(1)

SYSTEM MANPRINT MANAGEMENT PLAN

(SMMP)

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The System MANPRINT Management Plan (SMMP), as used by the Army, is described and defined in this procedural guide. The intent is to provide the reader sufficient information to develop and execute a SMMP. The SMMP is the cornerstone document used by the materiel acquisition community to identify and address Manpower and Personnel Integration (MANRPINT) issues and concerns throughout the Materiel Acquisition Process (MAP).

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SYSTEM MANPRINT MANAGEMENT PLAN

(SMMP)

PROCEDURAL GUIDE

July 1986

The System MANPRINT Management Plan and Procedural Guide were developed by personnel of the Analysis Division, Manning Integration Directorate, of the United States Army Soldier Support Center, National Capital Region. Questions and comments concerning the SMMP or the Procedural Guide should be addressed to:

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THE SYSTEM MANPRINT MANAGEMENT PLAN (SMMP)

Section I

General

1-1. The System MANPRINT Management Plan (SMMP). The SMMP is the management device used by the proponent school/center to ensure that MANPRINT (Manpower and Personnel Integration) issues are identified and addressed as early as possible and throughout the materiel acquisition process (MAP) to effect the design and supportability, from a MANPRINT perspective, of the subject system. The SMMP is the cornerstone of the MANPRINT effort and is:

a. A dynamic document. Each section is updated as necessary as the acquisition process progresses and new information or data is available.

b. A planning/management guide. The SMMP is used by all activities involved in the MAP to ensure MANPRINT issues are addressed throughout the system's life cycle. The SMMP is a management plan and not a data source (e.g.; the SMMP does not contain the O&O Plan or the Target Audience Description for the subject system). The SMMP provides a systems management approach for identifying and addressing MANPRINT issues and concerns and those data bases and analyses that will potentially provide answers for these issues. The SMMP documents the data that is available or must be generated, how and when the data will be generated, and how it will be employed to address MANPRINT issues/concerns. It provides the proponent with documentation that it has collected and analyzed all available data and has established a plan/program to address MANPRINT concerns throughput the MAP.

c. An audit trail. The SMMP will document the data sources, analyses, trade-offs, and decisions made throughout the MAP. The plan serves as documentation of what was considered and why it was or was not employed. The SMMP provides a source for continuity to lessen the impact of personnel changes on the MANPRINT effort. New personnel can review the SMMP and determine why and what tasks/actions/analyses have/have not been scheduled and performed, what actions must be coordinated and scheduled, and who is involved in the effort.

d. A stand alone MANPRINT document. The SMMP serves as a single source for what data is needed, when it is required, who is responsible for generating the data, and the strategy for obtaining the data. It provides the MANPRINT Joint Working Group (MJWG) with a complete management plan which may be passed forward to a TRADOC System Manager (TSM), if one is designated.

1-2. SMMP contents. The SMMP contains the five sections listed below and any necessary annexes (see Appendix 1).

a. Section 1, Summary.

b. Section 2, Description.
   (1) Description of the proposed materiel system.
   (2) Acquisition strategy.
   (3) Agencies.
   (4) Guidance.
      (a) "A Priori" Decisions.
      (b) General DA and TRADOC Guidance.
      (c) Assumptions.

c. Section 3, MANPRINT Strategy.
   (1) Objectives.
      (a) Human Factors
      (b) Manpower
      (c) Personnel
      (d) Training
      (e) System Safety
      (f) Health Hazard

   (2) Data Sources/Availability.
      (a) Predecessor system.
      (b) Early availability of data/Risk analysis.
      (c) Planned level of MANPRINT analysis effort.

d. Section 4, Concerns.
      (a) Human Factors
      (b) Manpower
      (c) Personnel
      (d) Training
      (e) System Safety
      (f) Health Hazard

e. Section 5, Tabs.
   (1) Tab A, Data Sources.
   (2) Tab B, MANPRINT Milestone Schedule.
   (3) Tab C, Task Descriptions.
   (4) Tab D, Questions to be Resolved.
   (5) Tab E, Coordination.
   (6) Tab F, Audit Trail.

f. Annexes (as applicable).

Section II

Development (Planning) Phase

2-1. SMMP Initiation. A SMMP will be initiated for all materiel systems. TRADOC will initiate all SMMP's, regardless of the life cycle position of the subject system.

a. The focus of the SMMP will be determined by the LCSMM position of the subject system.

(1) For systems that are pre-Milestone I (pre-MS I), the SMMP will focus primarily on influencing the design of the system.

(2) For systems that are post-MS I, the SMMP will focus primarily on MPT supportability of the system.

b. The SMMP will be initiated by the proponent MANPRINT Joint Working Group (MJWG).

c. While a SMMP will be initiated for all materiel systems, not all materiel developments will require that a SMMP be maintained throughout the acquisition process. The MJWG will determine whether the subject system has sufficient MANPRINT impacts to require that a SMMP be maintained (e.g.; a new 9mm cartridge has minimal MANPRINT impacts and does not require that a SMMP be maintained throughout the MAP). If the MJWG determines not to maintain a SMMP, a SMMP will be initiated containing paragraphs 1-3, with paragraph 3 providing the rationale for not maintaining the SMMP.

d. SMMP's initiated prior to MS I will be incomplete and vague in some sections and, in some cases, will be void of information in certain areas. The primary focus of the SMMP will be to influence the design of the subject system. At this point in the MAP, the SMMP is used to identify, among other things, existing guidance that will effect development of the system, potential predecessor or reference equipment, data sources, areas of concern, and analyses that will/may be performed in the future. The earlier in the MAP the SMMP is initiated, the less complete it will be and, therefore, the lack of data should not be an area of concern. As the system develops, more data will become available and the SMMP will begin to fill out with data. The data contained in the initial SMMP will be of a general nature and will become more specific and refined as the system matures.

e. For systems that are post MS I, a SMMP will be initiated with the main focus of the MANPRINT effort towards MPT supportability of the subject system. The analyses and studies scheduled in the SMMP will focus on those MPT decisions that remain to be made and, for example, are found in the following:

(1) BOIP/QQPRI

(2) TOE and MOS decisions

(3) New Equipment Training

(4) Test and Evaluation Master Plan

SMMP's initiated post MS I, will contain more data than those initiated prior to MS I because of the advanced state of the system. The availability of prototypes for study will provide more data for identifying and answering MANPRINT issues.

2-2. SMMP Development. Ideally the SMMP is initiated prior to program initiation by the proponent MJWG when a deficiency requiring a materiel solution is identified. At this point in the acquisition process, the SMMP will be vague and, in some areas, blank (as the acquisition process progresses, the plan will become more specific and definitive). Initiation of the SMMP follows a logical progression.

a. List all potential data sources/analyses, regardless of availability at this point in time. Potential data sources fall into two categories:

(1) Current available guidance and policy. This type of data refers primarily to that which is found in guidance and current policy (e.g.; Army end-strength, force structure policy) and that which must be generated (e.g.; future soldiers demographics, current "quality" mix and policy).

(2) Predecessor/reference system(s) data. If a predecessor/reference system exists, this type of data includes that which should be readily available (e.g.; program documents, DT/OT results) and that which must be generated (e.g.; via Early Comparability Analysis (ECA) or the Hardware vs. Manpower (HARDMAN) Comparability Methodology).

b. Review the list of data sources and determine which are appropriate for the effort being initiated, which are readily available, and which must be generated (also determine the availability of resources to generate this data). As the program progresses, data sources may be added or eliminated depending on requirements and resources (e.g.; a HARDMAN analysis may have been scheduled when the SMMP was initiated, however, it may be discovered later the resources to fund the application are not available and the HARDMAN must be dropped). The data sources selected and the MANPRINT strategy employed will be based primarily on the availability of predecessor/reference data.

(1) The absence of a predecessor/reference system limits the data sources available early in the MAP. The data available early will be primarily limited to manpower, personnel, and training (MPT) constraints and guidelines. In this situation, the primary concern of the MJWG is to determine which analyses and data sources will be scheduled in the SMMP for generation in the future as the system develops. Data that will initially be available includes data based upon the CMFs/MOSs that will/may be used to operate and maintain the proposed equipment. For example:

(a) What are the DA level manpower, personnel, and training (MPT) constraints, if any?

(b) By MOS, what are the manpower constraints/guidelines? Is there any range of flexibility?

(c) By MOS, what are the personnel constraints/guidelines for:

(1) mental category distribution and mean

(2) aptitude distribution and mean

(3) PULHES

(4) education requirements

(5) security clearance

(6) females

(7) physical demands

(8) color/vision discrimination

(d) By MOS, what are the training constraints/guidelines (e.g.; class size, frequency, instructor-student ratio)?

With the limited availability of data, the MJWG will place emphasis on scheduling tests and analyses to be performed in later stages. These include:

(1) HARDMAN

(2) ECA

(3) Training Effectiveness Analysis (TEA)

(4) Safety Assessment Reports (SAR)

(5) Health Hazard Assessment Reports (HHAR)

(6) Human Factors Engineering Analysis (HFEA)

(7) Technical Test/Operational Test (TT/OT)

(8) Simulation

(2) The availability of a predecessor/reference system will provide the MJWG with immediately available data. This will allow the MJWG to apply a "lessons learned" approach to its early planning in the SMMP, to be supported by analyses and tests scheduled for the future to support these "lessons learned" decisions. The MJWG will again gather the data listed in paragraph 2-2.b.(1) and as much data as possible from the predecessor system. For example:

(a) Was an ECA and/or HARDMAN done? If not, they should be considered and, if resources are available and the proposed system meets the requirements for these analyses, scheduled. If yes, are the results available?

(b) Are the requirements/program documents available for review?

(c) What, if any, were the health hazard lessons learned?

(d) What, if any, were the safety lessons learned?

(e) What, if any, were the HFE lessons learned?

(f) Are sample data collection (SDC) and MOS survey data available?

(g) Are TT/OT test criteria and results available?

(h) Are ARTEP and SQT results available?

(i) Were any simulations done?

c. Look at the acquisition strategy (which may be extremely vague early in the MAP) and set priorities for when MANPRINT data must be available and when coordination to have the data available must be scheduled.

2-3. SMMP Organization. The data gathered above serves as the basis for the development of the initial SMMP by the MJWG.

a. Section 1, Summary. Describe the purpose of the SMMP being developed and the highlights of the initial strategy the MJWG will employ.

b. Section 2, Description.

(1) Description of the proposed materiel system. Briefly describe the proposed system (at this early point of the MAP, information may be limited regarding the physical composition of the proposed system). Include a description of the materiel deficiency being addressed and essential total system performance characteristics that have been established to include its interactions with other Army systems and organizations. (As the acquisition process progresses, physical characteristics of the system, particularly those which impact the MANPRINT effort, will be included here.)

(2) Acquisition strategy. Describe the anticipated acquisition approach. (Initially it may consist of several methods depending on whether the materiel deficiency may be solved by a product improvement, a non-developmental item, or a new development.)

(3) Agencies. Identify the lead agency. Identify all participating organizations and provide point-of-contact data for coordination of the SMMP.

(4) Guidance.

(a) "A Priori" decisions. Identify all, if any, decisions that have been made that will have an impact on the total system development (e.g.; The Army senior leadership has decreed that a system will have a one-person crew and if that is not feasible the program will be reexamined. This decision, therefore, has a major impact on the SMMP and the MANPRINT effort).

(b) General DA and TRADOC guidance. Identify all available guidance provided for MANPRINT issues. Early in the MAP this may be no more than current end-strength or recruiting guidance (e.g.; The Army leadership dictates that a new system will have a crew of no more than four personnel. This allows the proponent to research the feasibility of different size crews from 1 to 4).

(c) Assumptions. Identify all assumptions being made which are not directly reflected in "A Priori" decisions or in DA and TRADOC guidance (e.g.; The average soldier operating the present system is a mental category IIIB, therefore, the average soldier operating the future system will also be a mental category IIIB).

(1) Objectives. List all MANPRINT objectives to be achieved during the MAP. List these objectives by the specific domain which they impact. If there are no objectives for a domain, state that there are none.

(2) Data sources/availability.

(a) Predecessor system. Identify the system(s) and/or components which will be used as predecessor or reference equipment for the proposed system, if any exist.

(b) Early availability of data/Risk analysis. Describe the MANPRINT strategy to be used in the acquisition effort. Refine the list of data sources established during the earlier preliminary stages of the acquisition process to those which impact the specific system being proposed. Identify which data sources will be used (list these data sources in Tab A) and those that will not be employed and the rationale supporting these decisions. Based on the existence of predecessor equipment, describe the risk involved with the strategy to be employed. (If predecessor equipment exists, there will be data available early in the MAP with which to effect the design of the proposed system. In this situation, the risk involved for the MANPRINT decision-makers is low. If predecessor equipment does not exist, MANPRINT decisions will have to be delayed until data can be generated later in the acquisition process. The risk involved with this MANPRINT strategy is high because the later in the MAP MANPRINT decisions are made, the more costly they are and the less the impact is.)

(c) Planned level of MANPRINT analysis effort. Identify when analyses will be conducted based on resources and the need for the data to be available. If predecessor equipment exists, the level of effort will be high early in the acquisition process. If predecessor equipment does not exist, the initial level of effort will be low and will increase later in the MAP as analyses are performed and data becomes available.

(d) If the SMMP will not be maintained throughout the life cycle of the subject system, document the rationale for this decision here and do not complete the remaining sections.

d. Section 4, Concerns. Identify any issues/areas of concern by domain that should be addressed during the MAP. As these concerns are addressed, the concern is removed from this section and listed in an additional annex. Also listed with the concern will be the data source that was used to address the concern.

e. Section 5, Tabs.

(1) Tab A, Data sources. Identify all potential data sources that will/may be employed throughout the entire life cycle of the proposed system, the MANPRINT area(s) impacted and the priority placed on each.

(2) Tab B, MANPRINT Milestone schedule. Provide a realistic milestone schedule which shows specific MANPRINT program tasks and events. Using the proposed acquisition strategy as a basis, develop a milestone schedule identifying what and when data will be required, when initial coordination for the generation of data must be effected, and key events that must be accomplished (including the proposed beginning and completion dates). (As the acquisition process progresses and the acquisition strategy is refined, the MANPRINT milestone schedule will be refined simultaneously.)

(3) Tab C, Task descriptions. Based on Tab's A and B, describe each task to be performed, to include: the rationale for conducting the task, what resources will be required to perform it, beginning and completion dates, lead and supporting agencies, what tasks must be completed prior to initiating the task, and what tasks this task will feed.

(4) Tab D, Questions to be resolved. Identify any questions that will have an impact on the MANPRINT effort that must be answered. These questions are more specific and detailed that the broad areas of concern identified in section 4.

(5) Tab E, Coordination. Identify all organizations that the SMMP must be coordinated with.

(6) Tab F, Audit Trail. This Tab will document all decisions made during the entire life of the system. The events in this section will be documented in chronological order as they occur. This Tab will be a historical record of the system's life.

2-4. Approval authority. The proponent school/center is the approving authority for the SMMP. The SMMP will be coordinated with all internal directorates and external agencies and organizations that are involved with the MANPRINT effort. Provide a copy to HQ TRADOC (ATCD-H), SSC-NCR (ATNC-NMM), and ODCSPER (DAPE-PSR) for information and comments.

Section III

Execution Phase

3-1. Execution.

a. Beginning with Program Initiation, subsequent phases of the acquisition process involve the actual execution of the SMMP. Planning for the MANPRINT effort does not stop at Program Initiation, but the bulk of the planning effort should have been accomplished prior to Program Initiation. As the acquisition process progresses, the SMMP will be updated to reflect new data and issues as they are generated. These updates will be included in the SMMP in several places. Section 1, Summary, will be updated to reflect the highlights of the MANPRINT effort up to the update. Tabs A, C, and D are updated to reflect the completion of tasks and analyses.

b. As issues and concerns are resolved or identified, they are listed in the appropriate sections of the SMMP. Resolved issues are listed in an additional tab containing the issue, the analysis or data source used to resolve the issue, and the data base where the data is contained.

c. As the MANPRINT effort progresses after program initiation, the SMMP documents the coordination, conduct or non-conduct of analyses and data generation, and the results of these actions. If an analysis is delayed because of lack of resources when scheduled in the SMMP, the analysis is rescheduled, if possible, and the rationale for the delay provided in the SMMP. (e.g., A HARDMAN was originally scheduled in the SMMP for initiation during the Concept Exploration phase, however, the resources were not available at the scheduled start time. The SMMP would be updated to reflect the rationale for the change from the original plan and when the analysis will be rescheduled for or why it will not be rescheduled.) The recording of the actions executed, as well as the actions that are rescheduled or deleted and the rationale for these deviations from the original plan, form the basis of the audit trail for the MANPRINT effort.

Appendix 1

System MANPRINT Management Plan (SMMP) Format

System MANPRINT Management Plan
for _____.

1. SUMMARY. Provide an overview of the MANPRINT strategy to be employed and the highlights of the SMMP. This will assist high level decision makers in their review of the SMMP.

2. DESCRIPTION.

a. Description of the proposed materiel system. Provide an overview including, but not limited to, the materiel deficiency being addressed, missions, operational environments, design versions or alternatives, and essential total system (Man in the Loop) performance characteristics.

b. Acquisition Strategy. Briefly discuss the Life Cycle System Management Model (LCSMM) strategy to be employed.

c. Agencies. List the lead agency and all agencies expected to be involved in supporting the system acquisition (other proponents, materiel developers, TSMs, etc...).

d. Guidance.

(1) "A Priori" Decisions. List all decisions which have been made that will have a direct impact on the design and/ or MANPRINT issues. (e.g.; The Secretary of the Army has decided system "X" will have a one-man crew.)

(2) General DA and TRADOC Guidance. List all available guidance provided for MANPRINT issues. (e.g., An MOS which is currently a shortage MOS may be planned for employment on a proposed system because DA has plans to increase the recruiting mission for the MOS.)

(3) Assumptions. Identify all assumptions being made which are not directly reflected in "A Priori" decisions or in DA and TRADOC guidance (e.g.; The average soldier operating the present system is a mental category IIIB, therefore, the average soldier operating the future system will also be a mental category IIIB).

3. MANPRINT STRATEGY.

a. Objectives. List the MANPRINT goals by domain to be achieved during the acquisition process. (e.g.; No plus-ups in the quality of new personnel to support the system.)

b. Data Sources/Availability.

(1) Predecessor System. Determine the predecessor/ reference systems and components, if any exist. Consider predecessors for each component of the materiel system, training devices, and repair and support equipment.

(2) Early Availability of Data/Risk Analysis. Discuss the types and importance of data to include when it is to be available for inclusion in analyses. Determine its impact on the MANPRINT strategy to be employed and the associated level of risk incurred. Provide the rationale and background employed in deciding how to address MANPRINT issues throughout the acquisition life cycle. (e.g.; If only a small amount of necessary data is available early, prior to MS I, address the risk incurred in having to delay MANPRINT decisions and how the shortfall will be made up later. The impact on resources should also be addressed in addition to the risk which the decision makers must face.)

(3) Planned Level of MANPRINT Analysis Effort. Identify what and when analyses are to be conducted based on the availability of data and resources. Include how they will affect the risk incurred by the MANPRINT strategy employed.

NOTE

If the MJWG determines there is no need to maintain the SMMP throughout the life cycle of the subject system, the rationale for this decision is documented here and the remaining sections are not completed.

4. CONCERNS. Discuss any issues/areas by domain of concern that have arisen. These are issues to watch during the system's development and should cause the SMMP to be updated as answers are obtained. (e.g.; System "X" has an accelerated acquisition strategy (MS I and MS II combined) and there is concern regarding time to establish test issues, time to conduct the test and analyze the data.)

5. TABS.

TAB A. Data Sources. List all potential data sources, the MANPRINT area(s) (Manpower, Personnel, Training, Human Factors, System Safety, and Health Hazard) addressed, and the data item's relative importance to the system's development. This will form the cornerstone for all analyses and planning.

TAB B. MANPRINT Milestone Schedule. Using a "Gantt Chart" style (a method of data display in the Program Evaluation Review Technique, PERT), display all significant MANPRINT tasks to be accomplished from Research Exploratory Development through First Unit Equipped. (Use of automation of this tab is highly encouraged. The Combat Developer's Studies and Analysis group should be able to assist.)

TAB C. Task Descriptions. For each task to be performed, list the following information (necessary for TAB B preparation):

Task Description (narrative)
Rationale (why is it necessary)
Resources (personnel & dollars)
Time to Complete (optimistic, normal, pessimistic)
Responsible Agency (lead agency)
Support Agencies
Dependencies (Tasks which must be completed prior to starting this one)
Feeds (Tasks which cannot start until this one has been completed)

TAB D. Questions to be Resolved. List any questions whose answers will influence the MANPRINT decisions/tradeoffs to be made. These are very detailed and specific in nature as opposed to the broad areas of concern contained in the basic document.

TAB E. Coordination. List all commands, agencies, and activities with whom the SMMP must be coordinated.

TAB F. Audit Trail. This Tab will document all decisions made during the entire life of the system. The events in this section will be documented in chronological order as they occur. This Tab will be a historical record of the system's life.

Appendix 2

Sample System MANPRINT Management Plan (SMMP)

1. This appendix contains two sample SMMPs for use in developing SMMPs. It is important to remember that each SMMP will be unique and will contain varying degrees of information based on the maturity of the subject system. The following examples are not to be considered as boilerplates but rather as examples of the format to be used and the types of data that could be placed in the SMMP. The SMMP is a flexible document and can be modified to fit the needs of the subject system. The key to the SMMP is to produce a document that can be used to manage the MANPRINT effort and to ensure that "soldier" issues and concerns are addressed throughout the MAP.

2. The sample SMMP beginning on page 17 illustrates the possible appearance of an SMMP developed early in the MAP. When developing early SMMPs, do not be concerned about ensuring that all the data shown in the sample is placed in your SMMP. As the subject system matures, so will the SMMP.

3. The sample SMMP beginning on page 35 is an update of the first sample SMMP. It shows how the SMMP will be updated as the system matures.

The System MANPRINT Management Plan
For the Advanced Field Artillery System (AFAS)

1. SUMMARY.

a. The AFAS will be the next generation self-propelled howitzer system replacing the M109 series.

b. The initial MANPRINT strategy will be based on the predecessor system and technology demonstration.

c. The key MANPRINT issues are:

1. The ability of the target audience to perform to standard.

2. The ability of the current target audience to maintain the system.

3. The ability to conduct sustained operations with a smaller crew.

2. DESCRIPTION.

a. The AFAS will be a lightweight, self-propelled, indirect fire weapon system capable of meeting the fire support needs of the close combat force, battle task force, and land battle force under the Army 21 concept.

b. The Army needs a new generation of indirect fire weapon systems that can meet all of the 1980 Fire Support Mission Area Analysis (FSMAA) and Army 21 requirements and use of emerging technology to leap ahead of the qualitatively improving threat. The Army must capitalize on quantum technological advances for fielding small, self-sufficient firing units.

c. The AFAS should meet the following performance characteristics:

1. Self-sustainability for 3 to 5 days.

2. Mobility and operations consistent with maneuver units.

3. An increased rate of fire over the M109 A2/A3 (burst rate in excess of 4 rounds, every 15 seconds, a cyclic rate of 4-6 rounds per minute, and be capable of achieving a 3 rounds simultaneous effect on target).

4. An increased range (> 50 Km).

5. Ability to fire on the move.

6. Small and lightweight relative to the M109 A2/A3 (airliftable).

7. On board navigation capability.

d. The anticipated acquisition approach for this system will be the accelerated acquisition process. This process will require a 4 year developmental process. Pre-planned product improvements will be used for later developing technologies.

e. Until Milestone I, the Field Artillery School will be the lead agency for both MANPRINT and the Acquisition Process. After Milestone I, the Program Manager will have the lead. Other agencies participating in this acquisition will include:

TRADOC

Field Artillery School-Lead until Milestone I
-TSM Cannon
Ordnance School and Center
Signal School
Integrating Centers
-SSC-NCR
-LOGC
-CAC

AMC

LABCOM
-Human Engineering Lab
Commodity Commands
-AMCCOM
-CECOM
-TACOM
-TECOM
PM CAWS-Lead after Milestone I
PM TRADE

Other

Office of the Surgeon General
Safety Center
DCSPER
DCSOPS
Army Research Institute
Operational Test and Evaluation Agency

f. The following guidance comes from the Vice Chief of Staff of the Army's HIP Program Decision Memorandum from 1 November 1984:

1. Improve operational availability.

2. Use predictive failure technologies.

3. Increase range, rate of fire, and ammunition lethality.

4. Improve battlefield mobility and survivability.

5. Consider applicability of a system common chassis.

6. Allow for pre-planned product improvement.

g. The following assumptions have been made:

1. No increase in manpower requirements.

2. Quality of target audience will not change.

3. Skill creep should be kept to a minimum.

4. There will be no increase in training resources or time.

5. No new MOS's will be required to operate or support this system.

3. MANPRINT STRATEGY.

a. Objectives

1. General

a) Avoid repeating the MANPRINT shortcomings of the current M109 system.

b) Ensure that mature subsystem technology is used in the design of the system.

2. Human Factors.

Develop workspace layout that facilitates individual and crew performance for 5th to 95th percentile male.

3. Manpower

a) Live within the manpower footprint of the current howitzer system.

b) Assure that capable and supportable organizational units are created.

4. Personnel

a) Eliminate or simplify all high driver tasks identified by analyses or test and evaluation.

b) Crew performance of all critical tasks with 95% reliability by not less than 90% of the target population.

c) Ensure equitable distribution of crew workload during periods of peakloading.

5. Training

a) Train all critical tasks in the institution.

b) Unit training tasks will not be increased.

c) Initiate technology actions which directly support the training of the soldier.

6. System Safety

a) Eliminate System Safety risks that degrade performance.

b) Use lessons learned from the predecessor system to correct System Safety faults.

7. Health Hazard

a) Eliminate Health Hazard risks that degrade system performance.

b) Use lessons learned from the predecessor system to eliminate Health Hazard risks.

b. Data Sources/Availability.

1. Predecessor System. The M109 A2/A3 and HIP will be predecessor system to establish a baseline.

2. Early Availability of data/risk analysis.

a) Manpower, personnel, and training constraints can be identified.

b) Associated performance issues can be identified.

c) Lessons learned in the area of system safety, health hazards and human factors on the predecessor will be identified.

d) Greater emphasis will be placed on analyses, simulations and testing to generate data on soldier functions, tasks, and performance with new technologies.

e) The key to the MANPRINT effort will be to schedule the necessary analyses, simulations, and test early to generate data.

f) Include answers to MANPRINT concerns and questions in technology demonstrations.

3. Planned level of MANPRINT analysis effort.

a) In Pre-Milestone I/II, MANPRINT actions include the development of information to support acquisition decisions. MANPRINT actions that should be taken at this time include:

-Formulation of the MANPRINT Joint Working Group.

-Development of the AFAS System Manprint Management Plan.

-Development and refinement of MANPRINT issues/questions.

-Initiation of research actions required to develop answers to MANPRINT questions.

-Inclusion of MANPRINT goals, objectives, constraints, issues, and questions in the RFP.

-Incorporation of MANPRINT in the TEMP and other program documents.

-Documentation of all the MANPRINT lessons learned during the acquisition process.

-Briefing the status of MANPRINT at the ASARC/DSARC.

b) After Milestone I/II, MANPRINT actions include the development of information and prototypes to support the acquisition decision. These MANPRINT actions include:

-Realigning MANPRINT actions from ASARC feedback.

-Defining MANPRINT testing issues in the TEMP.

-Continuation of the audit trail as solutions to issues are derived or additional question/issues are developed.

-Reviewing prototype designs to assure the adherence to MANPRINT constraints and document results.

-Participating in the development and operational testing of MANPRINT issues and document the results.

c) In the production and deployment phase, the following MANPRINT actions should occur:

-Ensuring all MANPRINT issues are resolved prior to production.

-Ensuring MANPRINT issues are resolved prior to production.

4. CONCERNS.

a. Sustained operations in an NBC environment

b. Soldier Hazards: Projectile Propulsion System

c. Section Chief Responsibilities in a Dispersed Battlefield

d. System Performance with the Current Soldier

e. Unit Operational Capability

f. Maintenance Troubleshooting: Requirements of the Maintainer

g. Be able to operate within the Manpower Footprint

h. Sustained operations of a 3 to 4 man crew

TAB A

Data Sources

1. The following data on the predecessor systems will be reviewed:

DATA SOURCES	RATIONALE
HARDMAN	MPT Data/supportability
O&O Plan	Concept/System Criteria
LOA	Concept/System Criteria
ICTP	Training Concept
TEMP/TR	Critical MANPRINT issues
IEP/IER	Critical MANPRINT issues
ARTEP	Performance data
SQT	Performance data
HFEA	Critical HFE, HH and SS Problems
AR 611-201	Target Audience Information
ARPRINT	Training Information
DOES	Performance Issues
Mishap Data Base	System Safety lessons learned
Safety Expertise in AMC, TRADOC, & Contractor	System Safety lessons learned
AMEDD Consultants *OTSG *AEHA *AHS *MRDC	Health Hazard lessons learned
HHARs	Health Hazard lessons learned
ECA	MPT Data/Constraints

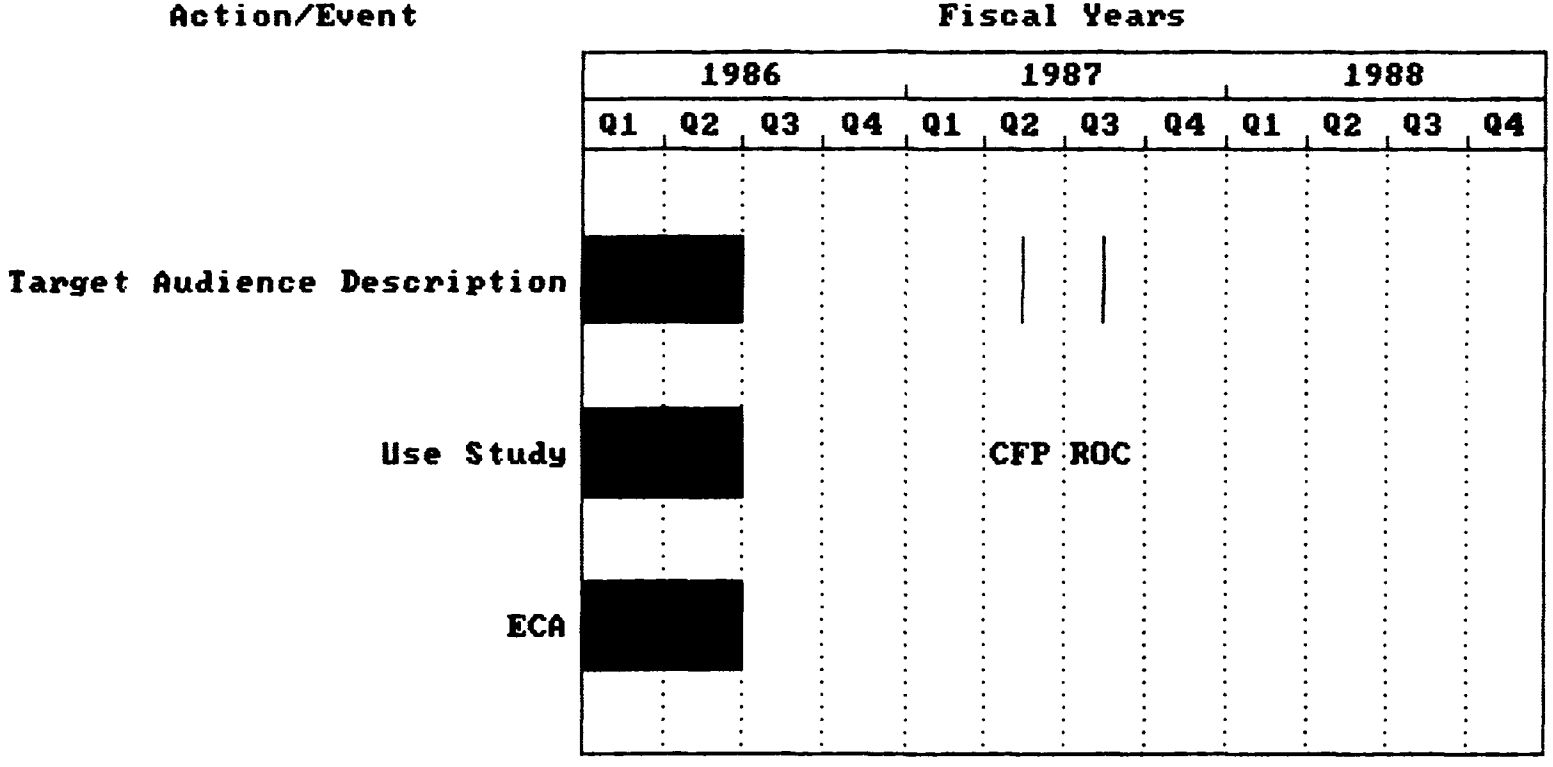
2. Data generated on new technologies and the new system will become primary data as it is developed.

TAB B

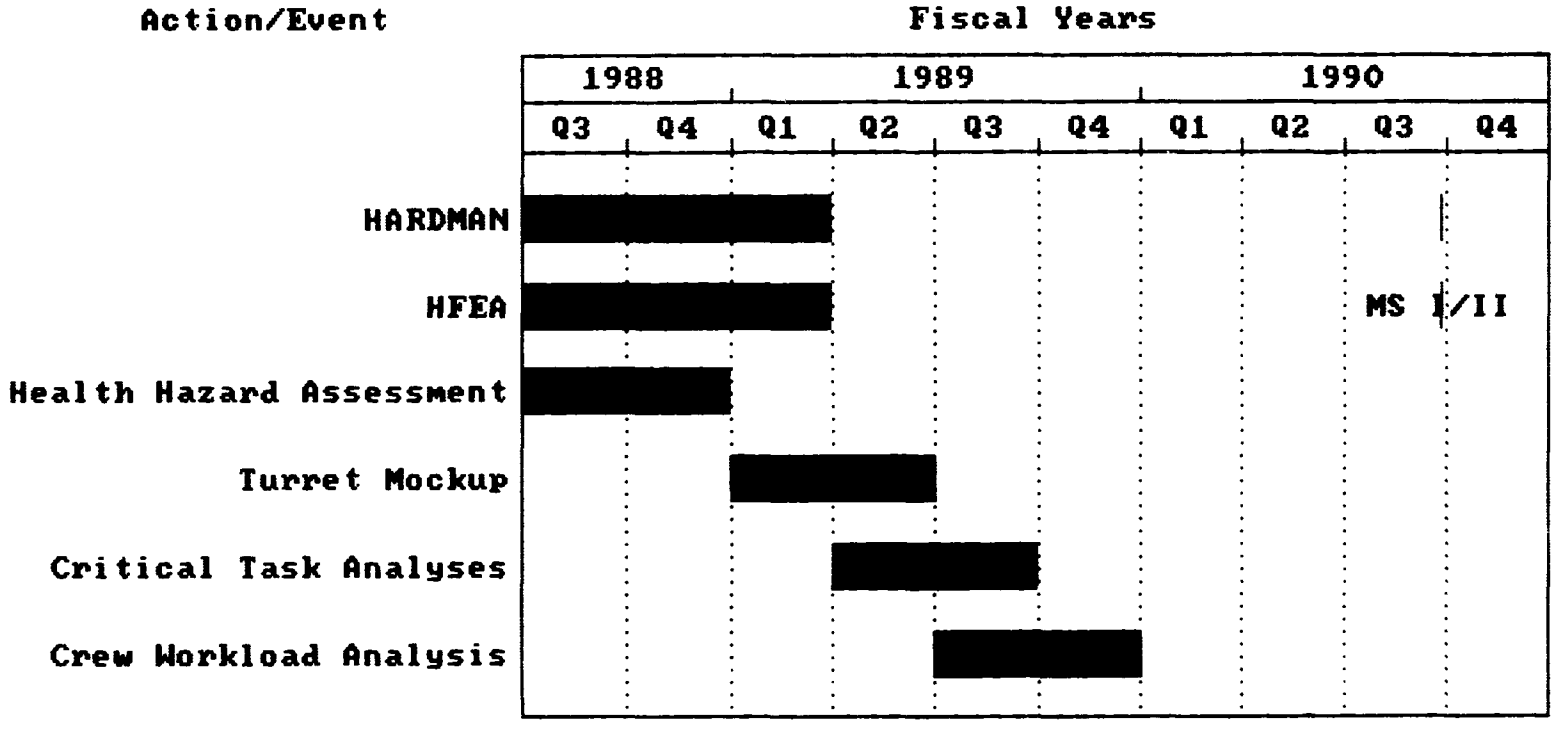
MANPRINT Milestone Schedule

ACTION	DATE
Subcomponent Development	FY 85 thru FY 88
Target Audience Description	3rd Qtr. FY 86
Use Study	3rd Qtr. FY 86
ECA	3rd Qtr. FY 86
System Demonstration	FY 89 thru FY 90
HARDMAN	1st-2nd Qtr. FY 89
HFEA	1st-2nd Qtr. FY 89
Health Hazard Assessment	1st QTR. FY 89
Turret Mockup	3rd Qtr. FY 89
Critical Task Analyses	4th Qtr. FY 89
Crew Workload Analysis	1st Qtr. FY 90
Full Scale Engineering Development	FY 91 thru FY 94
Update HFEA, HHA, SAR	2nd Qtr. FY 93
Compare MPT requirements with goals	3rd Qtr. FY 93

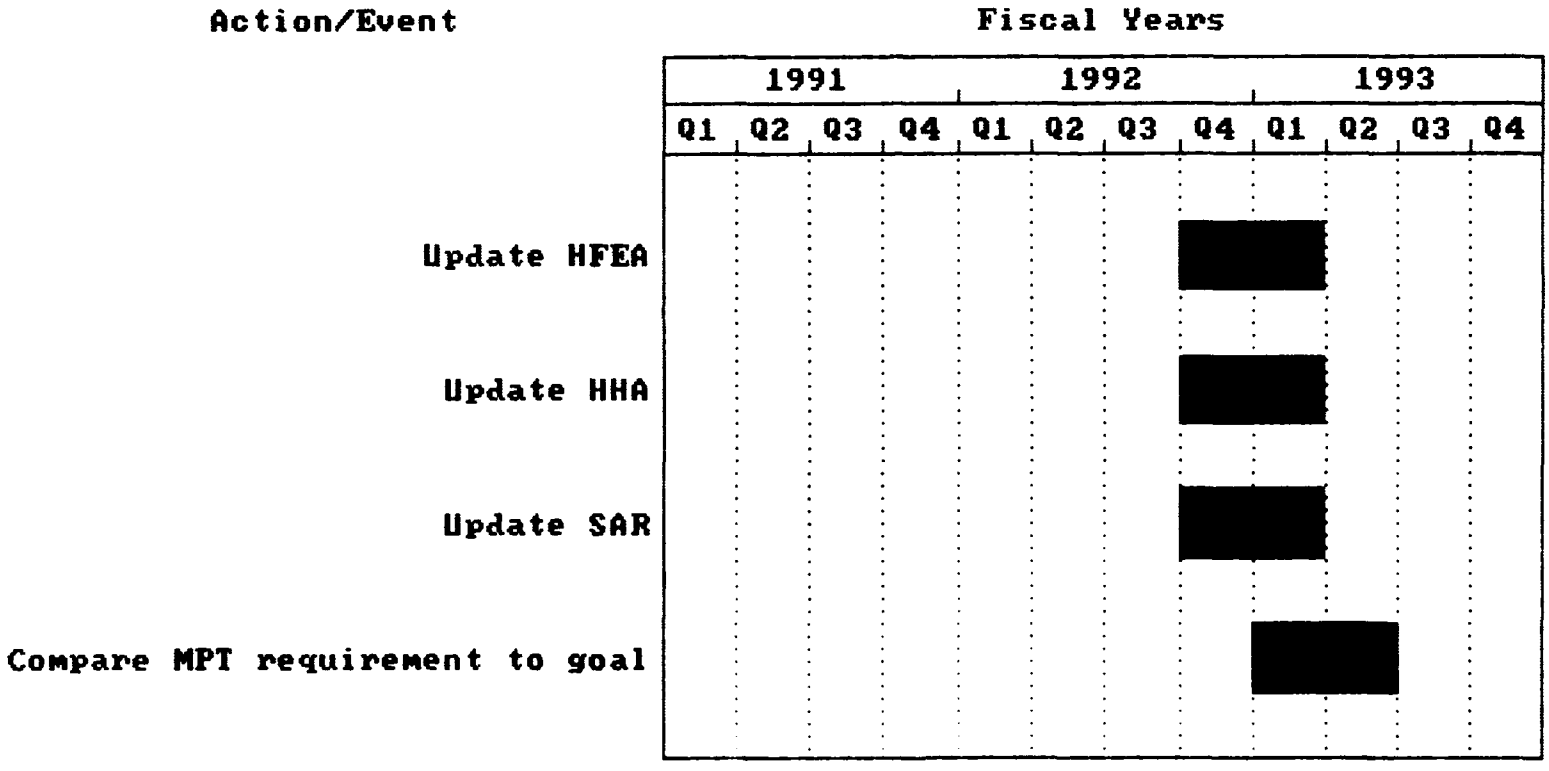
MANPRINT
Milestone Schedule
Subcomponent Development



MANPRINT
Milestone Schedule
System Demonstration



MANPRINT
Milestone Schedule
Full Scale Engineering Development



TAB C

TASK DESCRIPTIONS

1. Task Description Target Audience Description

Rationale Define Target Audience

Resources .5 MM

Time to Complete 1 week

Responsible Agency FA School (DCD)

Support Agency Ordnance School, Signal School

Task Flow Dependencies-None
Feeds-ROC
CFP

2. Task Description ECA

Rationale Need lessons learned from existing system

Resources .5 MY/ $30K

Time to Complete 9-12 weeks

Responsible Agency FA School (DCD)

Support Agency Ordnance School

Task Flow Dependencies- none
Feeds- O&O Plan
ROC
COEA
CTEA
TOA

3. Task Description Turret Mockup

Rationale Check workspace layout

Resources $100K

Time to Complete 6 months

Responsible Agency FA School (DCD)

Task Flow None

4. Task Description HARDMAN

Rationale MPT Analysis

Resources $250K

Time to Complete 9-12 months

Responsible Agency FA School (DCD)

Support Agency SSC-NCR

Task Flow Dependencies- None
Feeds- LSA
CTEA
ICTP
OTP
QQPRI

5. Task Description Field Study

Rationale Identify performance problems

Resources .7 MY

Time to Complete 6-10 weeks

Responsible Agency FA School (DCD)

Support Agency Ordnance School

Task Flow Dependencies- none
Feeds-LSA
CTEA
QQPRI

6. Task Description Critical Task Analysis

Rationale Operator/Maintainer Capability

Resources 1.5 MY/ $100K

Time to Complete 5 months

Responsible Agency FA School (DOTD)

Support Agency Ordnance School, Signal School

Task Flow Dependencies- None
Feeds- LSA
CFP
ICTP

7. Task Description Crew Workload Analysis

Rationale Peak performed and sustained workload

Resources 1.5 MY/ $100K

Time to Complete 5 months

Responsible Agency FA School (DOTD)

Task Flow Dependencies- None
Feeds- HFEA
TEMP

8. Task Description Health Hazard Assessment

Rationale Identify Health Hazards

Resources .3 MY

Time to Complete 2 months

Responsible Agency AEHA

Support Agency MRDC

Task Flow Dependencies- None
Feeds- HFEA
TEMP
SAR
ROC

9. Task Description System Safety Analysis

Rationale Identify System Safety Hazards

Resources .5 MY/ $50k

Time to Complete 4 months

Responsible Agency FA School (DCD)

Support Agency HEL

Task Flow Dependencies-None
Feeds-HFEA
TEMP
HHAR
ROC

TAB D

QUESTIONS TO BE RESOLVED

1. Can three or four man crews conduct sustained operations?

2. What is the maintenance impacts of new technologies?

3. Are noise and blast overpressure problems? Health Hazard and performance impact?

4. Can the target audience operate and maintain the equipment?

5. Will personnel be able to complete all their required tasks within the time allotted?

6. In which systems functions and tasks are personnel least reliable and why?

7. How much will performance degrade when system operators are fatigued or stressed?

TAB E

COORDINATION

TSM-Cannon MAJ Janda	Ft. Sill, OK AV 639-6902/2974
USAFAS-DCD CPT Troutt	Ft. Sill, OK AV 639-6903/1414
HQ TRADOC CPT Meyer	Ft. Monroe, VA AV 680-4225
ODCSPER, DA MAJ(P) Evans	Washington, DC AV 227-0575/0576
SSC-NCR CPT Collins	Alexandria, VA AV 221-0263/0946
HEL Mr Hadduch Mr Golden Mr Horley	Aberdeen PG, MD 298-5887/5804
HEL-Artillery Liaison Mr Kinney	Ft Sill, OK AV 639-1219/2489
MRSA Mr Brooks	Lexington, KY AV 745-4177
LOGCEN Mr Moore	Ft Lee, VA AV 687-3835

TAB F

AUDIT TRAIL

1 November 1984	HIP Program Decision Memorandum by VCSA

The System MANPRINT Management Plan
For the Advanced Field Artillery System (AFAS)

1. SUMMARY.

a. The AFAS will be the next generation self-propelled howitzer system replacing the M109 series.

b. The initial MANPRINT strategy will be based on the predecessor system and technology demonstration.

c. The key MANPRINT issues are:

1. The ability of the target audience to perform to standard.

2. The ability of the current target audience to maintain the system.

3. The ability to conduct sustained operations with a smaller crew.

4. The reliability and effects of Robotics.

5. The support requirements of a new system.

2. DESCRIPTION.

a. The AFAS will be a lightweight, self-propelled, indirect fire weapon system capable of meeting the fire support needs of the close combat force, battle task force, and land battle force under the Army 21 concept.

b. The Army needs a new generation of indirect fire weapon systems that can meet all of the 1980 Fire Support Mission Area Analysis (FSMAA) and Army 21 requirements and use of emerging technology to leap ahead of the qualitatively improving threat. The Army must capitalize on quantum technological advances for fielding small, self-sufficient firing units.

c. The AFAS should meet the following performance characteristics:

1. Self-sustainability for 3 to 5 days.

2. Mobility and operations consistent with maneuver units.

3. An increased rate of fire over the M109 A2/A3 (burst rate in excess of 4 rounds, every 15 seconds, a cyclic rate of 4-6 rounds per minute, and be capable of achieving a 3 rounds simultaneous effect on target).

4. An increased range (> 50 Km).

5. Ability to fire on the move.

6. Small and lightweight relative to the M109 A2/A3 (airliftable).

7. On board navigation capability.

8. Use of reconfigurable armor.

9. Modular/interchangeable components.

10. Use of Built-in Test Equipment (BITE).

11. Survive a NBC environment for 3 to 5 days.

12. On-board computer capable of computing technical firing data.

13. The AFAS will incorporate stealth technology and be survivable when attacked by smart munitions.

d. The anticipated acquisition approach for this system will be the accelerated acquisition process. This process will require a 4 year developmental process. Pre-planned product improvements will be used for later developing technologies.

e. Until Milestone I, the Field Artillery School will be the lead agency for both MANPRINT and the Acquisition Process. After Milestone I, the Program Manager will have the lead. Other agencies participating in this acquisition will include:

TRADOC
Field Artillery School-Lead until Milestone I
-TSM Cannon
Ordnance School and Center
Signal School
Integrating Centers
-SSC-NCR
-LOGC
-CAC

AMC
LABCOM
-Human Engineering Lab
Commodity Commands
-AMCCOM
-CECOM
-TACOM
-TECOM
PM CAWS-Lead after Milestone I
PM TRADE

Other
Office of the Surgeon General
Safety Center
DCSPER
DCSOPS
Army Research Institute
Operational Test and Evaluation Agency

f. The following guidance comes from the Vice Chief of Staff of the Army's HIP Program Decision Memorandum from 1 November 1984:

1. Improve operational availability.

2. Use predictive failure technologies.

3. Increase range, rate of fire, and ammunition lethality.

4. Improve battlefield mobility and survivability.

5. Consider applicability of a system common chassis.

6. Allow for pre-planned product improvement.

g. The following assumptions have been made:

1. No increase in manpower requirements.

2. Quality of target audience will not change.

3. Skill creep should be kept to a minimum.

4. There will be no increase in training resources or time.

5. No new MOS's will be required to operate or support this system.

3. MANPRINT STRATEGY.

a. Objectives

1. General

a) Avoid repeating the MANPRINT shortcomings of the current M109 system.

b) Ensure that mature subsystem technology is used in the design of the system.

2. Human Factors

a) Develop workspace layout that facilitates individual and crew performance for 5th to 95th percentile male.

b) Ensure that 90% of equipment faults are detectable within 20 minutes.

c) Provide 95% reliability of the following subsystems: semiautomatic or fully automatic loader and ammunition handling system, fire control system, electronic suite.

3. Manpower

a) Live within the manpower footprint of the current howitzer system.

b) Assure that capable and supportable organizational units are created.

4. Personnel

a) Eliminate or simplify all high driver tasks identified by analyses or test and evaluation.

b) Crew performance of all critical tasks with 95% reliability by not less than 90% of the target population.

c) Ensure equitable distribution of crew workload during periods of peakloading.

d) Reduce crew and maintainer error likelihood of high and moderately high critical errors to less than 5%.

e) Minimize the complexity (for operators and maintainers) created in integrating subsystems into a platform.

5. Training

a) Train all critical tasks in the institution.

b) Unit training tasks will not be increased.

c) Initiate technology actions which directly support the training of the soldier.

6. System Safety

a) Eliminate System Safety risks that degrade performance.

b) Use lessons learned from the predecessor system to correct System Safety faults.

7. Health Hazard

a) Eliminate Health Hazard risks that degrade system performance.

b) Use lessons learned from the predecessor system to eliminate Health Hazard risks.

b. Data Sources/Availability.

1. Predecessor System. The M109 A2/A3 and HIP will be predecessor system to establish a baseline. The Bradley Fighting Vehicle will be used as a predecessor system for chassis and new technologies that have been employed on the Bradley. The MLRS will also be used as a predecessor for those new technologies used on it.

2. Early Availability of data/risk analysis.

a) Manpower, personnel, and training constraints can be identified.

b) Associated performance issues can be identified.

c) Lessons learned in the area of system safety, health hazards and human factors on the predecessor will be identified.

d) Greater emphasis will be placed on analyses, simulations and testing to generate data on soldier functions, tasks, and performance with new technologies.

e) The key to the MANPRINT effort will be to schedule the necessary analyses, simulations, and test early to generate data.

f) Include answers to MANPRINT concerns and questions in technology demonstrations.

3. Planned level of MANPRINT analysis effort.

a) In Pre-Milestone I/II, MANPRINT actions include the development of information to support acquisition decisions. MANPRINT actions that should be taken at this time include:

-Formulation of the MANPRINT Joint Working Group.

-Development of the AFAS System Manprint Management Plan.

-Development and refinement of MANPRINT issues/questions.

-Initiation of research actions required to develop answers to MANPRINT questions.

-Inclusion of MANPRINT goals, objectives, constraints, issues, and questions in the RFP.

-Incorporation of MANPRINT in the TEMP and other program documents.

-Documentation of all the MANPRINT lessons learned during the acquisition process.

-Briefing the status of MANPRINT at the ASARC/DSARC.

b) After Milestone I/II, MANPRINT actions include the development of information and prototypes to support the acquisition decision. These MANPRINT actions include:

-Realigning MANPRINT actions from ASARC feedback.

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-Ensuring MANPRINT issues are resolved prior to production.

4. CONCERNS.

a. Sustained operations in an NBC environment.

b. Soldier Hazards: Projectile Propulsion System

c. Section Chief Responsibilities in a Dispersed Battlefield

d. System Performance with the Current Soldier

e. Unit Operational Capability

f. Maintenance Troubleshooting: Requirements of the Maintainer

g. Be able to operate within the Manpower Footprint

h. Electronics Systems and Mission Impact on Crew Requirements

i. Constrain Training Requirements

j. Robotics Impact on Soldier Responsibility

k. Sustained operations of a 3 to 4 man crew

l. Workspace layout of the turret with more gear

TAB A

Data Sources

1. The following data on the predecessor systems will be reviewed:

DATA SOURCES	RATIONALE
HARDMAN	MPT Data/supportability
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LOA	Concept/System Criteria
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IEP/IER	Critical MANPRINT issues
ARTEP	Performance data
SQT	Performance data
HFEA	Critical HFE, HH and SS Problems
AR 611-201	Target Audience Information
ARPRINT	Training Information
DOES	Performance Issues
Force Management Book	Problem MOS Information
Mishap Data Base	System Safety lessons learned
Safety Expertise in AMC, TRADOC, & Contractor	System Safety lessons learned
AMEDD Consultants *OTSG *AEHA *AHS *MRDC	Health Hazard lessons learned
Biomedical Data Base	Health Hazard lessons learned
HHARs	Health Hazard lessons learned
Contractor Data	Health Hazard lessons learned
ECA	MPT Data/Constraints

2. Data generated on new technologies and the new system will become primary data as it is developed.

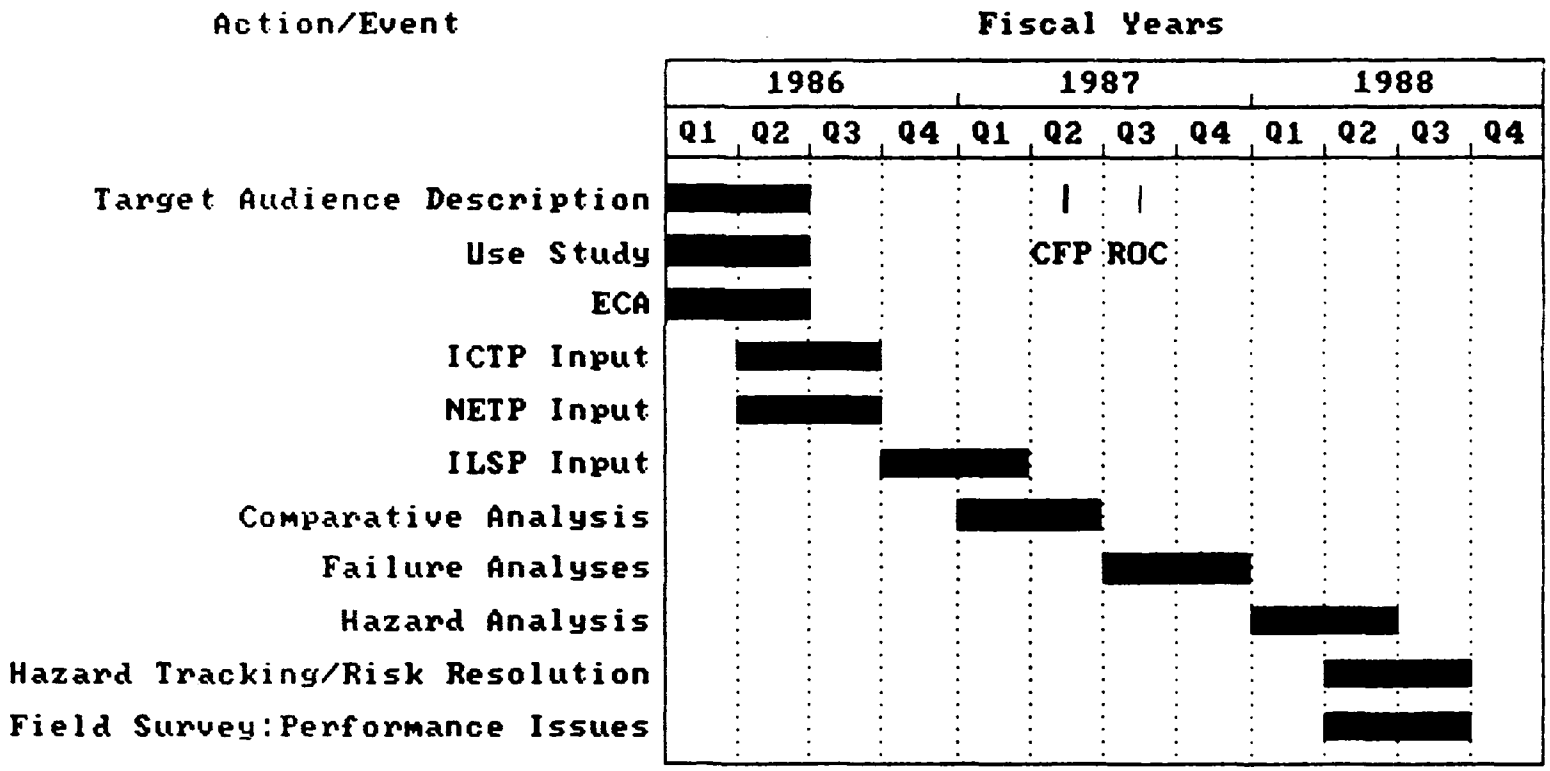
TAB B

MANPRINT Milestone Schedule

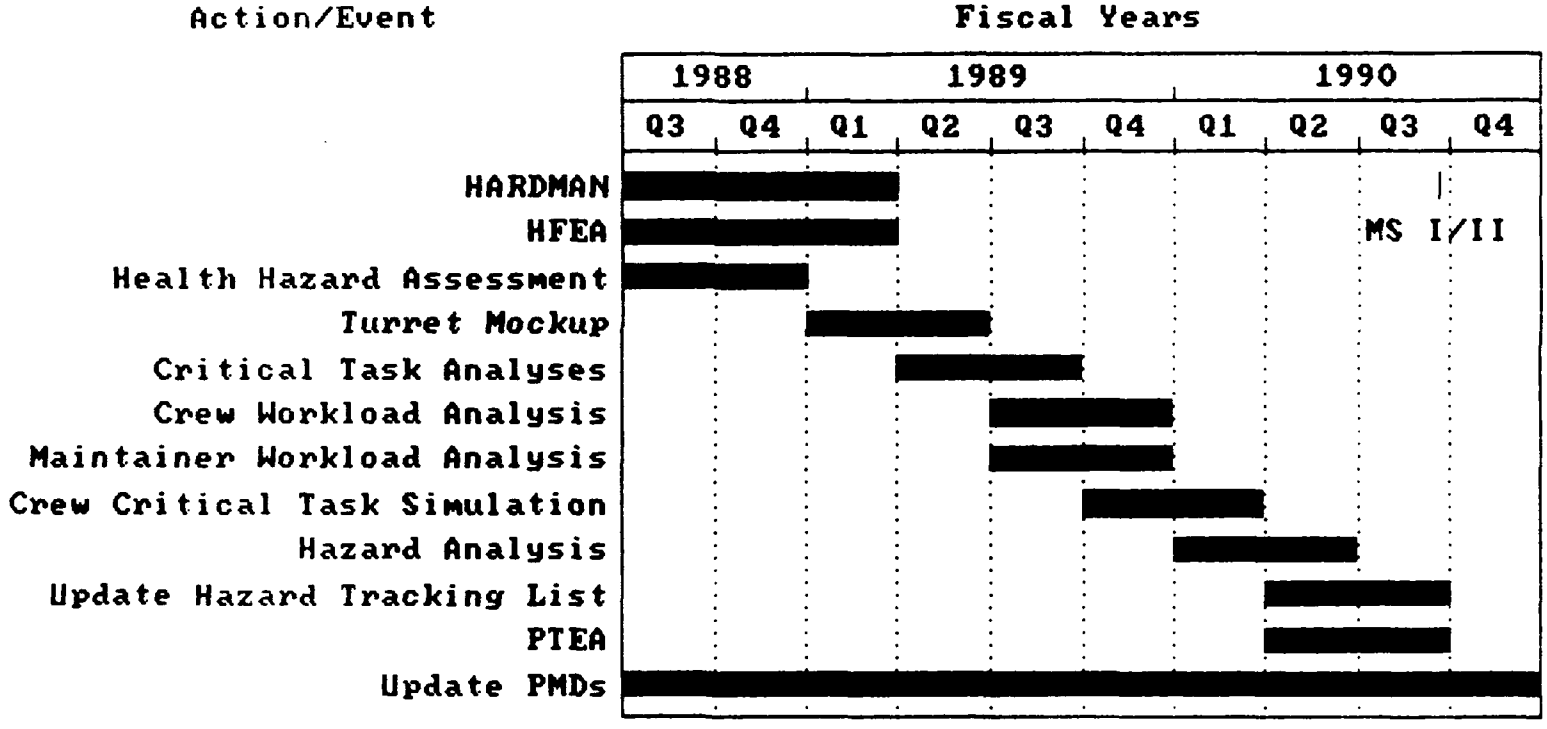
ACTION	DATE
Subcomponent Development	FY 85 thru FY 88
Target Audience Description	3rd Qtr. FY 86
Use Study	3rd Qtr. FY 86
ECA	3rd Qtr. FY 86
ICTP input	4th Qtr. FY 86
NETP input	4th Qtr. FY 86
ILSP input	2nd Qtr. FY 87
Comparative Analysis	3rd Qtr. FY 87
Failure Analyses	1st Qtr. FY 88
Hazard Analysis	3rd Qtr. FY 88
Hazard Tracking and risk resolution	4th Qtr. FY 88
Field Survey of Performance Issues	4th Qtr. FY 88
System Demonstration	FY 89 thru FY 90
HARDMAN	1st-2nd Qtr. FY 89
HFEA	1st-2nd Qtr. FY 89
Health Hazard Assessment	1st QTR. FY 89
Turret Mockup	3rd Qtr. FY 89
Critical Task Analyses	4th Qtr. FY 89
Crew Workload Analysis	1st Qtr. FY 90
Maintainer Workload Analysis	1st Qtr. FY 90
Crew Critical Task Simulation	2nd Qtr. FY 90
Hazard Analysis	3rd Qtr. FY 90
Update Hazard Tracking List	4th Qtr. FY 90

PTEA	4th Qtr. FY 90
Update PMDs	as required
Full Scale Engineering Development	FY 91 thru FY 94
Update HFEA, HHA, SAR	2nd Qtr. FY 93
Compare MPT requirements with goals	3rd Qtr. FY 93
Production and Deployment	FY 95-
PITEA	2nd Qtr. FY 96

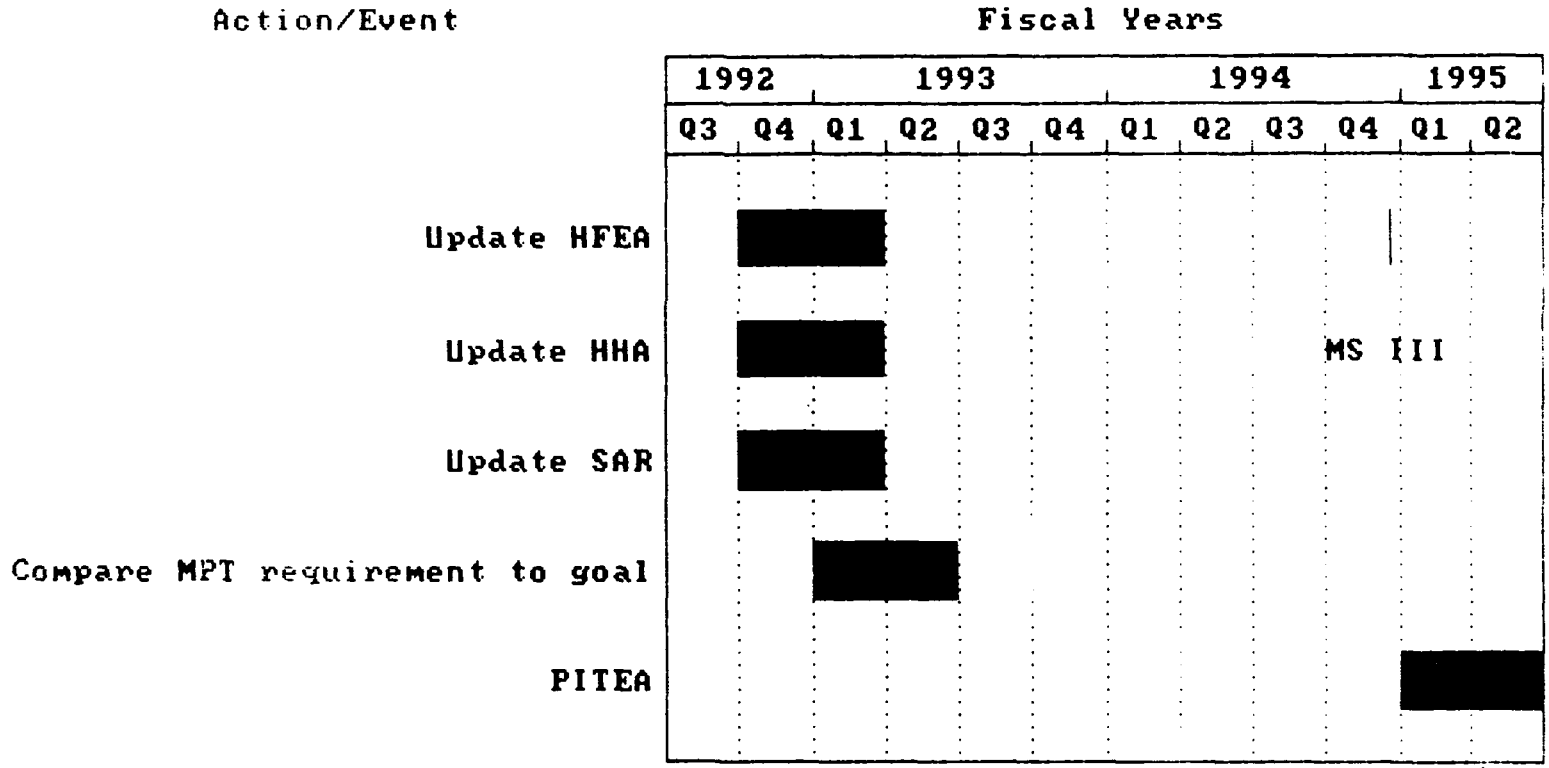
MANPRINT
Milestone Schedule
Subcomponent Development



MANPRINT
Milestone Schedule
System Demonstration



MANPRINT
Milestone Schedule
Full Scale Engineering Development



TAB C

TASK DESCRIPTIONS

1. Task Description Target Audience Description

Rationale Define Target Audience

Resources .5 MM

Time to Complete 1 week

Responsible Agency FA School (DCD)

Support Agency Ordnance School, Signal School

Task Flow Dependencies-None
Feeds-ROC
CFP

2. Task Description ECA

Rationale Need lessons learned from existing system

Resources .5 MY/ $30K

Time to Complete 9-12 weeks

Responsible Agency FA School (DCD)

Support Agency Ordnance School

Task Flow Dependencies- none
Feeds- O&O Plan
ROC
COEA
CTEA
TOA

3. Task Description Turret Mockup

Rationale Check workspace layout

Resources $100K

Time to Complete 6 months

Responsible Agency FA School (DCD)

Task Flow None

4. Task Description HARDMAN

Rationale MPT Analysis

Resources $250K

Time to Complete 9-12 months

Responsible Agency FA School (DCD)

Support Agency SSC-NCR

Task Flow Dependencies- None
Feeds- LSA
CTEA
ICTP
OTP
QQPRI

5. Task Description Field Study

Rationale Identify performance problems

Resources .7 MY

Time to Complete 6-10 weeks

Responsible Agency FA School (DCD)

Support Agency Ordnance School

Task Flow Dependencies- none
Feeds-LSA
CTEA
QQPRI

6. Task Description Critical Task Analysis

Rationale Operator/Maintainer Capability

Resources 1.5 MY/ $100K

Time to Complete 5 months

Responsible Agency FA School (DOTD)

Support Agency Ordnance School, Signal School

Task Flow Dependencies- None
Feeds- LSA
CFP
ICTP

7. Task Description Crew Workload Analysis

Rationale Peak performed and sustained workload

Resources 1.5 MY/ $100K

Time to Complete 5 months

Responsible Agency FA School (DOTD)

Task Flow Dependencies- None
Feeds- HFEA
TEMP

8. Task Description Health Hazard Assessment

Rationale Identify Health Hazards

Resources .3 MY

Time to Complete 2 months

Responsible Agency AEHA

Support Agency MRDC

Task Flow Dependencies- None
Feeds- HFEA
TEMP
SAR
ROC

9. Task Description System Safety Analysis

Rationale Identify System Safety Hazards

Resources .5 MY/ $50k

Time to Complete 4 months

Responsible Agency FA School (DCD)

Support Agency HEL

Task Flow Dependencies-None
Feeds- HFEA
TEMP
HHAR
ROC

TAB D

QUESTIONS TO BE RESOLVED

1. Can three or four man crews conduct sustained operations?

2. What is the maintenance impacts of new technologies?

3. Will the improved NBC environment enhance performance?

4. What is the reliability of the semiautomatic or fully automated loader and ammunition handling system? Are the back-up procedures effective?

5. What is the MANPRINT impact of the sustained rate of fire? What is the maintainer and supporter implications?

6. Are noise a^d blast overpressure problems? Health Hazard and performance impact?

7. Can the target audience operate and maintain the equipment?

8. What maintainer savings can be realized with a common chassis and automotive components on SPH and ARV?

9. What is the maintenance impact of self-diagnostics/self-repair on crew? Maintainer?

10. What is the MANPRINT impact of liquid propellant? System safety and support impact?

11. Will personnel be able to complete all their required tasks within the time allotted?

12. Where in the task sequence are operators likely to fail most or least often?

13. Where during system utilization will operators be most over or underloaded?

14. In which systems functions and tasks are personnel least reliable and why?

15. How much will performance degrade when system operators are fatigued or stressed?

16. How will various environmental factors (heat, light, etc.) affect total man-machine performance?

TAB E

COORDINATION

TSM-Cannon MAJ Janda	Ft. Sill, OK AV 639-6902/2974
USAFAS-DCD CPT Troutt	Ft. Sill, OK AV 639-6903/1414
HQ TRADOC CPT Meyer	Ft. Monroe, VA AV 680-4225
ODCSPER, DA MAJ(P) Evans	Washington, DC AV 227-0575/0576
SSC-NCR CPT Collins	Alexandria, VA AV 221-0263/0946
HEL Mr Hadduch Mr Golden Mr Horley	Aberdeen PG, MD 298-5887/5804
HEL-Artillery Liaison Mr Kinney	Ft Sill, OK AV 639-1219/2489
MRSA Mr Brooks	Lexington, KY AV 745-4177
LOGCEN Mr Moore	Ft Lee, VA AV 687-3835

TAB F

AUDIT TRAIL

1 November 1984	HIP Program Decision Memorandum by VCSA
1 April 1985	DIA Threat Validation
7 May 1985	JMSNS approved by CG, TRADOC
13 May 1985	DARPA program initiation
15 July 1985	O & O Plan approved by HQ,TRADOC
9 September 1985	DARPA/USAFAS briefing to industry
29 December 1985	DARPA program contract award
6 April 1986	System MANPRINT Management Plan completed and distributed
10 July 1986	Meeting on ECA initiation