Confidential - Former Restricted Data	A
Confidential - Restricted Data	B
Pilferage Code - may be applied to unclassified (U) items only	J
Secret	S
Secret - Cryptologic	E
Secret - Former Restricted Data	G
Top Secret	T

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

Top Secret - Cryptologic	F
Top Secret - Former Restricted Data	K
Top Secret - Restricted Data	L
Unclassified	U

Pilferage (Code J) items may be further categorized by use of the following codes:

Aircraft engine equipment and parts	I
Hand tools and shop equipment	M
Firearms	N
An item which is a drug or other substance determined by the Director, BNDD, Department of Justice, to be designated schedule symbol III, IV, or V as defined in the Controlled Substance Act of 1970 and other items requiring secure storage.	Q
Munitions and explosives	P
Alcohol, alcoholic beverages, precious metals, or a drug or other substance determined by the Director BNDD, Department of Justice, to be designated schedule symbol II as defined in the Controlled Substance Act of 1970 and other items requiring vault storage.	R
Individual clothing and equipment	V
Office machines	W
Photographic equipment and supplies	X
Communications/electronic equipment and parts	Y
Vehicular equipment and parts	Z

074 Prior Item PLISN

(See PLISN, DED 079)

075 Contractor Screening Code — 1 X F -

A coded entry to describe, in a gross way, the results of the contractors screening of Air Force/DOD and/or commercial sources for support and test equipment to meet the functional and technical requirements. The following codes will be used:

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

An item of equipment has been located in the Air Force or DOD inventory which will satisfy the requirements. — A

The contractor is unable to identify an equipment item in the Air Force or DOD inventory but has identified a commercially available item. — B

The contractor is unable to identify an equipment item and a new equipment development activity is required. — C

076 Spares Acquisition Integrated with Production (SAIP) — 1 — X — F — -

An "S" in this block indicates the recommended spare should be considered for acquisition commensurate with production release orders. (See AFR 800–26). Ideally, the SAIP items selected should comprise only from 10 to 15 percent of the total initial spares, but should represent a large share of the initial spares investment (from 65 to 75 percent). Additionally, the decision to use SAIP for replenishment spares will be based on the procurement method code (PMC) assigned to the item using AFR 57–6 or the contractor recommended code (CRC) using MIL-STD-789B.

077 Production Lead Time (PLT) — 2 — N — R — -

Indicates the computed or expected time interval in months between placement of a new contract and shipment of the first deliverable quantity.

078 Provisioning Control Code (PCC) — 3 — X — F — -

Reserved for Air Force use.

079 Provisioning List Item Sequence Number (PLISN) — 6 — X — L — -

Provides provisioning documentation sequential line item control, commencing with the first line on the first page of the first section of the format, and continuing numerically to the last item on the last page of the last section of the format. The first four digits are used for sequential numbering of line items on the list. Construction of the balance of the coding will be provided by the procuring activity

Data Use Identifiers:

PLISN, Next Higher Assembly
PLISN, Overhaul/Kit/Set
PLISN, Prior Item
PLISN, Replaced or Superseded
PLISN, Same As.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

080 Maintainability Design Criteria — 4000 — X — L — -

Enter a narrative description of the detailed maintainability design criteria. Detailed criteria shall be developed for each subsystem and configuration item using MIL-STD-470 as a guide. Design features that meet each criterian shall be described.

081 Quantity

A representative of the number of units of anything that has the property of being measurable in dimensions, amounts, etc.

Data Use Identifiers:

Quantity, Overhaul (OHL Qty)	3	N	R	-
Quantity per Assembly (QPA)	4	N	R	-
Quantity per End Item (Qty/EI)	5	N	R	-
Quantity per Task (Qty/Task)	4	N	R	1
Quantity, Unit Pack (QUP)	3	N	R	-

082 Recurring

(See Cost, DED 017)

083 Reference Designation — 32 — X — L — -

Letters or numbers, or both, used to uniquely identify and locate discrete units, portions thereof, and basic parts of a specific set. (A reference designation is not a letter symbol, abbreviation, or functional designation for an item). For electrical and electronic parts and equipment, the reference designation number is in accordance with ANSI Y32.16, utilizing either the Unit (preferred) or Block Number Method.

084 Reference Designation Code (RDC) — 1 — A — F — -

Indicates the type of data entered in the reference designation field:

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Assemblies that are separable or repairable identified with a reference designation in accordance with ANSI Y32.16 (does not apply to detail parts within the assembly). A

Same as A, except this code is to be assigned to assemblies that are inseparable or nonrepairable. U

Items identified with a figure and index number in the reference designation block. F

Installation and checkout items that are inseparable or non-repairable. C

Installation and checkout items that are separable or repairable. Z

085 Reference Number Category Code (RNCC) 1 X F -

Indicates the category or relationship of the reference number to a National Stock Number or other reference number. See MIL-STD-1552.

Source control reference	1
Definitive government specification of standard designator reference	2
Design control reference	3
Secondary reference	5
Specification control reference	7
Altered item reference	E
Selected item reference	F
Drawings	G

086 Reference Number Format Code (RNFC) 1 N F -

Identifies the format mode of a reference number per DOD 4100.39M, Volume 10, Chapter 4, Table 6, as follows:

Number is formatted in accordance with DOD 4100.39M, Volume 2, Chapter 2, paragraph 2.19 1

Format is unknown as to whether the number is restructured or "in-the-clear." 3

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

Number is formatted as originally configured/expressed on the originating document ("in-the-clear"). 4

087 Remarks 12 X L -

Explanatory type data which is considered essential to the provisioning process.

088 Remarks/Recommendations/Justification

a. Remarks 2000 X L -

Statement or explanation of a condition not readily identified in a given data element.

b. Recommendations 2000 X L -

Narrative recommendations for improving the support posture of the item based on logistic support analysis. A recommendation may be related to design changes, changes to the maintenance concept, etc.

c. Justification 4000 X L -

A narrative definition of major factors which (a) led to the decision that additional facilities, personnel, training, training material, support and test equipment, etc., are required, or that (b) provided the basis for establishing the maintenance concept or making a major program decision.

089 Repair Cycle Turnaround Time (TAT REP CYCLE) 12 N R -

Indicates the expected elasped time in whole days from receipt of a repairable item at the maintenance level capable of repair until the item is repaired and ready for reissue.

090 RESERVED

091 Rep or Sup PLISN

(See Provisioning List Item Sequence Number (PLISN) DED 079)

092 Replacement Task Distribution (REPL TASK DIST) 12 N R -

Indicates the actual percent of a replaceable item expected to be removed and installed by the specified maintenance level. The sum of the fields should equal 100 percent.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

093 Requirements (For)-

a. Support Facilities (SF) 1 A F -

Indicates whether a new or modified facility is required. If coded "Y," a Support System Facility Requirement, Data Sheet F will be prepared.

Required - Yes	Y
Not required - No	N

b. Support Equipment Grouping Identification Number (Sup Equip Grp Id No) 3 X F -

A BMO assigned number to facilitate the aggregation of reqirements for similar or identical support or test equipment types; e.g., 100 = voltmeters; 200 = wattmeters, etc.

c. Tool Requirement Code (TC) 1 A F -

Indicates when tools are required and whether tools are common or peculiar.

Both peculiar and common tools	B
Common tool	C
Not required	N
Peculiar tool	S

094 Revision Code (Rev Code) 1 A F -

Indicates, in alphabetical sequence, the revision status of the input data sheet

First change	A
Second change	B
etc.	etc.

095 Safety Hazard Level Code 1 N F -

In conjunction with a specific task code, identifies existing or potential conditions where personnel error, environment, design characteristics, procedural deficiencies, or subsystem or component failure or malfunction may cause personnel injury or system damage or loss. See SAMSO STD 79-1 for definitions of the three hazard level categories and their respective codes.

Catastrophic	1
Critical	2
Serious	3

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

096 Same as PLISN

(See Provisioning List Item Sequence Number, PLISN, DED 079).

097 Sequential Line Number (SLN) — 2 — N — R —

Identifies the sequence of steps required to satisfy each task.

098 Serial Number Effectivity — 20 — X — R —

A two-part sequence identifying the serial numbers of a specific group of items to which the data sheet applies. The entry is divided into effectivity "from" (10 digits) and effectivity "to" (10 digits). For single serial number effectivity, the serial number will be repeated to indicate a span of one. When the ending number is unknown, "SUB" (subsequent) will be entered in the serial number "to" data field. If the item being analyzed is not serialized, leave this data field blank.

099 Service Designator Code — 1 — A — F —

Identifies the military service or nonmilitary major governmental agency having jurisdiction over or executive management responsibility for the acquisition.

Army	A
Air Force	F
Navy	N
Marines	M
All military	X
FAA	B
Coast Guard (Treasury Dept)	C
NASA	S

100 Shelf Life Code (SL) — 1 — X — F —

Indicates whether an item is subject to deterioration or perishability. When that is so, indicates time limitations, measured from the date of manufacture, after which the item may not be suitable for issue. See DOD 4100.39M, Volume 10, Chapter 4, Table 50 for codes.

101 Significant Character Code (SCC) — 1 — X — F —

Indicates whether a long part number has been reversed in order to place the significant characters in the first 16 positions. An "X" indicates the part number has been reversed.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

102 Air Force Specialty Code (AFSC) 7 X L -

Describes the maintenance or operator skill required to accomplish the task. Codes are as specified in the applicable configuration item specification or as specifically approved by BMO. The codes are defined in the publications listed below:

OFFICER	AFR 36-1
AIRMAN	AFR 39-1

103 Skill Specialty Evaluation Code (SS Eval) 1 A F -

Denotes the adequacy of the identified Air Force Specialty Code (AFSC) with regard to the specific skills and knowledge required to accomplish the identified task. Use as a flag to indicate the requirement for additional training.

SS is adequate	A
SS needs modification (additional training)	M
New SS should be established	E

104 Source, Maintenance, and Recoverability Codes (SMR) 6 A R -

Uniform codes assigned to all support items early in the acquisition cycle to convey maintenance and supply instructions to the various logistic support levels and using commands. Codes are assigned based on the logistic support planned for the configuration item and its components. A data chain composed of three data elements, source code, maintenance category code and recoverability code in that order. (See TO 00-25-195 for codes.)

a Source Codes 2 A F -

Assigned to indicate the source of acquiring items for the maintenance of end items; i.e., procured and stocked, manufactured or assembled. Codes occupy first and second positions of the uniform format. (See TO 00-25-195.)

b. Maintenance Codes 2 A F -

Assigned to indicate the maintenance levels authorized to perform the required maintenance functions. Codes occupy the third and fourth positions of the uniform format. First space indicates the lowest level of maintenance authorized to remove, replace, and use the item. Second space indicates whether the item is to be repaired and identifies the lowest level

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

of maintenance with the capability to perform complete repair. (TO 00-25-195)

c. Recoverability Codes 2 A F -

Assigned to indicate the disposition action on unserviceable items. Codes occupy the fifth and sixth positions of the uniform format. Enter code in first space. The second space is reserved for procuring activity use. (TO 00-25-195)

105 Special Handling Code (SHC) 1 X F -

Reserved for Air Force Use.

106 Specification Range of Readouts 1000 X L -

Specifies the upper and lower limits or range of values that the support and test equipment readout(s) will be required to measure and/or indicate. Indicates the designed range(s) or specific value(s).

107 Specification Tolerance of Readouts 1000 X L -

Specifies the indicating and readability accuracy of the support and test equipment readout(s). Indicates the allowable deviation from the nominal, defined by the manufacturer or required by the procuring activity.

108 Specification Type of Readouts 1000 X L -

Specifies the type of readout(s) to be included in the support and test equipment; e.g., digital, dial, chart.

109 RESERVED

110 Support Equipment Grouping Identification Number

(See Requirements (For), DED 093)

111 Support and Test Equipment Characteristics 1000 X L -

A narrative definition of the performance characteristics and capabilities of the selected support and test equipment or training material. These characteristics are generally in the same terms as those used to define the functions of the selected items.

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

112 Support and Test Equipment Description and Function — 1000 X L -

A narrative definition of the performance, physical, installation, etc., parameters of the support and test equipment or training material necessary to support the task code identified. Includes all pertinent information concerning the type of measurements to be performed, parameters to be evaluated, accuracy, stability requirements of measurements, etc.

113 Task Characterization Code (Task Char) — 4 X F -

A four character code which characterizes the human factors engineering aspects of a given maintenance task.

a. First entry task criticality. Entries shall be a single letter indicative of the criticality of task performance to mission accomplishment.

(1) (Noncritical) – Tasks noncritical to the operation of the system or subsystem. Improper performance of the tasks may have some effect on a subsystem operation but will not jeopardize the overall performance, mission success or safety. — N

(2) (Semicritical) – Tasks critical for subsystem operation that may result in some system degradation if not correctly performed. Improper performance of the task would cause a degradation to operational effectiveness, but the mission can succeed by using alternate modes and no safety problems are created. — S

(3) (Critical) – Tasks that must be performed correctly because they are critical to system operation (e.g., if the task were not performed correctly the system may not work, the operational effectiveness would be degraded to an unacceptable level and/or a safety hazard may be induced). — C

b. Second entry - task newness. Entries shall be single digit indicative of task newness in accordance with the following definitions:

(1) Standard to the Air Force at the time weapon system development is initiated and requiring no new knowledge or skills to perform; — 1

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

(2) Tasks requiring no new skills but requiring familiarization with the location, use, and/or installation; 2

(3) Tasks involving standard equipment that has been reconfigured or repackaged, or applications that are new. Special knowledge of the particular subsystem or component, or use of the equipment may be required and there may be a requirement for the acquisition of new skills; 3

(4) Tasks involving new equipment for which new skills and/or knowledge are required or which involve abnormal conditions, unusual criteria or unique manipulative skills. 4

c. Third entry - skill demand. Entries shall be single letter indicative of task skill demands in accordance with the following definitions:

(1) Unskilled. The perceptual and motor demands can be met by all Air Force personnel, the requirements are within the capabilities of all personnel. A

(2) The perceptual ability required is the sensing of a nonprecision indication, distinguishing primary colors, a coarse texture, odor or no odor, taste or no taste, hot or cold, noise or no noise, movement or no movement. The perceptions are of a coarse, noncritical type which are readily learned. The physical dexterity is of nonprecision manipulations and can be readily learned. These acts consist of noncritical and coarse motions for adequate results. B

(3) The perceptual ability required is the accurate and/or coordinated sensing of one or more fixed or variable indications, such as quantity indications of an instrument, distinguishing relative positions of objects, shapes of objects, kinds of odor, kinds of taste, differences of weight, relative frequency, and rates of movement. The physical dexterity required is of a coordinated and/or precise type that must be learned and may require practice. These acts consist of accurate, coordinated, and timely motions to achieve the optimum results. C

(4) The perceptual ability required is a critical, precise, and/or coordinated sensing of one or more fixed or D

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

variable indications, such as distinguishing quality indications of an object; relative motion; degrees of comparison; simultaneous or time critical events; differences in pressure; amounts and kinds of odor; amounts and kinds of taste; shades and brillance of colors; volume of sound; and the frequency, rates, and direction of movement. The physical dexterity required is of a critical, exact, coordinated and/or variable type of activity that must be practiced to maintain the proficiency to achieve the necessary results. This can be learned by training and repetitive practice. These acts consist of precise, timely, coordinated and/or variable type of motions resulting in crucial responses.

d. Fourth entry - knowledge demand. Entries shall be a single digit indicative of task knowledge demands in accordance with the following definitions:

(1) Common knowledge – The knowledge demands can be met by all Air Force personnel. 1

(2) Associating – Associating, naming, or responding to a specific input. The person associates a response with a specific input only. The response may be vocal, subvocal, written or motor. Examples: naming objects, people, or events; "go" on green light. 2

(3) Chaining, verbal – Recalling of long verbal sequences which must be recalled in a specific sequence, and no other sequence and may require practice. Examples: memorizing numbers, verbatim learning of textual materials, stating rules or regulations. 3

(4) Chaining, motor – Chaining of individual inputs, actions, and outputs in a specific sequence, and no other sequence. These sequences involve nonverbal motor responses. They generally require some degree of hand-eye coordination and manipulative abilities and may require practice. Examples: starting a car; unlocking a door; shooting at a target; swinging a golf club; or any other performance involving use of legs, arms, hands, or other parts of the body. 4

(5) Discriminating – Making different responses to the different members of a particular class. Being able to distinguish among inputs, and respond differently to each 5

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

and may require practice. Examples: having to tell the differences among similar gauges on an instrument panel.

(6) Classifying – Responding in a single way to all members of a particular class of observable events. Seeing the essential similarity among a class of objects, people, or events which call for a single response (generalizing). Seeing the essential differences between those inputs which are members of a class and those which are not (discriminating) and requires practices. Examples: classifying aircraft as being tactical, fighter, etc.; classifying behavior conforming to military protocol as appropriate behavior; and classifying behavior which fails to conform as inappropriate. 6

(7) Rule using – Applying a rule to a given situation or condition by responding to a class of inputs with a class of actions. Relating two or more similar concepts in the particular manner of a rule. A rule states the relationship among concepts and requires practice. It is helpful to think of rules or principles as "if-then" statements. Examples: "If an object rolls, then it is round; if you can convert a statement into an 'if-then' statement, then it is a rule or principle." 7

(8) Problem solving – Solving a novel problem by combining previously learned rules to create a higher-order rule and requires practice. May involve generating new rules which receive trial-and-error use until the one which solves the problem is found. Example: finding a new way out of a building when the only exit you know is locked. 8

114 Task Code 9 X F -

Uniquely identifies each maintenance task for a particular item. Used to identify and relate associated analysis data to a specific requirement. A data chain made up of the following data elements:

a. Functional Task 1 A F -

Denotes one of a number of specific maintenance or support functions necessary to the maintenance of an item.

T Test

C Checkout

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

R = Remove
N = Install
E = Calibrate
A = Adjust
P = Protect
S = Service
B = Inspect
D = Repair
F = Clean
G = Alignment
J = Composite test
K = Purge
H = Handle
L = Overhaul
M = Store
Q = Assemble/disassemble
V = Transport
W = Brief/debrief
X = Maintenance preparation

b. Maintenance Frequency 1 A F -

Identifies scheduled or unscheduled task occurrence.

Scheduled (No hardness criticality)	S
Unscheduled (No hardness criticality	U
Scheduled (harness critical)	1
Unscheduled (hardness critical)	2

c. Indenture 1 N F -

Identifies the relative hierarchical indenture of the item within the subsystem indenture. Zero is reserved for the weapon system level. Indenture codes 1 through 7 will be used, starting with the subsystem level and progressing to the lowest reparable unit within the subsystem.

DED No.	Standard Data Element Title	Field Format				CODE
		Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

d. Effectivity 1 A F -

Identifies the geographical and/or weapon system configuration.

Operating Base	O
Vandenberg AFB, California (Peculiar)	V
Both VAFB and OB	B
Trainer	T
All Other	BLANK

NOTE: Additional effectivity codes will be supplied by BMO as required.

e. Maintenance Level (Area) 1 A F -

Identifies the physical location of the maintenance/operator activity.

Organizational Level

Cluster Maintenance Facility	A
Remote Surveillance Site	B
Horizontal Shelter Site	C
Resident OSE Enclosure	D
Protective Structure	E
Power Substation	F
Intersite	G

Intermediate Level

Airborne Launch Control Center	M
Missile Assembly Building	N
Operational Control Center	P
Operational Base	Q
Operational Base Test Site	R

Depot Level

Depot	Y

f. Installed Status Code 1 A F -

Identifies the operability impact on the weapon system.

System inoperative during equipment maintenance	A
System operative during equipment maintenance	B
Off equipment maintenance	Y

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

g. Task Unique Code 2 X F -

Characters used to differentiate and sequence tasks having common entries in columns 1 through 6 of the task code (use letters A through Z and numbers 0 through 9 as required).

h. Multiple Card Code 1 A F -

Used to identify multiple line entries for the same task (use letters A through Z as required).

115 Task Frequency 5 N R 2

The frequency of performance or occurrence of the task identified by the task code. Expressed as the number of annual occurrences based on the annual system operating requirements. For example, the frequency of monthly inspection would be recorded as Ø12.ØØ.

116 Task Description 40 X L -

A narrative description of the task to be performed; e.g., ("service strut" or, "replace brake assy.").

117 Team Code 1 A F -

Used to identify a composite group of maintenance personnel, prescribed by BMO, to perform organizational level maintenance.

Missile assembly team (MAT) Missile maintenance specialist/technician (AFSC-443X0)	E
Missile maintenance team (MMT) Missile maintenance specialist/technician (AFSC-443X0)	A
Missile handling team (MHT) Missile maintenance specialist/technician (AFSC-443X0)	B
Electromechanical team (EMT) Missile systems analyst specialist/technician (AFSC-316X0)	C
Facility maintenance team (FMT) Missile facilities specialist/technician (AFSC-445X0) Electric power line specialist/technician (AFSC-542X1) Electrician/electrical technician (AFSC-542X0)	D
Leak verification team (LVT) Bioenvironmental engineer (AFSC-9124) Missile maintenance specialist/technician (AFSC-443X0)	J
Physical security and communications team (PSCT) Missile control communications systems specialist/ technician (AFSC-362X3)	K

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Ground radio communications specialist/technician (AFSC-304X4)
Space communications systems equipment operator/ specialist-technician (AFSC-304X6)
Automatic tracking radar specialist/technician (AFSC-303X3)
Radio relay equipment specialist/technician (AFSC-304X0)
Cable splicing, installation and maintenance specialist/ supervisor (AFSC-361X1)
Electronic communications and cryptographic equipment systems specialist/technician (AFSC-306X0)
Cable and antenna systems installation/maintenance specialist-supervisor (AFSC-361X0)
Electronic computer systems specialist/technician (AFSC-305X4)

Technical engineering team (mechanical) (TET) F
Mechanical engineer (AFSC-2835)
Missile maintenance technician (AFSC-44370)
Missile facilities technician (AFSC-44570)

Technical engineering team (electronic) (TET) G
Electronic engineer (AFSC-2825)
Missile systems analyst technician (AFSC-31670)

Roads maintenance team (RMT) R
Construction equipment operator/technician (AFSC-551X1)
Pavements maintenance specialist/technician (AFSC-551X0)

SALT operations team (SOT) S
Construction equipment operator/technician (AFSC-551X1)

PLU team (PT) P
Trained operator of any AFSC (AFSC-XXXXX)

Security police team (SPT) T
Security specialist/supervisor (AFSC-811X0)

118 New Technical Data (NTD) I A F -

An indication of the requirement for technical data in order for the maintenance personnel to perform this task. Enter "Y" for yes – when technical data is required, or "N" for no – when technical data is not required.

119 RESERVED

120 RESERVED

121 RESERVED

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

122 RESERVED

123 Tool Requirement Code (TC) (see Requirements (For), DED 093).

124 Total Item Changes (TIC) 2 N R -

The total number of times an item is affected by a design change.

125 Total Quantity Recommended (Total Qty Rec) 6 N R -

The recommended quantity of the item required to support a specific number of applications for a specific period of time. The applications may be to weapon system, configuration item, component or combinations thereof which are contained in the applicable contract. The contractor or vendor will base his recommendation on the anticipated failure pattern utilizing defined usage parameters of the item and the known delivery schedule. Unless otherwise advised by the government, the support period will be for one year beginning with the scheduled delivery of the first configuration item(s). Support and test equipment, tools, or training material recommendations will be total quantity to support the system/equipment.

126 Training Characterization Code (Trng Char) 3 X F -

A three character code which characterizes the training requirements for a given AFSC skill level to perform a given task.

a. Practice Required – First Position.

No practice required - this entry should also be used for tasks classified as being unskilled and requiring only common knowledge.	0
Skill practice required.	1
Knowledge required.	2
Knowledge and skill practice required.	3

b. Knowledge Training Level – Second Position.

Nomenclature – recall nomenclature, simple facts or simple procedures.	A
Procedure – determine step-by-step procedures for sets of tasks or for accomplishing important decisions.	B

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Operating principles – explain why and when each task must be done. C

Complete theory – predict, identify, and resolve problems related to tasks. D

Knowledge training not required. N

c. Skill Training Level – Third Position.

Skill training is not required. 0

Extremely limited – accomplish task only by being told or shown how. 1

Partially proficient – accomplish most of the requirements of task but not to the desired speed or accuracy. 2

Competent – accomplish performance of task at minimum acceptable levels of speed and accuracy. 3

High proficient – accomplish performance of task at highest levels of speed and accuracy and be able to tell or show others how to do task. 4

127	Type, Model, Series, Designator	26	X	F	-

Reserved for Air Force use.

128	Type Item Code,	3	A	F	-

The field is divided into three subfields as follows:

a. Special Materiel Content Code

Acid (medical) V

Alcohol (medical/drugs) D

Antibiotic (medical/drug) A

Combustible and toxic substance S

Combustible liquid G

Corrosive liquid C

Drugs, other than A, D, N, and K requiring special handling/issue/storage L

Explosive item 2

Extremely flammable liquid Q

DED No.		Field Format				CODE
	Standard Data Element Title	Length	Type	Just	Decimal Place-Right	
	Definition					
	Data Item(s)	Explanation				

Flammable compressed gas	B
Flammable liquid	F
Flammable solids	Z
Hazardous substance	H
Magnetic material	M
Medical kits containing any combination of codes A, D, L, and N	K
Mercury (medical)	U
Poison	P
Precious metals	E
Narcotic	N
Nonflammable compressed gas	W
Nonmagnetic	Y
Nuclear hardness	I
Oxidizing material	J
Radioactive and magnetic material	X
Radioactive material	R
Toxic substance	T
Not Applicable	3

b. Provisioning List Category Code

Bulk item list	E
Government furnished	A
Interim released item	G
Interim support item	B
Long lead time items	C
Prorated	P
Recommended item	R
Tools and test equipment	D
Vendor item	F
Other	X

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

c. Special Maintenance Category Code

Factory repairable	B
Matched set	C
Non-repairable	A
Select at test	D

129 Unit Cost (see Cost, DED 017)

130 Unit of Measure Code (UM) 2 A F -

In conjunction with numerical values, completely identifies the quantity of an item measured, weighted, or priced. See DOD 4100.39M, Volume 10, Chapter 4, Table 79 for codes.

131 Unit Price 10 N R 2

The estimated price for one unit of measure of the line item.

132 RESERVED

133 Unscheduled Maintenance (Time)

(See Elapsed Time or Man-Hours, DED 022 or 055)

134 Update Code 1 A F -

Denotes status of a particular punch card or other data handling media.

Additional	Original card, or card added to data file.	A
Change	Change made to update card.	C
Deletion	Card deleted from data file.	D

135 Usable on Code 600 X L -

Provides a suitable coding for assemblies and parts to indicate specific usability by serial number, type, model, series, etc. The specific coding to be applied for each contract is in accordance with MIL-STD-1552, MIL-M-8910 and AFLCR 65-5, unless specific coding instructions are provided by the procuring activity.

136 Volume

(See Length, DED 048)

DED No.	Standard Data Element Title	Field Format: Length	Type	Just	Decimal Place-Right	CODE
	Definition					
	Data Item(s)	Explanation				

137 Weight — 6 — N — R — 1

The weight of the item in units, defined by the data element unit of measure code.

138 Width — 4 — N — R — 1

The width of the item in units, defined by the data element unit of measure code.

139 Maintenance Flow Block Number — 14 — X — L — -

Enter the block number from the maintenance flow diagram which identifies this task requirement.

140 Government Furnished Equipment/Contractor Furnished Equipment (GFE/CFE) — 1 — A — F — -

This data element is used to identify an item of equipment as government furnished equipment (GFE) or contractor furnished equipment (CFE), reference AFLCR/AFSCR 800-31. Where applicable, the following codes shall be used:

GFE	A
CFE	C

141 Work Unit Code (WUC) — 5 — X — F — -

Work unit codes will be assigned by the procuring agency. Where applicable, enter the appropriate WUC assigned to the item of equipment.

142 Method of Support (MOS) — 3 — N — F — -

Reserved for Air Force use.

143 Major Organizational Entity (MOE) Rule — 4 — X — L — -

The major organizational entity rule code will be entered during the provisioning conference and/or during the processing of the PTD by the Air Force cataloging technician

144 Scheduled Maintenance

(See Elapsed Time or Man-hours, DED 022 or 055).

50.4 Preparing timeline forms. (see figure B-13.) For equipment functions, timing diagrams (not illustrated) shall be used for personnel functions and timeline drawings shall be used to plot tasks. The "source" of each function (flow drawings, function numbers, titles, and/or LSAR data sheet D_1 and line numbers) shall be identified in the proper column. The elapsed time for maintenance functions shall be expressed in hours and decimal functions thereof with the smallest increment of time commensurate with the criticality. In entering these times, consideration shall be given to which tasks should or must be performed sequentially and which can, from a technical or physical standpoint, overlap or be performed in parallel.

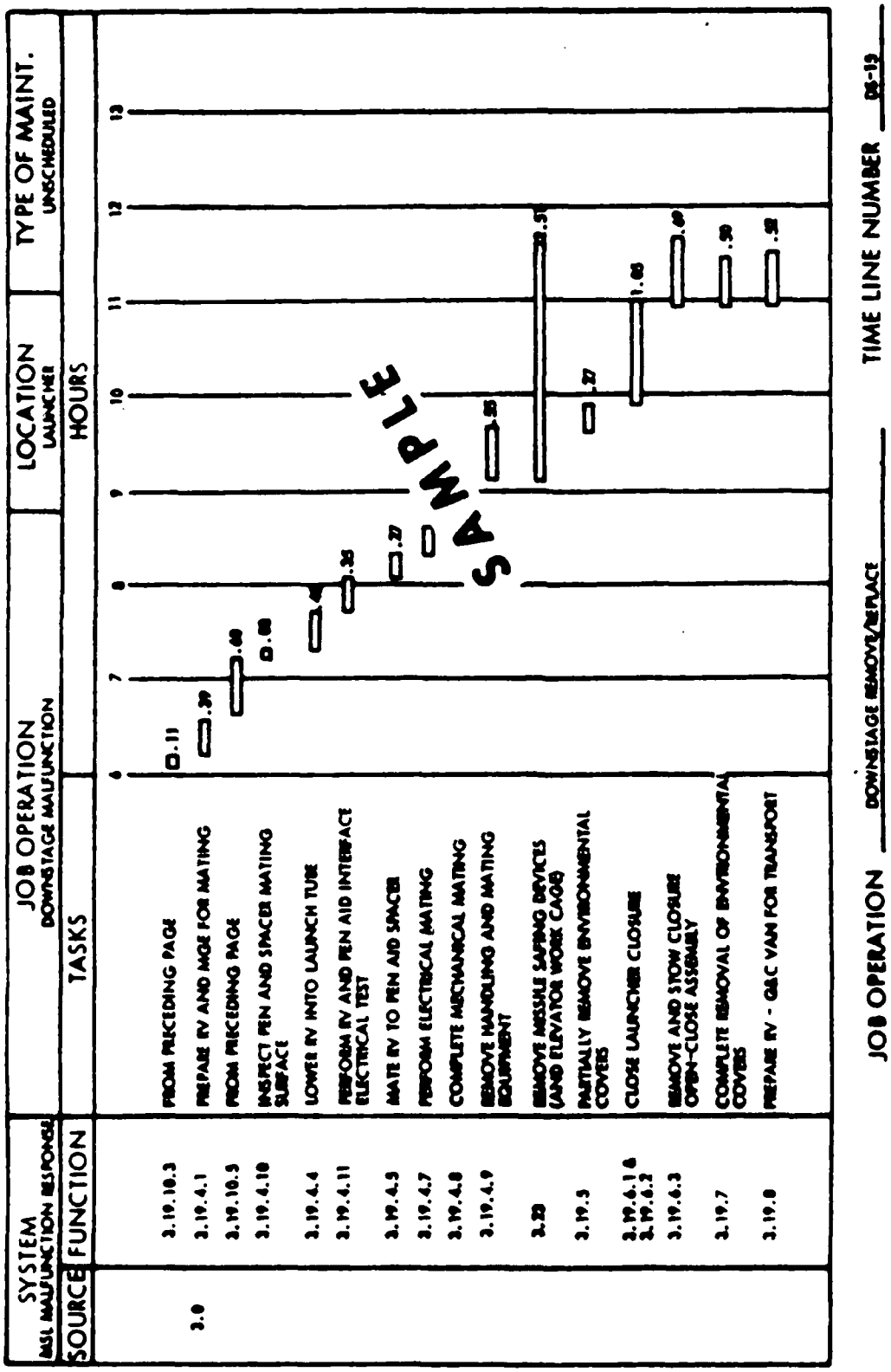


FIGURE B-13. Timeline Drawings

APPENDIX C

INSTRUCTIONS FOR PREPARATION OF TEST PLANNING ANALYSIS DOCUMENTATION

10. SCOPE

10.1 Purpose. This appendix establishes detail instructions for preparation of documentation required by the development and initial operational test planning analysis.

10.2 Application. Compliance with this appendix by contractors is mandatory.

20. REFERENCED DOCUMENTS

30. DEFINITIONS

30.1 Confirm. A qualitative test that requires comparison of test results to an applicable requirement(s).

30.2 Demonstrate. A qualitative test that does not require comparison of test results to an applicable requirement(s).

30.3 Determine. A quantitative test that does not require comparison of test results to an applicable requirement(s).

30.4 Evaluate. A quantitative test that requires comparison of test results to an applicable requirement(s).

30.5 Substantiate. A quantitative test that establishes that the composite performance of a specified configuration does not exceed a pre-determined level with a pre-determined level of confidence. This type of test is principally employed wherein the instrumentation accuracy is equivalent to or worse than that predicted for the test article in question. The pre-determinations of levels and confidence are based on the test technique and instrumentation capability as well as upon the predicted performance of the test article. Such predictions may be made via deduction based on the observed performance of other elements under test and on known history of performance elsewhere (factory test, preflight test, etc.). A typical example of this is flight testing of a G&C subsystem.

30.6 System level tests. Tests which involve two (2) or more weapon system "subsystems". (Two or more associate contractors' equipment.)

30.7 Validation. A process by which the contractor checks technical manuals for technical adequacy and accuracy against the equipment for which they are

written. Validation may be conducted at the contractor's facility or may be performed at test sites.

30.8 Verification. A process by which technical publications are tested and proved (by Air Force personnel under Air Force jurisdiction) to be clear, logical and adequate for operating and maintaining associated equipment and for certifying that selected technical publications are compatible with the pertinent hardware, software and support equipment.

40. GENERAL REQUIREMENTS

50. DETAILED REQUIREMENTS

50.1 Test compliance and allocation matrices documentation

50.1.1 General. The test compliance and allocation matrix (table C-I) will be used by SAMSO to document and track the specification requirements, interface control drawing (ICD) requirements, safety requirements, other requirements, and integrated test plan (ITP) test objectives which will be tested or analyzed at the system level.

50.1.2 Configuration and structure. The matrix will be compiled using the requirements paragraphs of the program documents such as: specifications, ICDs, safety documents, test and analysis tables, etc. The matrices will be constructed as follows:

a. Each paragraph is identified by number and document and is followed by a general code which defines the status of the requirement:

   1 - System test (performance requirements)

   2 - System test (design constraint requirements) (i.e., reliability, environments, etc.)

   3 - Title/Definition

   4 - Subsystem test (only)

   5 - No test required

   6 - Compliance confirmed by analysis

   7 - Subsystem and system test

   8 - System test and system analysis

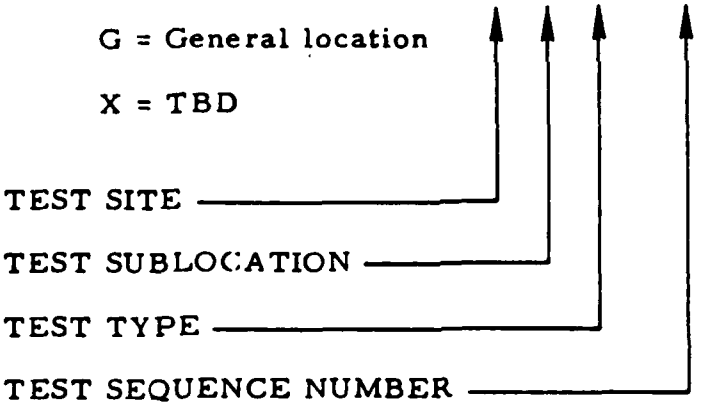
b. Each test will be coded as to test site location, type of test, and sequence number (see table C-II).

TABLE C-I. Test Compliance and Allocation Matrix

REQUIREMENT	TEST TABLE						
S-M-N-4[illegible]	Code No.	Test Code ___ Missile Ejection Tests	Test Code ___ DT&E Canister Launch Complex Refurb. Test	Test Code ___ Flt Test from Pad Mounted Canister	Test Code ___ Flights From MAP Launcher	Test Code ___ Flights From MAP Launcher	Analysis ___
3.2	2						
3.2.1	2						
3.2.1.1	6			DEM	CON	EVL	
3.2.1.2	6			DEM	CON	EVL	
3.2.1.3A	6			DEM	DEM	EVL	
3.2.1.3B	6			DEM	DEM	EVL	
3.2.1.3C	6			DEM	DEM	EVL	
3.2.1.3D	6			DEM	DEM	EVL	
3.2.1.3E	6			DEM	DEM	EVL	
3.2.1.3F1	6			DEM	DEM	EVL	
3.2.1.3F2	6			DEM	DEM	EVL	
3.2.1.3.1	2						
3.2.1.3.1.1	2						
3.2.1.3.1.2	6	EVL	EVL	CON	EVL	EVL	
3.2.1.3.1.3	6	CON	CON	CON	EVL	EVL	
3.2.1.3.1.4	6	DET	DET	DET	EVL	EVL	
3.2.1.3.1.5	2						
3.2.1.3.2	2						
3.2.1.3.2.1	6		DEM				
3.2.1.3.2.2	6		DET	DET	EVL	EVL	
3.2.1.3.2.3	6		DEM	DET	EVL	EVL	
3.2.1.3.2.4	2						
3.2.1.3.2.4.1	5						
3.2.1.3.2.4.2	5						
3.2.1.3.2.4.3	6		DEM	DET	EVL	EVL	
3.2.1.3.2.4.4	6			DET	EVL	EVL	
3.2.1.3.2.4.5	6		DEM	DET	EVL	EVL	
3.2.1.3.2.5	5						

TABLE C-II. MX Test Number System Code

Test Site	Test Sublocation	Test Type	Sequence No.
V = VAFB	M - MAB	G = System Ground	000-999
T = Texas	I = ITF	F = Flight	
A = Arizona	P = PAB	S = Special	
F = Factory	T = Trench/shelter	I = Integration	
etc.	L = Lab	D = Development	
	C = Pad/canister		
	A = AS&I	Sample Test Number	
	S = Stage mod. bldg.	V M G 001	
	G = General location		
	X = TBD		



Test, if repeated, bears same number with "A" suffix (first repeat test), "B" suffix (second repeat test), etc.

c. The code letter will be entered against a paragaph and test code if the requirement is to be tested in the test. The codes will be as follows:

ANL - Analysis
CON - Confirm
DEM - Demonstrate
DET - Determine
EVL - Evaluate
SUB - Substantiate
VAL - Validate
VER - Verify

50.2 Functional flow drawings

50.2.1 Test planning analysis (TPA) functional analysis flows. The functional flow diagrams generated as part of TPA shall be in accordance with the instructions in Appendix A, 50.2, as modified below.

50.2.2 Test sequence flows. Prepare flow diagrams to indicate pretest, test or post-test sequencing, these flows can be prepared as in figure C-1. Title blocks and other traceability data need not be included in this case. SAMSO will determine when test sequence flows are required.

50.3 Test planning analysis Form Bs

50.3.1 Functional analysis Form Bs. The functional analysis Form Bs which are generated as part of TPA shall be in accordance with Appendix A. The major subcategories of the functional analysis are as described in 5.3.1.7.1. Major test facility analysis will be based on consideration and satisfaction of each applicable requirement and design constraint listed in appendix V of MIL-STD-490. For noncomplex pieces of test support equipment/special test equipment (TSE/STE) or instrumentation a functional analysis need not be performed. New instrumentation which cannot be procured as commercial equipment is TSE/STE. For TPA, an abbreviated Form B may be used with SAMSO approval.

50.3.2 Test plan Form Bs. The test plan Form Bs (figure C-2) which are generated as part of TPA shall be in accordance with the instructions in Appendix A, 50.2, except as listed below:

a. Column A3 - area code. This colum is used as a dual purpose column for test. The area code as defined in Appendix A, 50.2.1.6, shall be entered and the heading codes for the performance requirements and test planning requirements shall be entered as follows:

A - Test objectives/requirements
B - Test constraints

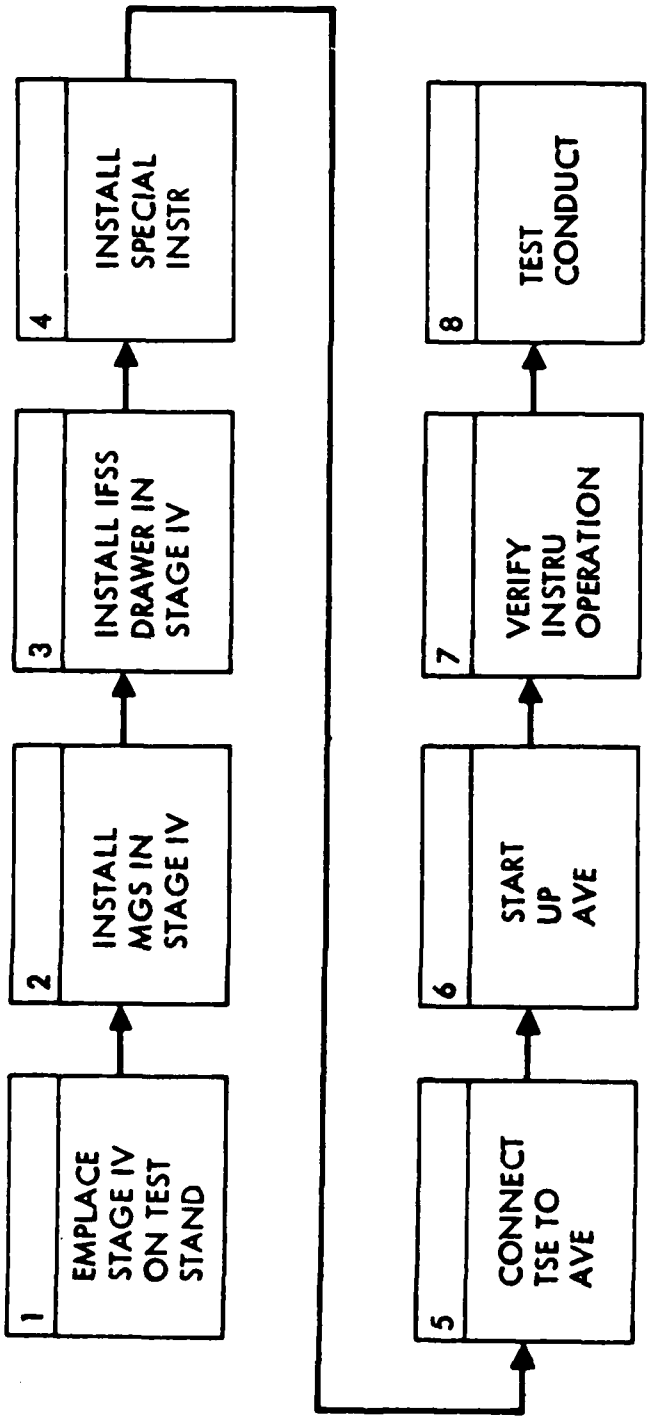


FIGURE C-1. Pretest Sequence Flow

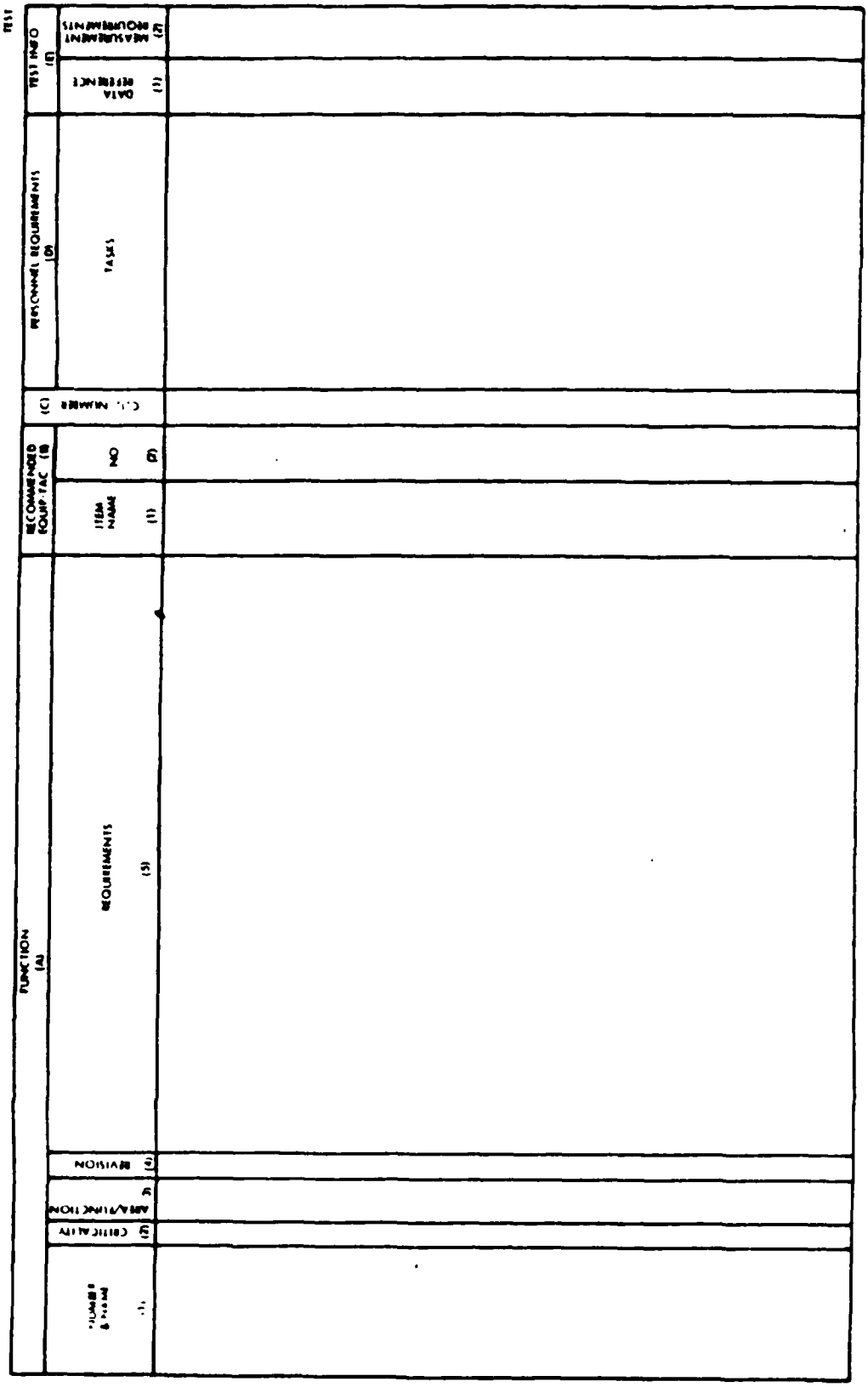


FIGURE C-2. Test Plan Form B

C - Pretest requirements

D - Performance/success criteria

E - Test configuration

F - Data acquisition and formatting requirement

G - Post-test requirements

These entries coincide with the entries in column A5.

b. Column A5 - requirements. Test evaluation requirements A through G shall be addressed in this column. When no data is to be recorded under one of the headings, enter "none" under that heading. An explanation of the data recorded under these headings is as follows:

(1) A - Test objectives. Test objectives are identical to, or an expansion of, the objectives specified in the SAMSO-generated system test directives, that are to be satisfied during the test.

(2) B - Test constraints. Any equipment, instrumentation, safety or other type of constraint which must be met during the test. If the sequence of testing is mandatory, it shall be defined as a test constraint.

(3) C - Pretest requirements. Any test analyses or functions which must be accomplished prior to test start.

(4) D - Performance/success criteria. The specific expected equipment/personnel functional performance and measurement results which are to be compared with test results to determine if the test articles operate within specification or predicted limits or adequate data has been gathered.

(5) E - Test configuration. The configuration of and interconnection of equipment, software, instrumentation, range support and facilities during the test. This section shall be supported by a drawing of the test configuration and gross equipment connectivity, as shown in figure C-3 when required.

(6) F - Data acquisition and formating requirements. The data required to support test analysis, and the methods and formats to be used to report the test.

(7) G - Post-test requirements. Such things as post-test activities, site reconfiguration or restoration requirements, hardware disposition, etc., are post-test requirements. A post-test functional flow may be prepared to support this section.

c. Column C - CI number. Enter the configuration item number or the identifier of the configuration item subsystem/system being tested.

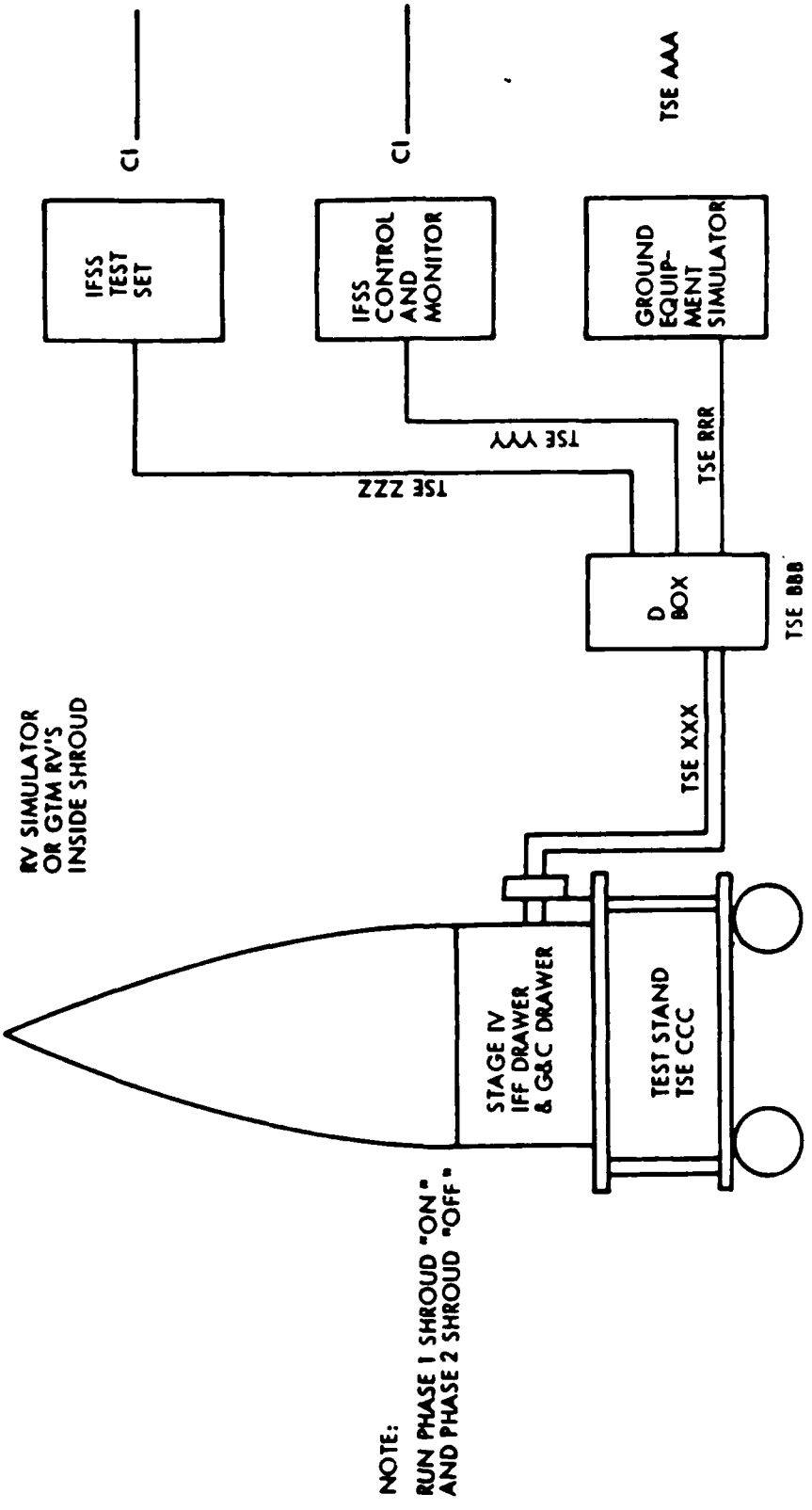


FIGURE C-3. Sample Test Setup Drawings

d. Column E - test information. The test information column E shall be filled out as follows:

(1) Column E1 - data reference. Source data and reference data relating to test objectives or tasks.

(2) Column E2 - measurement requirements. The measurement code(s) of measurements which are required to be taken.

50.3.3 Supporting forms

50.3.3.1 Measurement list form. This special form shall be prepared to define detailed measurement characteristics and associated instrumentation requirements for each measurement which is to be taken during a test. The format is shown in figure C-4. The data to be recorded in the various columns are as follows:

a. Measurement data columns. Enter the following data for each required measurement:

(1) Code column. Enter the code number for each measurement in this column. If a code number does not exist for the signal, assign temporary numbers sequentially. The TPA integrator will assign permanent numbers for each measurement.

The permanent measurement code number shall define each measurement uniquely by an alpha-numeric designation. The code shall consist of eight (8) characters, giving information regarding the type of measurement to be made, location where the measurement is made, the three (3) digit numerical sequence of that type of measurement and an alpha-numerical code to account for variations in making different types of measurements on the same signal. The following identifies the characters to be used in the coding:

(a) Measurement types

A - Acceleration
C - Command Data
D - Displacement
E - Electrical - Voltage, Power, Current, Phase, Frequency
F - Flow Rate - Volume, Velocity
H - Heat Transfer
L - Light - Illumination
M - Miscellaneous - Gas Content, Water Purity, Humidity, etc.
N - Acoustics - Acoustic Level, Acoustic Power
P - Pressure
R - Thermal Radiation
S - Status Data

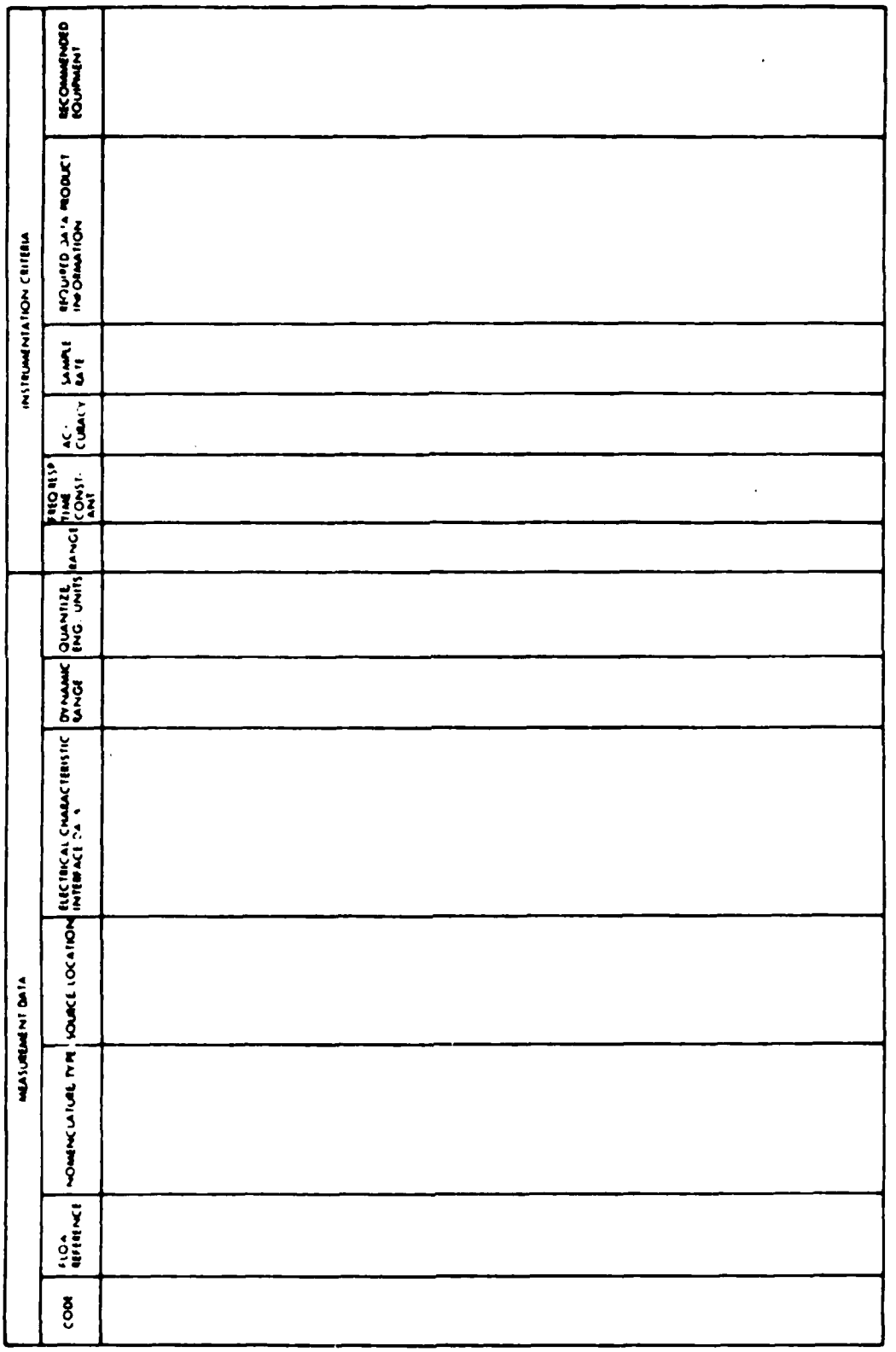


FIGURE C-4. Measurement List

T - Temperature
V - Vibration/Shock
W - Weight - Dynamic Load
X - Event
Z - Signal
*

(b) Locations

0 - Canister
1 - Stage I
2 - Stage II
3 - Stage III
4 - Stage IV
5 - RS
6 - Missile Launcher
7 - MLCC-Launch Control Center
8 - Range
*

(c) Subsystems or modes

A - Security System
B - G&C Condenser System
C - Cable System
D - Deployment Module
E - RS Shroud
G - G&C System
H - IFSS Support Equipment
I - IFSS Telemetry Subsystem
L - Life Support Subsystem
O - Flight Termination Ordnance Subsystem
P - Power Subsystem
R - Radio Subsystem
S - IFSS Flight Safety Subsystem
T - 494L Subsystem
V - R/V
*

(d) Variation of measurement

A - Amplitude
C - Current
D - Duration

* Others may be assigned by SAMSO during TPA development.

E - Energy
F - Frequency
I - Intensity
P - Power
R - Velocity/Rate
S - Spectral
V - Voltage
X - Phase
Y - Rise Time/Fall Time
Z - Volume
*

(e) A number shall be used after the variation of measurement alphabetical character to account for variation in accuracy-instrumentation used, etc. The variations shall be explained in the other columns of the measurement list.

An example of the measurement code is as follows:

E	3	G	002	V 1
Electrical Measurement	Stage III	G&C Subsystem	Sequence No.2	Voltage Measurement No. 1

(2) Flow function reference column. Enter the test planning analysis Form B paragraph which requires each measurement.

(3) Nomenclature/type column. Enter the name or type of each quantity being measured.

(4) Source/location column. Enter the mechanical location of each signal; i.e., connector ____, pin or station and azimuth, at which each measurement will be taken.

(5) Electrical characteristics/interface data column. Enter the electrical or other characteristics parameters of the quantity to be measured at the point where the instrumentation system will interface with the signal.

(6) Dynamic range column. Enter the full range over which the parameter being measured can be expected to vary.

(7) Quantization/engineering units. Enter the quantization and engineering units of the parameters to be presented to the instrumentation system.

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* Others may be assigned by SAMSO during TPA development.

b. Instrumentation criteria columns. Enter the following instrumentation data for each required measurement, when the columns apply:

(1) Range column. Enter the instrumentation range required for each measurement.

(2) Frequency response/time constant column. Enter the frequency response or time constant the instrumentation must have for each measurement.

(3) Accuracy column. Enter the accuracy with which the final data product should be reported for each measurement. The values indicated shall be the three sigma point expressed as a percent or tolerance of the specified full scale signal excursion (peak-to-peak or range span) for that channel. The combined errors shall include the root-sum-square of the random errors and the algebraic sum of the systematic tolerance.

(4) Sample rate column. Enter the number of measurements which are required per unit time.

(5) Required data product/information column. Enter the required data (information) and the specific formats which the data is to be presented in the test report(s), or provided for other purposes. This data need not be provided here if it is already provided in paragraph F of the test plan Form B, in which case the paragraph F should be referenced.

(6) Recommended equipment column. Enter the equipment recommended for recording each measurement; (i.e., oscillograph, oscilloscope, voltmeter, special TSE, telemetry receivers, etc.).

Any column on this measurement form may be used for remarks by entering "Note" or "Remark" followed by the required data.

50.3.3.2 Miscellaneous forms. This is a category of test planning data which is required to support the data recorded on other Form Bs. Such data may be documented in any convenient format which can be presented on 8½ x 11 inch or 11 x 17 inch paper. The format shall be coordinated with SAMSO and the TPA integrator. Typical data of this category are:

a. Test Configuration Schematics

b. Measurement/Recording Equipment Type Utilization Matrices

c. Test Measurement Matrices

d. Graphs

e. Charts

50.4 Hardware/software requirements documentation. In the process of developing the test planning analysis for a particular program or individual test(s), all required equipment and software are identified in the Forms B. The requirements must be allocated against (or satisfied by) existing hardware and software, or a new item must be defined against which to allocate the requirements. The requirements may, at times (if timely and cost effective) impose requirements against operational hardware and software. This implementation will occur through technical interchange with the operational SRA activities. If an item is to be used during operational testing, it will be incorporated into the operational SRA.

50.4.1 Configuration item specifications. If SAMSO directs that a configuration item specification should be developed for test related hardware or software end items, the specifications shall be prepared as defined in Appendix A, 50.5.1, of this document. The specifications shall be delivered as defined in the CDRL.

50.4.2 TSE/STE documentation. TSE/STE requirements shall be specified in MIL-STD-490, type B1, B2, B3 or B5 specification formats. Only the applicable paragraphs of section 3, for these formats, shall be used in the TPA. SAMSO will approve the format to be used for each TSE/STE item.

50.4.3 Instrumentation analysis. The instrumentation analysis for each test is part of the TPA and shall include all information required to define the detailed instrumentation requirements for each measurement. New instrumentation which cannot be procured as commercial equipment and which must be designed and fabricated is considered TSE/STE. This type of special instrumentation shall be analyzed and developed in the same manner as TSE/STE.

50.4.4 Facility documentation. The facilities analysis is part of the TPA and shall include all requirements for the new test facilities as defined in 5.3.1.7.1.1.

APPENDIX D

INSTRUCTIONS FOR PREPARATION OF ASSEMBLY, INSTALLATION AND CHECKOUT TECHNICAL ANALYSIS DOCUMENTATION

10. SCOPE

10.1 Purpose. This appendix establishes detailed instructions for preparation of documentation required by the assembly, installation and checkout analysis.

10.2 Application. Compliance with this appendix by contractors is mandatory.

20. REFERENCED DOCUMENTS

30. DEFINITIONS

40. GENERAL REQUIREMENTS

50. DETAILED REQUIREMENTS

50.1 Weapon system design impact on A&CO. The analysis shall review weapon system element design during the system requirements analysis (SRA) and preliminary design phases for potential impact on deployment. The results of this phase of the analysis shall be presented at design reviews and technical interchange (TI) meetings.

50.2 Maintenance of A&CO master flows. The A&CO master flow will be prepared by SAMSO and given to the contractor. The A&CO analysis shall iteratively test the master flows for necessary changes to reflect either changes to the weapon system or A&CO concepts. The master flows shall be in accordance with Appendix A, 50.1, format. The contractor's proposed changes shall have SAMSO concurrence prior to revision of the flows.

50.3 Detailed functional flows. The first level of analysis shall be recorded on detailed functional flows in accordance with Appendix A, 50.1, format. Detailed A&CO functions shall be derived by the analysis for each of the master flow areas. The detailed functions shall be used to structure the functional analysis. The detail flow diagramming of functions requires the engineering investigation and analysis of the prerequisites, sequential operations and output conditions for satisfaction of each function. The detailed functional flows shall be diagrammed to the level of detail necessary to permit definition of technical requirements which will satisfy the A&CO function. Technical requirements are developed in the conduct of the functional analysis.

50.4 A&CO functional analysis. The SAMSO approved detailed functional flows shall be the basis for a functional analysis. The functional analysis shall,

when applicable, identify the checkout requirements for each element of the weapon system and test bed TSE/STE by functions. The functional analysis shall be the basis for development of procedural documents and drawings to be used and complied with during the A&CO field effort.

50.4.1 Conduct of functional analysis. During the conduct of the functional analysis, each detailed function of the detailed flows shall be analyzed. The analysis shall define the technical requirements and success criteria to satisfy the function. In addition, the analysis shall include constraints and prior conditions which establish safety and sequencing considerations.

50.4.2 Requirements identification. The technical requirements and related success criteria are further analyzed to the detail necessary to define the following requirements:

a. Equipment

b. Facility

c. Assembly drawings

d. Procedures

e. Detailed tasks

f. Minimum mandatory sequencing

50.4.3 Instructions for functional analysis form. The functional analysis shall be recorded in an A&CO functional analysis form (figure D-1) in accordance with Appendix A, 50.2, except as modified by the following instructions:

a. Column A2 - This column is completed for each corresponding technical requirement to be entered in column A5. A "1" is entered for technical requirements deemed critical. This classification shall apply to the areas of A&CO which have direct effect upon the weapon system functional capabilities, weapon system safety, nuclear hardness and survivability, special demonstrations, or would add or delete the requirements for critical ACO item (reference 50.5). Critical classification requires SAMSO approval.

b. Column A3 - This column is a dual purpose column. It is used to define the physical area or facility in which the A&CO function is to be performed. Coded entries shall be in accordance with Appendix A, 50.2.1.6. It is also used to define the type of requirement entered in A5. Coded entries shall be as follows:

K - Performance requirements description

L - Constraints

M - Prior conditions

N - Technical requirement

O - Facility requirement

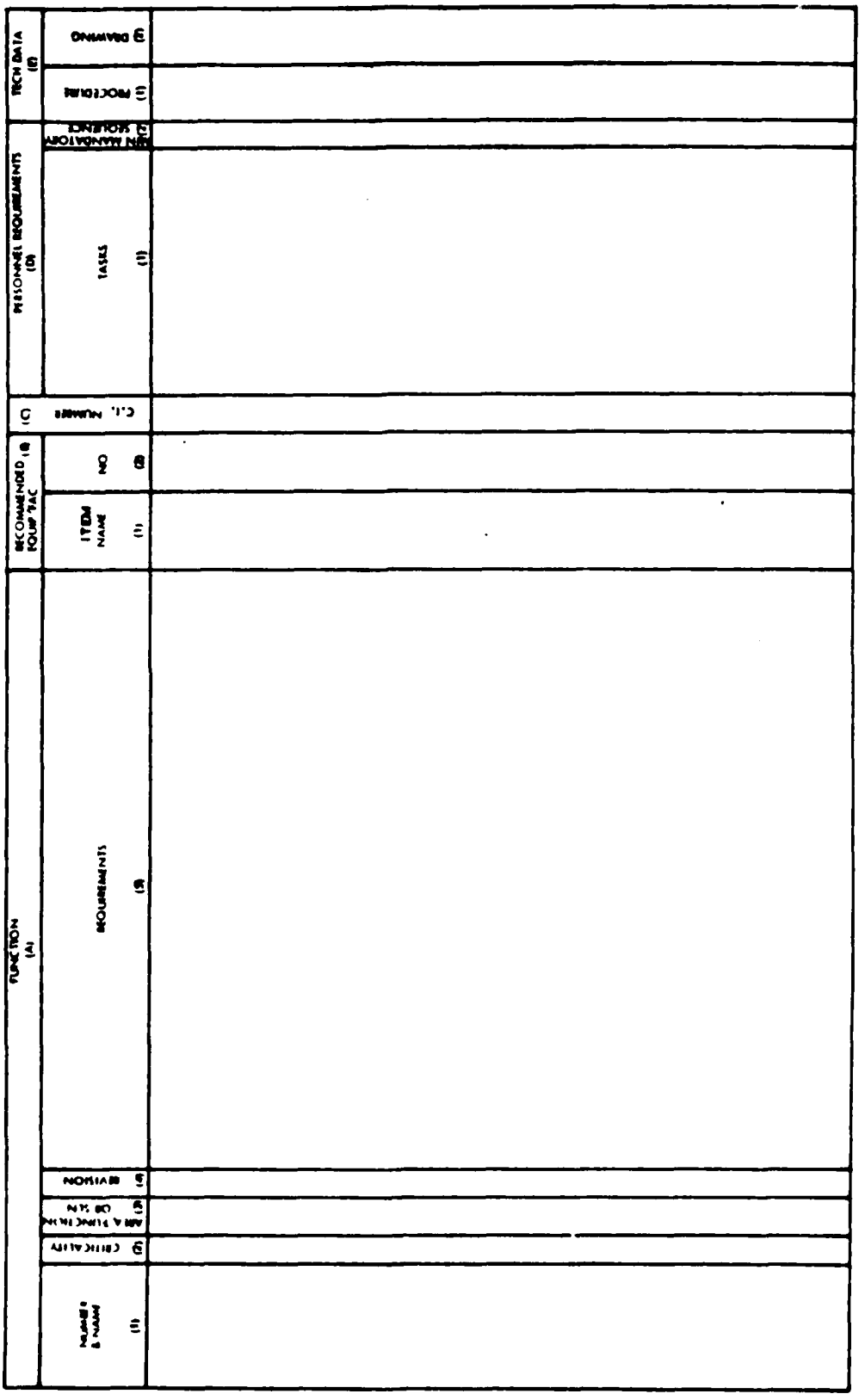

FIGURE D-1. A&CO Functional Analysis Form

c. Column A5 - The A&CO requirement entries to this column are made for the five categories of requirements identified and coded in column A3. The requirement shall be aligned with A3 code and include the following:

(1) Requirements decription. The requirements shall be stated. This statement shall be concise and comprehensive, yet general enough to cover each of the technical requirements. Success criteria shall be reserved for the technical requirements statements unless it is required to properly state the functional requirements.

(2) Constraints. The constraints applicable to technical requirements shall be stated. Constraints are listed only when necessary to impose restrictions on subsequent technical requirements within the function. They are unique to the technical requirements and applicable throughout the performance of the function. Constraints applicable throughout the entire A&CO program are not listed against individual functions. When no constraints apply, enter the word "none".

(3) Prior conditions. The prior conditions applicable to technical requirements shall be stated. Prior conditions list those minimum mandatory technical conditions or requirements which must be performed prior to the technical requirements. A prior condition which is applicable to only certain of the technical requirements is so noted. Generally, every given A&CO function will have a number of prior conditions which must be satisfied. Prior conditions applicable to safety, security and construction sequences are noted only when required for technical considerations. To preclude undue complexity, only those prior conditions immediately preceding the function under analysis will be written. When no prior conditions apply, enter the word "none." Each prior condition statement shall end with "reference function XXX" to identify the function that fulfills the requirement of the condition.

(4) Technical requirements. The technical requirements shall be stated and individually numbered. They shall reflect the design requirements, limitations, and operating characteristics which the function imposes. Each entry shall be a concise and comprehensive statement of the objective of the requirement. Each entry must be complete in itself and include, as applicable, the technical prerequisites, stimulus, response, and success criterion. Narration and tasks shall be excluded from each technical requirements.

(5) Facility requirements. Enter facility requirements (A&CO contractor unique). Entries shall identify facility requirements resulting from the function being analyzed. Entries shall be prepared to the same detail as the functional requirements on the A&CO functional analysis forms and shall define such things as

structural requirements; power requirements; controlled and natural environmental requirements such as noise levels, illumination, temperature, ventilation, etc., as they pertain to the function being analyzed. This analysis will be based on consideration and satisfaction of each applicable requirement and basic constraint listed in appendix V of MIL-STD-490.

d. Column B - Provide short form nomenclature and number for all items of ACO necessary to satisfy tasks recorded in column D. ACO numbers shall be assigned by SAMSO. Reference 50.5 for additional requirements for identification of ACO item.

e. Column C - Provide short form nomenclature and number for all items of aerospace vehicle equipment (AVE) and support equipment (SE) necessary to satisfy tasks recorded in column D.

f. Column D1 - Tasks which are to be used to satisfy the technical requirements shall be entered sequentially. Each task entry shall be a decimal derivative of its associated technical requirements. Each task shall be sufficiently ordered and detailed to provide visibility concerning the function, systems effects of the operation being performed, and guidelines and constraints for the preparation of procedures. Tasks involving hazardous conditions or requiring special safety precautions shall be noted. Tasks shall be correlated to technical requirements (column A5) and ACO entries (column B).

g. Column D2 - Enter the minimum mandatory sequence of the technical requirements only when technically required. When no mandatory sequence is applicable, the word "none" shall be entered.

h. Column E1 - Provide appropriate identification of the documents which contain the A&CO procedure or any supporting data required to properly perform the function. For functions identical to the operational system, the TO number, section, subsection, or identifying paragraph, as applicable, is entered.

i. Column E2 - Provide the number or other appropriate identification of drawings required to properly perform the A&CO function recorded in column A5.

50.5 ACO item specification

50.5.1 Identification of ACO items. Each item of ACO required to accomplish the functional requirements shall be identified and assigned an ACO number. The following priority shall be observed in identifying ACO items:

a. MSE/TSE items are to be used whenever the requirements to be satisfied are the same as those for maintenance of the operational weapon system. This equipment shall be identified by an ACO number identical to that of the configuration item (CI) number.

b. Where use of MSE CI items are not feasible, commercially available equipment, TSE developed under the TPA, or an identified Air Force standard item (AFSI) shall be specified whenever possible. This equipment shall be identified by ACO number.

c. In the event that a functional requirement(s) cannot be satisfied using equipment in the above categories, the requirements for unique ACO shall be identified. This equipment is classed as special ACO item and shall be identified by ACO number.

d. Special ACO item which is electronically/mechanically complex, requires long lead-time component procurement; is costly; or interfaces with two or more associate contractors will be defined by SAMSO as critical ACO item. A specification describing the design requirements for critical ACO shall be developed. Critical ACO item will be designed and developed in accordance with the approved ACO item specification.

50.5.2 Instructions for assembly and checkout equipment requirements form. ACO items identified in the functional analysis shall be described to the following detail and recorded on an assembly and checkout requirements form as shown in figure D-2.

a. Entry 1, ACO nomenclature. Enter the nomenclature/title of the equipment.

b. Entry 2, ACO number. Enter the ACO number of the item as assigned by SAMSO.

c. Entry 3, function correlation. Enter the function number(s) which this ACO item is required.

d. Entry 4, classification. Enter the classification of the ACO item as defined in 50.5.1 (MSE, commercial, special, or critical).

e. Entry 5, effectivity. Enter the effectivity as to the usage of the ACO item (wing, VAFB, etc.).

f. Entry 6, technical data. Enter the technical data (document number, TO, or drawing) which prescribes the use of the ACO item.

g. Entry 7, purpose and justification. Enter a brief description of purpose and justification for the ACO item.

h. Entry 8, technical requirements. Enter a list of the technical requirements, i.e., range, capacity, special interfaces, etc.

i. Entry 9, functional description. Provide a functional description of the ACO item including drawings, logic diagrams, schematic diagrams, etc., as applicable.

ACO NOMENCLATURE (1)	ACO NO. (2)
FUNCTION CORRELATION (3)	CLASSIFICATION (4)
EFFECTIVITY (5)	TECHNICAL DATA (6)
PURPOSE AND JUSTIFICATION (7)	
TECHNICAL REQUIREMENTS (8)	
FUNCTIONAL DESCRIPTION (9)	
MANUFACTURER AND MODEL (10)	

FIGURE D-2. A&CO Equipment Requirements Form

j. Entry 10, manufacturers and model. Enter the model number and manufacturer of the ACO item if item is off-the-shelf.

50.6 Checkout matrices. Checkout matrices shall be developed to assist in the scoping and planning of the A&CO field effort. Two matrices shall be developed as outlined in the following paragraphs.

50.6.1 Checkout matrix. The development of the A&CO matrix shall combine and logically group functions which can be integrated to form elements, subsystems, or systems level checkout phases to be conducted during the incremental buildup of the weapon system. The conduct of this analysis shall emphasize the demonstration of weapon system performance and minimize redundancy during checkout.

50.6.2 Checkout exclusion matrix. The development of the A&CO exclusion matrix shall consider the performance of weapon system elements, subsystems, or systems which will be partially verified or not verified at all by A&CO due to A&CO configurations, nondestructive test requirements, or results of the analysis. The matrix shall identify equipment which will be partially checked out or not checked out, the equipment functions which will be partly verified or not verified, and the rationale for exclusion from A&CO.

50.7 Operational deviations matrix. An operational deviations matrix shall be developed which defines the expected weapon system operational characteristics during the A&CO program. The analysis required to develop the matrix shall consider the various A&CO configurations (incomplete, simulated, etc.) and their effect upon operation of the weapon system during A&CO activity. In addition, the analysis shall consider the various operational configurations which are expected during buildup. The matrix shall depict the characteristics of operation (response to commands, status indicator lamps or printouts, etc.) for all expected configurations which deviate from operational weapon system instructions as specified in the TOs.

50.8 Predelivery maintenance matrix. The conduct of routine periodic maintenance is the responsibility of the A&CO contractor during A&CO for all weapon system facilities and equipments. The planning of this maintenance activity shall be based upon the predelivery maintenance matrix. An assessment shall be made for all facility/equipment which shall be within the A&CO contractor custody to determine all maintenance. The predelivery maintenance assessment shall be recorded on an A&CO predelivery maintenance form as shown in figure D-3 in accordance with the following instructions:

a. Column A1, number/facility. Enter the number of all equipment/facility under A&CO contractor custody during A&CO (include CI and ACO). Enter the term "FAC" for all facilities.

b. Column A2, nomenclature. Enter the nomenclature of the equipment/facility corresponding to the number in column A1. Include real property installed equipment (RPIE) if applicable.

(A) EQUIPMENT/FACILITY		(B) REQUIREMENTS			(C) EQUIPMENT	(D) TECH DATA
(1) NUMBER/ FACILITY	(2) NOMENCLATURE	(1) MAINT REQD	(2) LEVEL	(3) PERIOD		

FIGURE D-3. A&CO Predelivery Maintenance Form

c. Column B1, maintenance requirement. Enter an "X" corresponding to equipment/facility only if maintenance is required. If no maintenance is required, leave column blank.

d. Column B2, level. Enter the level of maintenance required (organizational, intermediate, depot, etc.).

e. Column B3, period. Enter the period which maintenance is required.

f. Column C, equipment. Enter the number of the ACO item required to perform the maintenance.

g. Column D, technical. Enter the procedure/drawing number of the technical data required to perform the maintenance.

50.9 A&CO/loading matrix. Loading studies shall be performed for ACO items required to perform the A&CO activities during deployment. The results of the studies shall be documented and used as source data for subsequent ACO buildup planning. Source data from the A&CO catalog and the A&CO sequential flows developed in this analysis shall be utilized during these studies. ACO loading studies shall determine the expected quantities and buildup rate for each ACO considering the following factors:

a. The ACO item required to perform each A&CO task.

b. The sequence of the A&CO functions.

c. The A&CO schedules and buildup rate.

50.10 A&CO sequential flows. A&CO sequential flows shall be developed as a part of this analysis. The flows shall portray the minimum mandatory sequencing of all A&CO activities. The purpose of the sequential flows is to graphically depict the minimum mandatory sequencing of all A&CO activities as a function of technical considerations only. Hence, the flows should portray which activities must precede other activities and which activities can be performed concurrently with others based upon known technical constraints. The sequential flows shall depict all of the technical functions in a logical series and parallel flow format. The flows shall orient the technical functions with consideration to the following:

a. Physical facility or area of A&CO activity.

b. Weapon system safety..

c. Equipment and technical data requirements for performing tasks to satisfy technical requirements.

d. Constraints and prerequisites defined in the functional analysis.