

LIFE CYCLE TIME AND COST ESTIMATES

FOR

SQUAD AUTOMATIC WEAPON SYSTEM CANDIDATES

BY

State State

R. F. SCHWEGLER

JANUARY 1975

SMALL ARMS WEAPON SYSTEMS DIRECTORATE RODMAN LABORATORY ROCK ISLAND ARSENAL ROCK ISLAND, ILLINOIS 61201

UNCLASSIFIED SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered) READ INSTRUCTIONS REPORT DOCUMENTATION PAGE EEFORE COMPLETING FORM 2. JOVT ACCESSION NO. 3. RECIPIENT'S CATALOG NUMBER 1. REPORT NUMBER -R-TR-75-Ø3Ø 5. TYPE OF REPORT & PERIOD COVERED 4. TITLE (and Subtitle) Life Cycle Time and Cost Estimates for Squad Automatic Weapon System Candidates 6. PERFORMING ORG. REPORT NUMBER 8. CONTRACT OR GRANT NUMBER(*) AUTHOR(s) R. F. Schwegler 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 9. PERFORMING ORGANIZATION NAME AND ADDRESS GEN Thomas J. Rodman Laboratory Rock Island, IL 61201 11. CONTROLLING OFFICE NAME AND ADDRESS 12. REPORT DATE Small Arms Weapon Systems Directorate January 1975 13. NUMBER O SARRI-LS-C 390 15. SECURITY CLASS. (of this re 14. MONITORING AGENCY NAME & ADDRESS(If different from Controlling Office) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE 16. DISTRIBUTION STATEMENT (of this Report) Distribution Unlimited 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) 18. SUPPLEMENTARY NOTES 19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Trade Off Determination Squad Automatic Weapon (System) Advanced Development Time & Cost SAW Estimate SAWS Engineering Development Time & Life Cycle Cost Cost Estimate Life Cycle Schedule 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report documents for future reference the steps taken to prepare Life Cycle Cost and Schedule Estimates for the Squad Automatic Weapon System (SAWS) Program. All costs are given in FY75 dollars, The body of the report addresses a program which remains in Advance Development from FY75 until FY77. The period encompassing FY77, FY78 and FY79 is the time frame for Engineering Development. This is followed by a 12 month Limited Production period and a subsequen Full Scale Production period. DD FORM 1473 EDITION OF 1 NOV 65 IS OBSOLETE Nati UNCLASSIFIED SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered) 408247V

UNCLASSIFIED

CUNTY CLASSIFICATION OF THIS PAGE (The Date Intered)

19. Key Words (Cont'd) Limited Production Cost Estimate SFW1 Scale Production Cost Estimate SRWS Development Program.

29; Abstract (Cont'd)

. ...

12.00

The Appendix gives the detailed Cost and Schedule Estimates from which the final Trade Off Determinations and Program Costs were derived. Five weapon mechanism concepts and six types of ammunir time are approached in a variety of combinations.

TABLE OF CONTENTS

the service many

d,

ないないないないない

State State

Forward	iv
Rationale for SAWS Life Cycle Schedule and Cost Estimate	1
Figure 1: SAWS Weapon Program Schedule for 6.00mm/7.62mm	4
Figure 2: SAWS Weapon Program Schedule for 5.56mm	5
Rationale: Advanced Development Time and Cost Estimate	6
Figure 3: Advanced Development Cost Data	8
Program Plan 1	9
Program Plan 2	16
Program Plan Supplement	22
Rationale: Engineering Development Time and Cost Estimates	24
In-House Man Hour Summary	26
Contractor Man Hours Summary	27
Engineering Development Cost	28
Appendix 1: SAWS Weapon Life Cycle Cost Estimate	37
Estimated Costs for SAWS Options	38
Recommendations	41
Conclusions	42
Table 1: Life Cycle Costs Weapon Only	43
Summary of SAW Program Time and Cost	44
Supporting Rationale Life Cycle Costs - Weapon	52

Appendix 2:	Basic Estimated Cost Packages
NUMBER	TOPIC
I-A	Advanced/Engineering Development 7.62mm Conversion from 6.0mm-9month effort
I - B	Advanced/Engineering Development 5.56mm Conversion from 6.0mm-12 months effort
I-C	Advanced/Engineering Development Conceptual Weapon System with Extensive Changes-18 months effort
I-D	Advanced/Engineering Development Added Cost for Contractor without previous SAWS program experience-6 months effort
II-A	Engineering Development-XM233 Contracted in a Low Cost Area in 6.0mm
II-B	Engineering Development-XM234 Contracted in a High Cost Area in 6.0mm
II-C	Engineering Development-XM235 Contracted in a Low Cost Area in 6.0mm
II-D	Engineering Development-XM235 Contracted in a High Cost Area in 6.0mm
II-E	Engineering Development-Best Conceptual Weapon Contracted by an Average US Contractor in 6.0mm (or Fabrique Nationale Contender Contracted by an Average US Contractor in 5.56mm/63 grain Projectile)
III-A, B,	C and D
	Initial Limited Production of 1000 Weapons
	A. XM233
	B. XM234

D. Best Conceptual and Fabrique Nationale Contender Weapons 375

XM235

~ C.

ţ,

*	IV-A	XM233 Full Scale Production of 80,000 Weapons	379
*	IV-B	XM234 Full Scale Production of 80,000 Weapons	381
*	IV-C	XM235 Full Scale Production of 80,000 Weapons	383
*	IV-D	Fabrique Nationale SAWS Contender or Conceptual Weapon-Full Scale Production of 80,000 Weapons	385
*	for Package in the Ind as prepare respective	eets only are included. The detailed rationale es IV-A, B & C are not included and may be found ependent Government Cost Estimate for each weapon d by AMSAR-PPX-PD, ARMCOM 75-a, 75-b, and 75-c ly. Package IV-D is taken as the average of IV-A, or lack of sufficient engineering data.	

Distribution Page

FORWARD

This report is intended to document the steps taken to prepare Life Cycle Cost and Schedule Estimates for the Squad Automatic Weapon System (SAWS) Program.

The original basis for estimation assumed that Advanced Development had been essentially completed and a Weapon Mechanism had been selected to start Engineering Development 1 February 1975. All costs were to be given in FY75 dollars.

On 4 December 1974 the program was redirected to remain in Advanced Development until FY77 (1 October 1976) for the basic purpose of investigating the potential of 7.62mm and 5.56mm ammunition to meet the SAWS requirement.

Following this redirection the SAWS Program was re-evaluated. A Decision Risk Analysis based on the original Engineering Development estimates indicated that most likely elapsed time for Engineering Development was 36 months. Thus the period encompassing FY77, FY78 and FY79 was established as the time frame for Engineering Development.

Due to a shortage of time and existing funding guidance it was decided to prepare a representative Life Cycle Cost and Schedule Analysis in accordance with the new directive and based on the following assumptions:

- 1. Mechanism-XM235
- 2. Contractor from high cost area.
- 3. Advanced Development of the weapon mechanism in 7.62mm NATO ammunition.
- 4. Investigate 5.56mm ammunition for potential to meet SAWS requirements.

In the following report the Costs and Schedules shown in the first section are those resulting from evaluating the SAWS program as redirected 4 December 1974.

In the Appendix are given the original Life Cycle Cost and Schedule Estimates from which the Trade-Off Determinations and the Redirected Program Costs were derived.

When comparing and tracing the Costs and Schedules contained herein the reader must keep in mind the changes in constraints imposed by the redirected program, especially the changes in performance time, and quantities produced in Limited and Full Production. RATIONALE FOR SAWS LIFE CYCLE SCHEDULE AND COST ESTIMATES

PRECEDING PAGE BLANK-NOT FILMED

The estimates of SAWS Schedule and Life Cycle Cost have been prepared in accord with the following regulations:

- a. AR 37-18 Weapon/Support Systems Cost Categories and Elements.
- b. AR 70-1 Army Research and Development.
- c. AR 70-32 Work Breakdown Structures for Defense Material Items.
- d. MIL-STD-881 Work Breakdown Structures for Defense Material Items.
- e. Letter of Instructions (LOI) for Implementing the New Material Acquisition Guidelines, dated 23 August 1972.

The bases for the estimates were derived by studying the various contending mechanisms and comparing the results of validation tests of those mechanisms against the requirements as set forth in the Material Need (MN).

After these comparisons were made the deficient areas of the respective weapons were determined and a tentative list was made of tasks necessary to correct the noted deficiencies. Estimates were then made of the types of manpower and the number of man-hours necessary to accomplish those tasks.

Subsequently the required milestone sequence was established and, using the estimates of man-hours, a tentative schedule was determined. The tentative schedule was then revised to insure continuity of effort and efficient use of men and material.

Advanced Development Tasks are identified as:

Task Ol-Complete Concept Formulation Package Related Activities.

Task 02-Hardware Design Verification.

Task 03-Program Administration.

Task 04-7.62mm Investigation

Task 05-5.56mm Investigation

Task 06-RAM and Quality Control.

'Task 07-System Safety.

Task 08-Human Factors and Reliability Engineering.

Task 09-Lethality Determination.

Task 10-Steel Case Technology.

Task 11-Aluminum Case 7.62mm.

Engineering Development Tasks involve:

a. Finalize weapon configuration.

b. Prepare the Technical Data Package.

c. Fabricate prototype weapons under contract.

d. Conduct Contractor Acceptance Test.

e. Conduct Development Tests and Operational Tests.

f. Conduct In-Process Review.

g. Type Classify for Limited Production.

Limited Production Tasks include:

a. Establish a contractor production facility capable of producing a specified number of weapons per month.

b. Produce under contract a specified quantity of weapons to be used for Development and Operational Testing.

c. Conduct and evaluate Development and Operational Tests.

d. Conduct In-Process Review.

e. Type Classify for Full Scale Production.

Full Scale Production Tasks include:

a. Establish a contractor production facility capable of producing at a specified rate significantly greater than the rate for a Limited Production Facility.

b. Produce a specified quantity of weapons.

c. Establish Initial Operational Capability at a specified date.

Figure 1 depicts the Schedule and Milestones for the redirected program as estimated and applies to either 6.0mm or 7.62mm caliber.

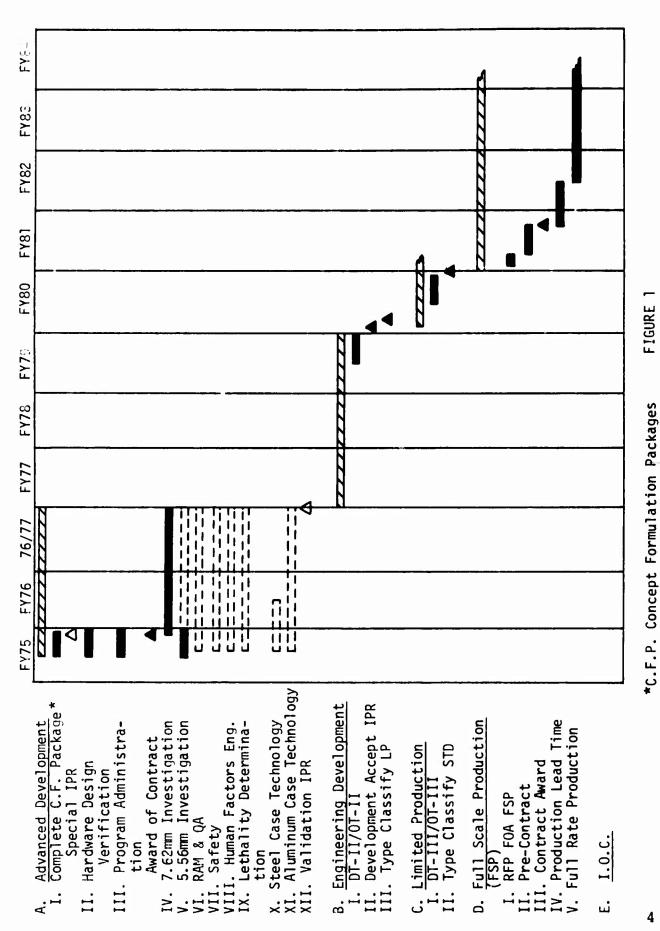
Also considered under the redirected effort was the effect of selecting 5.56mm ammunition for the SAWS.

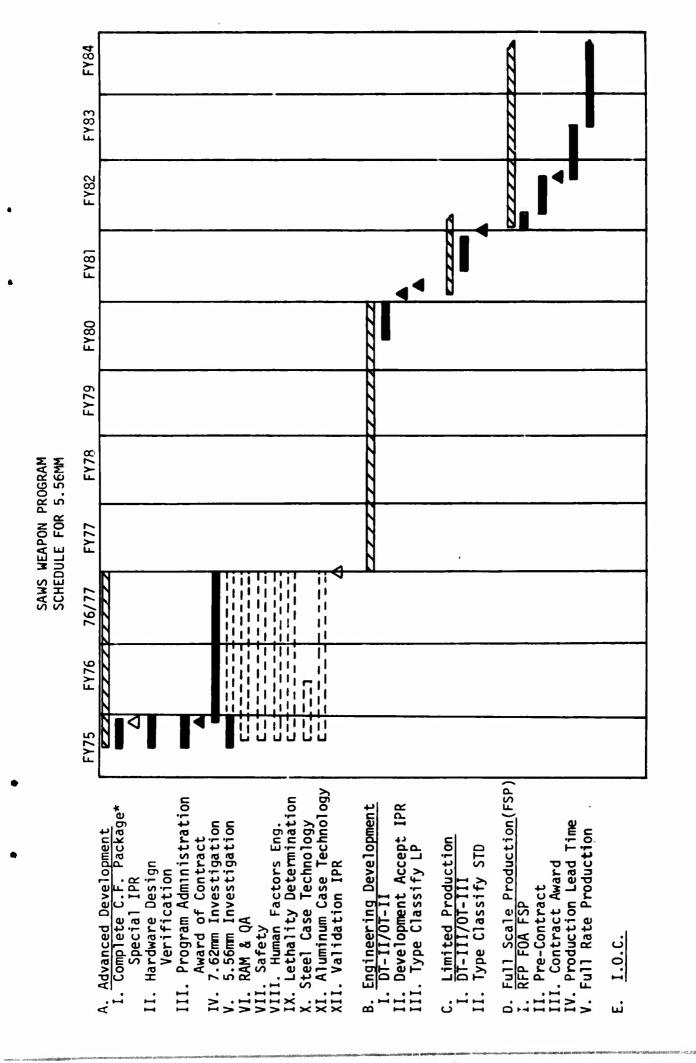
Based upon the 6.0mm estimates the Engineering Development period would increase from 3 years to 4 years and the costs would increase accordingly.

Figure 2 depicts the estimated Schedule and Milestones for the redirected program in any 5.56mm ammunition.

NO. & GENERAL

SCHEDULE FOR 6.00MM/7.62MM





からいないないないないでも

れないとないのであるというというという

*C.F.P. Concept Formulation Packages

FIGURE 2

RATIONALE: ADVANCED DEVELOPMENT TIME AND COST ESTIMATE

DA Teletype 191750Z, Dec 75 directed the SAWS Program to remain in Advanced Development into FY77 with the specific objective of performing all necessary experimental and analytical analysis to completely define the potential of 7.62mm caliber systems and 5.56mm caliber systems for use as SAWS.

A program addressing the scope of work directed by the teletype is contained in <u>Program Plan 1</u>. The funding requirements to support that program are estimated at \$2,360,000 for the remainder of FY75, \$3,620,000 for FY76, and \$700,000 for the FY76/77 transition period.

Subsequently, informal guidance was received relative to this effort as follows:

FY75 - \$915,000

FY76 - \$1,900,000

FY76/77 - \$700,000

On the basis of this guidance the program mentioned above was reviewed to further evaluate and determine those activities which are essential for the decision data base and minimized risk in successfully meeting program objectives.

The essential activities for the program are considered to be preparation of the Concept Formulation Package, mechanism analysis and hardware design verification of the DT-I/OT-I mechanisms, program administration, RAM, safety, human factors engineering, and the development of experimental lethality data to rank and quantify expected performance of the various SAWS contenders.

Preparation of the Concept Formulation Package, hardware design verification, and experimental lethality data are essential for the forthcoming In-Process Review. Therefore the first two activities have been funded and the lethality investigation has been initiated utilizing available funds.

Relative to the technical activities an assessment of risk indicates that the lowest risk mechanism approach is to utilize the 7.62mm standard family of cartridges. The potential payoff to the program from improved 7.62mm ammunition is judged to be minimal.

Similarly the utilization of 5.56mm standard, M193 etc., cartridges in a mechanism has several potential problem areas which include the compatibility of the M193 projectile in a machine gun bore and the power available in the family of cartridges to power a mechanism reliably through the required operational environments. The maximum payoff in 5.56mm utilization appears to be in the area of improved ammunition.

Thus considering risk and maximum payoff, investigation of 7.62mm mechanisms and quantification of the potential of 5.56mm ammunition as a SAWS caliber are considered to be the essential activities and form the bases for the recommended Advanced Development Programshown in <u>Program Plan 2</u>.

This recommended progra m, designated Priority I, is the program incorporated in the Life Cycle Time and Cost Estimate.

Priority II and Priority III efforts have been identified for reference only under <u>Program Plan Supplement</u>.

Figure 3 on the following page summarizes Advanced Development costs and the priority assigned to each task.

Following Jections discuss in detail the above Program Plans, i.e.;

- 1. Program Plan 1
- 2. Program Plan 2
- 3. Program Plan Supplement

				un -	:	a share of the	ADVANCED DEVELOPMENT COST DATA	DEVELOP	MENT C	OST D	ATA	Be from	Will The Second and		「「「「「「「「」」」			
REQ	REQ	REQ		RIA	FY75	CONT	0GA	REQ	RIA	FY76	CONT	06A	REQ	RIA	FY76T	CONT	OGA	
CFP ¹ I 100	18/I	100		80	20	0												
Hdw Dsn VRF ¹ I 93 II 45		93 45		38		55 45												
Prog Admin I 120		120		100	20			370	290	80			190	145	45			
7.62 I 390 II 135		390 135		40	20 95	330		745 410	120	25 40	600 370		190	30	10	150		
5.56 I 590 II 390		590 390		100 40	255 20	235 330		625 745	60 120	165 25	400 600		190	30	10	150		
RAM I 40		40		20	20			200	160	40			70	55	15			
Safety I 15	I 15	15		15				30	30				10	10				
HFE I 20		20	_				20	40				40	50				50	
Lethality ² I 50		50			10		40	80		20		60						
Steel Case ² II 70		70	_	10	60			75	10	65								
Ai Case ³ III 305		306		20	285													
ADVT-G I II	II							240 60	240 60									
TOTALS I 1403 11 655 111 305		1403 655 305	m 10 10	393 90 20	330 190 285	620 375 0	60	2330 1290 0	006 061	330 ⁻ 120	0001 970 0	001 000	700	270	80	300	50	
<pre>¹Priority 1 efforts are funded under FY75 program 220K to initiate task funded under FY75 program r ³Cmdr FA recommends Pr I - Task is not considered</pre>	ts are fur task fund ids Pr I -	funder funder Î-		led und 1 under Fask is	der FY r FY75 s not	75 program program r considered	0	ed. ial	objec	ctives	of DA	to objectives of DA IT and thus is retained	us is	retai	ned as	Pr II		

FIGURE 3

PROGRAM PLAN 1

こうちょう あいというな ちゅうちょう ちょうちょう

に、 やくいれい

いたいないないない

ANAR I ARGY OF THE A

SAWS ADVANCED DEVELOPMENT PHASE

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 4)

PAGE	07	PAGES	28 January 1975	
PRON			AMCMS CODE	

TO: AMSAR-RD

FROM: SARRI-LS

PROJECT NO: 1J663607D640

PROJECT TITLE: Squad Automatic Weapon Advanced Development (Program Plan 1)

1. The following plan is the recommended FY75 effort based on the redirection that the SAW program is to stay in the Advanced Development category through a balance of FY75, FY76, FY76 transition, and into FY77. Additional guidance received was that equal consideration should be given to the development of hardware and demonstration of potential of both 5.56 and 7.62mm as calibers for the SAW application.

2. Anticipated Phase Slippages: N/A

3. Funding Level Adjustments: N/A

4. Work to be Performed:

a. Task 01 - Complete Concept Formulation Package Related Activities \$100,000

The activities within this task include completion of the TOD analysis, support to the ARMCOM activities in conducting the final TOD, conduct and completion of the TOA, BTA, and support to the IPR. Also included are those activities required to support USAIS in the conduct and completion of the COEA.

b. Task 02 - Hardware Design Verification

The activities within this task are to provide continuity with the hardware developers during the completion of the ARMCOM TOD and the Concept Formulation Package. The recommended hardware modifications to correct problem areas encountered during DT-I/OT-I will be finalized by completing detailed designs and providing in-depth analyses of the expected improvements and the interface with other components within the mechanism. The completion of this element coincides with the completion of the ARMCOM TOD. At this point in time the mechanism selected by the ARMCOM TOD for further development will be conducted in this task through fabrication of hardware and testing of that hardware to validate the design and analysis process.

c. Task 03 - Program ^dministration

\$120,000

\$138,000

Normal program administration activities such as updating plans, demonstrations, briefings, coordination and project management will be included in this task area. The program plan calls for development of the SAW system through contractual activities. To accomplish this it is necessary to prepare a Secretarial D&F, a Request For Proposal, evaluation of proposal submissions, and award of contract. Conduct of these administrative and technical actions to arrive at a contract in FY75 are included in this area.

11:20 1

AMC FORM 1006A

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 4)

PAGE	OF	PAGES	DATE
PRON			AMCMS CODE

d. Task 04 - 7.62mm Investigation

(1) The principal activity will be a contract for development of a 7.62mm system utilizing standard M80 family of cartridges. To accomplish this the mechanism identified as having the highest potential during previous SAW activities will be utilized to design, develop and test a 6mm mechanism. The objective of this activity is to identify the minimum weight achievable and to assess the level of performance as a baseline for continuing design activities and program decisions.

(2) Companion with the weapon work will be the investigation of ammunition concepts to identify the potential for improved performance that would upgrade the current M80 family of cartridges and/or 7.62mm as a caliber for SAW utilization.

e. Task 05 - 5.56mm Investigations

(1) Activities within the SAW program to date have indicated the potential for improvement in ammunition effectiveness and have also indicated areas of concern relative to the utilization of the M193 cartridge as a machine gun cartridge and the achievement of reliability with a mechanism firing a 5.56mm cartridge. This task will identify ammunition concepts and demonstrate their potential as well as investigating the M193 cartridge compatibility with the machine gun role, evaluate and design a bore configuration to be used in a 5.56mm machine gun, investigate powering of a 5.56mm mechanism, and initiate link development. M16 compatibility with ammunition concepts identified in this task will be performed in the future rifle program. Coordination of this compatibility evaluation will be within this subtask.

(2) The guidance provided requires investigation of a 5.56mm system for SAW application. Using the same mechanism as will be used to investigate 7.62 a contract will be prepared for award such that on determination of potential from subtask (1) above the contract can be awarded so that the activities in developing and designing this mechanism can run parallel with and companion to Task 04.

(3) Ammunition development of the cartridge selected as having the most potential will also be accomplished in parallel with the weapon development under this subtask. The concept or concepts pursued in this development and design will be those resulting from subtask (1).

f. Task 06 - RAM and quality Control

40.000

RAM analysis will be conducted on the design and test activities to isolate problem areas, evaluate potential performance, and determine potential reliability performance. The current weapon, ammunition and system RAM plans will be updated and maintained during this period of time.

g. Task 07 - System Safety

Provide a safety analysis of design activities and analysis of test results to maintain an independent assessment of the safety aspects of the system.

PREVIOUS EDITION WILL BE USED UNTIL EXHAUSTED

h. Task 08 - Human Factors and Reliability Engineering

20,000 11.

AMC 12 JUL 67 1006 A



\$

15,000

\$525,000

\$980,000

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 1)

PAGE	OF	PAGES	DATE
PRON			AMCMS CODE

\$

\$

50.000

70,000

\$ 305,000

During the conduct of previous SAW activities advancements have been made in this area relative to the designation of design and evaluation criteria. Proper application of these criteria have been shown to make significant differences in system performance. This task will provide the consultation and coordination with the Human Engineering Laboratory necessary for the application of HFE factors during the design and evaluation process.

i. Task 09 - Lethality Determination

During the conduct of activities in support of the COEA it has been determined that lethality data provided for analysis of the relative effectiveness of these systems has been extrapolated from minimal firings rather than data points empirically determined. A limited test data indicates that these extrapolations cannot be verified by actual test data and it is thus necessary to initiate this task to establish data points for a valid relative ranking of the systems for terminal performance.

j. Task 10 - Steel Case Technology

The steel case activities under the 6mm program have resulted in significant advances in technology relative to the utilization of steel as a cartridge case material and have indicated the feasibility of utilizing steel cartridge cases. Under this task steel case technology will be applied in establishing design criteria for application of steel as a cartridge case material in a caliber of choice.

k. Task 11 - Aluminum Case 7.62mm Ammunition

The principal shortcoming of 7.62 as a caliber is its weight. The system weight at the present time is approximately 7 lbs heavier than required. The application of aluminum can reduce this overweight condition to approximately 3 lbs. This task would involve the application of the aluminum case advancements and technology derived from 6.2 efforts to the 7.62 system.

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 4) PAGE OF PAGES DATE 28 January 1975 PRON AMCMS CODE

TO: AMSAR-RD

.

¢

FROM: SARRI-LS

PROJECT NO: 1J663607D640

PROJECT TITLE: Squad Automatic Weapon Advanced Development (Program Plan 1)

1. The following plan is the recommended FY76 effort based on the redirection that the SAW program be in Advanced Development category into FY77. This plan also accommodates equal development of hardware including ammunition and demonstration of potential for both 5.56mm and 7.62mm as calibers for the SAW application.

2. Anticipated Phase Slippages: NA

3. Funding Level Adjustments: NA

4. Work to be Performed:

a. Task 03 - Program Administration

(1) Normal program administration activitues such as program documentation, program plans and coordination with other interested agencies will be performed.

(2) The Validation IPR scheduled for January 1975 was replaced by a special IPR and the Validation IPR rescheduled for the FY76 transitionary period. To support the Validation IPR will require an updated concept formulation package including TOD, BTA, DRA and IGCE. In addition support to the user will be required in conduct of his COEA. An Integrated Logistics Support Plan will also be required. The necessary analysis and documentation will be provided from this subtask.

b. Task 04 - 7.62mm Investigation

(1) Hardware development was initiated in FY75. The FY76 effort is a continuation of that activity that will culminate in the delivery of two prototype weapons for engineering type tests to evaluate the predictions of the potential of this system and to establish data to estimate the reliability at this level of development.

(2) Ammunition development was initiated in FY75. The FY76 effort is a continuation of that activity and includes the delivery of 300,000 rounds of ammunition to support hardware development and provide a initial quantity for follow on engineering development activities. The conduct of this task is dependent upon the adoption of a cartridge other than the standard family of ammunition now available.

c. Task 05 - 5.56 Investigation

(1) Hardware development was initiated in FY75. The FY76 effort is a continuation of that activity that will culminate in the delivery of two prototype weapons for engineering type tests to evaluate the predictions of the potential of this system and to establish data to estimate the reliability at this level of development.

(2) Ammunition development was initiated in FY75. The FY76 effort is a continuation of that activity and includes the delivery of 300,000 rounds of

13

\$ 370.000

\$1,155,000

\$1,370,000

AMC 12 JUL 67 1006A

on enginee the adopti d. Ta RAM an weapon, am	to support hardware development a ring development activities. The on of a cartridge other than the s sk O6 - RAM & QA alysis of design and test activiti	conduct of this ta	isk is depend	ent upon ow availabl
RAM an weapon, am	alysis of design and test activiti		\$	
weapon, am	alysis of design and test activiti			200,000
	munition and system RAM plans will alyzed to support an updated CFP.	es and the update be conducted. In	and maintena addition te	nce of the st data
e. Ta	sk 07 - System Safety		\$	30,000
Contin and analys	ued activities to provide a safety is of test results to determine th	analysis during t e safety aspects c	he design ac of the system	tivities
f. Ta	sk 08 - Human Factors and Reliabil	ity Engineering	\$	40,000
	e consultation and coordination by plication of HFE factors during th			
g. Ta	sk 09 - Lethality Determination		\$	80,000
data as a considerat	ishment of a data base was initiat basis for comparing the lethality ion for the SAW role. The activit collection and analysis process.	of the various pro	jectiles und	er
h. Ta	sk 10 - Steel Case Technology		\$	75,000
	ue steel case technology to establ cartridge case material in a cali		a for applic	ation of
i. Ta Government	sk 12 - Limited Advanced Developme (ADVT-G)	nt Verification Te	st-\$	300,000
the FY75 a comparable	er to demonstrate the potential of nd FY76 program will be necessary data to that derived from the DT- ds shown \$100,000 is for the procu upport.	to conduct a limit I/OT-I conducted i	ed test to d n FY74 and F	evelop Y75.

.

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 4) PAGE OF PAGES DATE 28 January 1975 PRON AMCMS CODE

TO: AMSAR-RD

FROM: SARRI-LS

PROJECT NO: 1J663607D640

PROJECT TITLE: Squad Automatic Weapon Advanced Development (Program Plan 1)

1. The following plan is the recommended FY76 transition period effort for the Squad Automatic Weapon Program. The principal activities during this period will be the completion of the Advanced Development Verification Test-Government, the analysis of data and the preparation of supporting documentation for a Validation IPR.

2. Anticipated Phase Slippages: NA

3. Funding Level Adjustments: NA

4. Work to be Performed:

a. Task 03 - Program Administration

(1) Normal program administration activities such as program documentation, program plans and coordination with other agencies will be performed.

(2) Data analysis and documentation will be provided to support the Validation IPR. This will include an updated Concept Formulation Package including TOD, BTA, DRA, and IGCE, and support to the user in the conduct of a COEA.

b. Task 04 - 7.62 Investigations

Analysis of the ADVT-G test data will be conducted to support the data requirements for the CFP and Validation IPR.

c. Task 05 - 5.56 Investigations

Analysis of the ADVT-G test data will be conducted to support the data requirements for the CFP and Validation IPR.

d. Task C6 - RAM and QA

RAM analysis of the design and test activities and the update and maintenance of the weapon ammunition and system RAM plans will be conducted. Analysis of the test data in support of an updated CFP will also be conducted.

e. Task 07 - Safety

Analysis of the weapon designs under consideration relative to safety to provide inputs required for the CFP.

f. Task 08 - Human Factors Evaluation

To provide an analysis of the ADVT-G and to conduct as necessary supplemental tests to analyze the interface between the weapons under consideration. This data will also be provided to support the CFP.

15

70,000

10.000

50,000

\$

\$ 190,000

\$ 190,000

\$ 190,000

PROGRAM PLAN 2

SAWS ADVANCED DEVELOPMENT PHASE

١.

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 4) PAGE OF PAGES DATE 28 January 1975 PRON AMCMS CODE

TO: AMSAR-RD

FROM: SARRI-LS

PROJECT NO: 1J663607D640

PROJECT TITLE: Squad Automatic Weapon Advanced Development (Program Plan 2)

1. The following plan is the Priority 1 effort for the third and fourth quarters of FY75. This plan is a compromise between the guidance for technical scope in DA Teletype 191750Z Dec 74 and the tentative funding guidance provided by AMSAR-RDG. The activities in this plan contain the essential program administrative activities, the investigation of technical areas which are essential for program decisions such as lethality for cartridges under consideration, and gun weapon interface, and initiates the development of weapon mechanisms in 7.62 which have been identified as having a high probability of success from a technical viewpoint. The principal questions to be addressed during the technical investigation are the minimum weight that can be achieved with the 7.62 caliber systems and the maximum range potential obtainable with a 5.56mm cartridge that is compatible with the M16A1 Rifle.

2. Anticipated Phase Slippages: N/A

3. Funding Level Adjustments: N/A

4. Work to be Performed:

a. Task 03 - Program Administration

Normal program administration activities such as updating plans, demonstrations, briefings, coordination and project management will be included in this task area. The program plan calls for development of the SAW system through contractual activities. To accomplish this, it is necessary to prepare a Secretarial D&F, a Request For Proposal, evaluation of proposal submissions, and award of contract. Conduct of these administrative and technical actions to arrive at a contract in FY75 are included in this area.

b. Task 04 - 7.62mm Investigations

The guidance provided requires the investigation of minimum weight 7.62 system utilizing the standard M80 family of cartridges. To accomplish this, the mechanism identified as having the highest potential during prev.ous SAW activities will be utilized to design, develop and test a 7.62 mechanism. The objective of this activity is to identify the minimum weight achievable and to assess the level of performance as a baseline for continued design activities. Two prototype weapons will be obtained for engineering type tests as required to validate expected performance predictions utilizing the M80 cartridge.

c. Task 05 - Improved 5.56mm Investigation

The objective of this task is to survey the current state of the art relative to available 5.56mm projectiles and to apply existing technology to further improve the performance of 5.56mm projectiles. Compatibility with existing mechanisms and potential for use in an automatic weapon will be a companion activity. Projectiles will be fabricated and tested to support investigations required to define expected

17

\$ 120,000

\$ 390,000

\$ 590,000

	PAGE OF	PAGES	DATE
CONTINUATION OR SUPPORTING SHEET			
(AMCR 11-4, Vol. 4)	PRON		AMCMS CODE
			<i>.</i>

ballistics performance, ballistic match with tracer, improved tracer performance, and lethality. Companion activities will be undertaken to investigate potential problem areas in the gun ammunition interface area that were identified during previous SAW development activities. These areas include weapon powering and cartridge bore configuration interface.

d. Task O6 - RAM and Quality Control

RAM analysis will be conducted on the design and test activities to isolate problem areas, evaluate potential performance, and determine potential reliability performance. The current weapon, ammunition and system RAM plans will be updated and maintained during this period of time.

e. Task 07 - System Safety

Provide a safety analysis of design activities and analysis of test results to maintain an independent assessment of the safety aspects of the system.

f. Task 08 - Human Factors and Reliability Engineering \$ 20.000

During the conduct of previous SAW activities advancements have been made in this area relative to the designation of design and evaluation criteria. Proper application of these criteria have been shown to make significant differences in system performance. This task will provide the consultation and coordination with the Human Engineering Laboratory necessary for the application of HFE factors during the design and evaluation process.

q. Task 09 - Lethality Determination

During the conduct of activities in support of the COEA it has been determined that lethality data provided for analysis of the relative effectiveness of these systems has been extrapolated from minimal firings rather than data points experimentally determined. Limited test data indicates that these extrapolations cannot be verified by actual test data and it is thus necessary to initiate this task to establish data points for a valid relative ranking of the systems for terminal performance.

50,000

40.000

Ŝ

Ś

15,000

PAGES DATE 28 January 1975 PAGE OF CONTINUATION OR SUPPORTING SHEET AMCHS CODE (AMCR 11-4, Vol. 4) PRON FROM: SARRI-LS TO: AMSAR-RD PROJECT NO: 1J663607D640 PROJECT TITLE: Squad Automatic Weapon Advanced Development (Program Plan 2) 1. The following plan is the Priority 1 FY76 effort based on the redirection that the SAW program be in Advanced Development category into FY77. This plan also accommodates equal development of hardware including ammunition and demonstration of potential for both 5.56mm and 7.62mm as calibers for the SAW application. 2. Anticipated Phase Slippages: NA Funding Level Adjustments: NA 3. 4. Work to be Performed: \$ 370,000 a. Task 03 - Program Administration (1) Normal program administration activitues such as program documentation, program plans and coordination with other interested agencies will be performed. (2) The Validation IPR scheduled for January 1975 was replaced by a special IPR and the Validation IPR rescheduled for the FY76 transitionary period. To support the Validation IPR will require an updated concept formulation package including TOD, BTA, DRA and IGCE. In addition support to the user will be required in conduct of his COEA. An Integrated Logistics Support Plan will also be required. The necessary analysis and documentation will be provided from this subtask. \$745,000 b. Task 04 - 7.62mm Investigation (1) Hardware development was initiated in FY75. The FY76 effort is a continuation of that activity that will culminate in the delivery of two prototype weapons for engineering type tests to evaluate the predictions of the potential of this system and to establish data to estimate the reliability at this level of development. (2) Ammunition development was initiated in FY75. The FY76 effort is a continuation of that activity and includes the delivery of 300,000 rounds of ammunition to support hardware development and provide a initial quantity for follow on engineering development activities. The conduct of this task is dependent upon the adoption of a cartridge other than the standard family of ammunition now available. \$625,000 c. Task 05 - 5.56 Investigation (1) Hardware development was initiated in FY75. The FY76 effort is a continuation of that activity that will culminate in the delivery of two prototype weapons for engineering type tests to evaluate the predictions of the potential of this system and to establish data to estimate the reliability at this level of development.

(2) Ammunition development was initiated in FY75. The FY76 effort is a continuation of that activity and includes the delivery of 300,000 rounds of

4

PAGE PAGES DATE 0. CONTINUATION OF SUPPORTING SHEET PRON ANCHS CODE (AMCR 11.4, Vol. 4) ammunition to support hardware development and provide an initial quantity for follow on engineering development activities. The conduct of this task is dependent upon the adoption of a cartridge other than the standard family of ammunition now available. \$ 200,000 d. Task 06 - RAM & QA RAM analysis of design and test activities and the update and maintenance of the weapon, ammunition and system RAM plans will be conducted. In addition test data will be analyzed to support an updated CFP. 30,000 e. Task 07 - System Safety Continued activities to provide a safety analysis during the design activities and analysis of test results to determine the safety aspects of the system. \$ 40,000 f. Task 08 - Human Factors and Reliability Engineering Provide consultation and coordination by the Human Engineering Laboratory for the application of HFE factors during the design and evaluation process. q. Task 09 - Lethality Determination 80,000 Establishment of a data base was initiated in FY75 to obtain actual performance data as a basis for comparing the lethality of the various projectiles under consideration for the SAW role. The activity under this task will be to complete this data collection and analysis process. h. Task 10 - Steel Case Technology 75,000 Continue steel case technology to establish design criteria for application of steel as a cartridge case material in a caliber of choice. i. Task 12 - Limited Advanced Development Verification Test-\$ 240.000 Government (ADVT-G) In order to demonstrate the potential of the systems that have resulted from the FY75 and FY76 program will be necessary to conduct a limited test to develop comparable data to that derived from the DT-I/OT-I conducted in FY74 and FY75. Of the funds shown \$100,000 is for the procurement of ammunition and \$200,000 is for test support.

CONTINUATION OR SUPPORTING SHEET	PAGE OF PAGE	28 January 1975
(AMCR 11-4, Vol. 4)	PRON	AMCMS CODE
O: AMSAR-RD FRO	OM: SARRI-LS	
PROJECT NO: 1J663607D640		
ROJECT TITLE: Squad Automatic Weapon Adv	anced Development (Prog	jram Plan 2)
I. The following plan is the recommended bound Automatic Weapon Program. The principal be the completion of the Advanced Devo the analysis of data and the preparation of the Advanced Devo	ipal activities during elopment Verification 1	this period Test-Government,
2. Anticipated Phase Slippages: NA		
3. Funding Level Adjustments: NA		
. Work to be Performed:		
a. Task O3 - Program Administration		\$ 190,000
(1) Normal program administration act program plans and coordination with other	ivities such as progra: agencies will be perfo	documentation, rmed.
(2) Data analysis and documentation w IPR. This will include an updated Concept DRA, and IGCE, and support to the user in	Formulation Package in	port the Validation ncluding TOD, BTA,
b. Task 04 - 7.62 Investigations		\$ 190,000
Analysis of the ADVT-G test data will for the CFP and Validation IPR.	be conducted to suppor	t the data requireme
c. Task 05 - 5.56 Investigations		\$ 190,000
Analysis of the ADVT-G test data will for the CFP and Validation IPR.	be conducted to suppor	t the data requireme
d. Task C6 - RAM and QA		\$ 70,000
RAM analysis of the design and test ac the weapon ammunition and system RAM plans test data in support of an updated CFP wil	will be conducted. A	e and maintenance of nalysis of the
e. Task 07 - Safety		\$ 10,000
Analysis of the weapon designs under c inputs required for the CFP.	onsideration relative	to safety to provide
f. Task 08 - Human Factors Evaluation	l	\$ 50,000
To provide an analysis of the ADVT-G a tests to analyze the interface between the	nd to conduct as neces weapons under conside	sary supplemental ration. This data

A CARLES AND A CARLE

になっていたろう

1

WEINER MAND

PROGRAM PLAN SUPPLEMENT SAWS ADVANCED DEVELOPMENT PHASE

CONTINUATION OR SUPPORTING SHEET (AMCR 11-4, Vol. 4)

TO: AMSAR-RD

FROM: SARRI-LS

PROJECT NO: 1J663607D640

PROJECT TITLE: Squad Automatic Weapon Advanced Development (Program Plan Supplement)

1. The following Priority 2 and 3 plan is based on activities which could not be covered within the program guidance. The priority 2 effort is considered essential to investigate 5.56mm and 7.62mm utilization for SAW. The priority 3 effort fully responds to the guidance to investigate the potentials of 7.62 and 5.56mm as SAW contenders including high risk areas.

2. Anticipated Phase Slippages: N/A

3. Funding Level Adjustments: N/A

4. Work to be Performed:

a. Task 04 - Investigation of Improved 7.62mm Ammunition (Priority 2) \$ 135,000

A low recoil 7.62mm cartridge utilizing a reduced weight projectile will be investigated to determine performance characteristics.

b. Task 05 - Expanded Improved 5.56mm Investigations (Priority 2) \$ 390,000

The priority 1 effort will provide the basic answers to address the potential 5.56mm, however will not provide hardware to demonstrate and validate this potential as a system. The activity in this area will include the design, development, and test of the 5.56mm automatic weapon using the same mechanism as will be utilized in the 7.62mm priority 1 effort.

c. Task 10 - Steel Cased Ammunition (Priority 2)

The SAWS Advanced Development activities have resulted in the demonstration of feasibility of a steel cartridge case with expected performance comparable to that encountered when utilizing brass as a cartridge case material. This task will transfer the technology to either 7.62 or 5.56 to demonstrate the feasibility in the new caliber.

d. Task 11 - Aluminum Case 7.62mm Ammunition (Priority 3)

\$ 305,000

70,000

S.

The principal shortcoming of 7.62 as a caliber is its weight. The system weight at the present time is approximately 7 lbs heavier than required. The application of aluminum can reduce this overweight condition to approximately 3 lbs. This task would involve the application of the aluminum case advancements and technology derived from 6.2 efforts to the 7.62 system. The in-house portion of this program is \$85K with \$200K in contractual activities.

AMC 12 JUL 67 1006A

Martin Martin Co

RATIONALE: ENGINEERING DEVELOPMENT TIME AND COST ESTIMATES

The following estimate of time and cost for the Engineering Development (ED) Phase of the Redirected SAWS Program is based on the following assumptions:

1. The contractor is from a high cost area, i.e., West Coast.

2. The mechanism is the XM235.

3. The time span for ED is 36 months i.e., the caliber is 6.0mm or 7.62mm.

4. The rationale developed in the XM235 mechanism contracted in a High Cost Area can be applied as discussed in the Appendix.

INDEPENDENT GOVERNMENT COST ESTIMATE--RESEARCH AND DEVELOPMENT (AMCR 715-22)

1. PREPARING INSTALLATION

4. SYSTEMBL SUPPORTED BY THIS PROCUREMENT Squad Automatic Weapon System 8. WORK BEARDOOM 4 8. BYNATE PREPAR 18 December 19 18 December 19 18 December 19 18 December 19 19 10 COST RESEARCH AND DEVELOPMENT COST REFERENCE 10 11 COST CATEGORIES HOURS RATE SCHEDULE 1 BINESTLASON 85,206 59.22 794,822 2 WATENAL 1.975 50.525 3 OVERMED 86,206 59.22 794,822 4 OTENES 80,525 50.525 3 OVERMED 80,525 50.525 4 OTENES 80,525 50.525 5 TOOLING 389,944 50.525 1 UNEET LASON 56,957 56,957 5 TOTA STITEM MARGEMENT 622,770 56,957 6 CONTRACTON 486,179 58,933,593 7 TOTA STITEM MARGEMENT 52,893,593 59.33 8 CANDAL 7,443,417 58,206 9.14 9.14 7,43,417 59.593 8 CANDAL 80,206 59.22 <t< th=""><th></th><th>in</th><th>High Cost Ar</th><th>ea, PEP inc</th><th>luded</th><th>cted 4 Dec 74,</th><th></th><th>NA</th></t<>		in	High Cost Ar	ea, PEP inc	luded	cted 4 Dec 74,		NA
RESEARCH AND DEVELOPMENT COST REFERENCE 2 0 9 10 11 COST CATEGONIES HOUMS RATE ESTIMATE SCHEDULE 4 DIRECT LADOR 86,206 \$9.22 794,822 11 2 MATEMAL 1,975 2 SCHEDULE 11 3 OVEREAD 10% 874,304 4 4 4 OTHER 80,525	4. 1	5751	EN(S) SUPPORTED B	Y THIS PROCURE	MENT			ESTIMATE PREPARE
7 8 10 11 COST CATEGORIES HOURS RATE SCHEDULE A Image:		Sq	uad Automatic	Weapon Sys	stem	4	18	December 19
COST CATEGORIES HOURS RATE ESTIMATE SCHEDULE A IMMETIANS 86,206 \$9.22 794,822 1,975 1 JONECT LEBON 86,206 \$9.22 794,822 1,975 1 JONECT LEBON 874,304 975 1,975 2 MATERIAL 80,525 1,074,04 3 JONECT LABON 389,944 1,004 4 OTHER 389,944 1,004 3 OVERMEAD 1,000 1,000 4 OTHER 389,944 1,004 5 JONECT LABON 1,000 1,000 4 OTHER 790,000 1,000 5 JPAT 56,957 1,000 6 JATA 56,957 1,702,115 7 TOTAL SHITHEM MARGAMENT 622,770 1,002,115 1 OTHER (Spring) PEP 1,702,115 1 TOTAL SHITHEM MARGAMENT 1,702,115 1,703,431,417 1 TOTAL FRIC			RESEARCH AN	D DEVELOPMENT		COST	REF	ERENCE
a Implementation Implementation Implementation a Implementation Implementation Implementation <td< th=""><th></th><th></th><th>7</th><th>•</th><th>•</th><th>10</th><th></th><th>11</th></td<>			7	•	•	10		11
1 DRECT LABOR 86,206 \$9.22 794,822 2 WATERIAL 1,975 3 OVERMEAD 80,525 4 OTHER 389,944 1 ONECT LABOR 389,944 2 WATERIAL 389,944 3 OVERMEAD 389,944 4 OTHER 790,000 4 OTHER 790,000 4 OTHER 790,000 4 OTHER 790,000 5 PROTOTFE PRODUCTION 790,000 4 OTHER 56,957 5 POTA 56,957 7 TOTAL STSTEMS MANAGEMENT 622,770 5 CONTANUTION 94,002 1 OTHER (SPUT) PEP 1,702,115 5,893,593 4 TOTAL COST LESS (G AND A) 5 CAND A 4 CAND A 4 COTAL COST LESS (G AND A) 5 SP33,593 4 COTAL COST LE		co	ST CATEGORIES	HOURS	RATE	ESTIMATE	SCH	EDULE
1 DIRECT LABOR 86,206 \$9.22 794,822 2 WATERIAL 1,975 3 OVERMEAD 80,525 4 OTMER 389,944 1 OVERTICAL 389,944 2 WATERIAL 389,944 3 OVERMEAD 389,944 4 OTMER 389,944 5 TOOLING 790,000 4 OTMER 790,000 4 OTMER 56,957 5 TOTAL STSTEMS MANAGEMENT 622,770 6 CONTRUCTION 94,002 1 OTMER (Sperify) PEP 1,702,115 TOTAL COST LESS (G AND A) 5,893,593 4 CAND A 24.6% 1 TOTAL COST LESS (G AND A) 5,893,593 4 TOTAL COST LESS (G AND A) 5,090,71.5	-	<u>1</u> -	TENGINEERING					
2 WATERIAL 1,975 3 OVERMEAD 110% 874,304 4 OTHER 80,525 9 TOOLING 389,944 1 DIRECT LABOR 389,944 1 DIRECT LABOR 389,944 1 DIRECT LABOR 389,944 1 OVERMEAD 1 0 OTHER 790,000 2 WATERIAL 1 3 OVERMEAD 486,179 9 System TEST AND EVALUATION 486,179 9 TOTAL SYSTEMS MANAGEWENT 622,770 6 CONTRUCTION 94,002 1 TOTAL SYSTEMS MANAGEWENT 622,770 6 CONTRUCTION 94,002 1 TOTAL COST LISS (CAMP A) 5,893,593 K S GAND A 24,68 1 TOTAL COST LISS (CAMP A) 5,893,593 K S AND A 24,68 1 TOTAL COST LISS (CAMP A) 5,893,593 K S GAND A 24,68 1 TOTAL COST LISS (CAMP A) 5,893,593 </td <td>2</td> <td></td> <td></td> <td>86,206</td> <td>\$9.22</td> <td>794,822</td> <td></td> <td></td>	2			86,206	\$9.22	794,822		
3 OVERMEAD 110% 874,304 4 OTHER 80,525 700LMG 389,944 1 OURCT LABOR 389,944 2 WATERIAL 389,944 3 WATERIAL 389,944 4 WATERIAL 4 5 OURCT LABOR 790,000 6 OTHER 790,000 7 FORTANCTION 466,179 8 PATA 56,957 7 TOTAL SYSTEM MANDEMENT 622,770 6 CONTRUCTION 94,002 1 TOTAL SYSTEM MANDEMENT 622,770 6 CONTRUCTION 94,002 1 TOTAL SYSTEM MANDEMENT 56,957 1 TOTAL SYSTEM MANDEMENT 56,957 1 OTHER (Sperify) PEP 1 TOTAL COST LESS (GAND A) 5,893,593 1 TOTAL COST LESS (GAND A) 5,893,593 1 TOTAL COST LESS (GAND A) 8,011,668 FROMARKS TOTAL COST LESS (GAND		2	the same the second sec					
4 OTMER 80,525 1 DIRECT LADOR 389,944 2 WATERIAL		· ⊢ = · ·			110%			
I TOOLING 389,944 I UNACT LABOR Image in the imag		T	• • • • • • • • • • • • • • • • • • •					
i DIRECT LADOR 2 WATERNAL 0 OTHER c PROTOTIVE PRODUCTION 790,000 c PROTOTIVE PRODUCTION 790,000 c PROTOTIVE PRODUCTION 790,000 c Stream Test and Evaluation 6 Pata 7 TOTAL SYSTEMS MANAGEMENT 6 CONSTRUCTION 7 TOTAL SYSTEMS MANAGEMENT 7 TOTAL COST 9 PA 7 TOTAL COST 9 PA 7 TOTAL COST 9 PA 7 TOTAL COST 9 S 80,011,668 9 S 9 S <td></td> <td>1.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		1.						
1 WATERIAL 0 OTHER 0 OTHER 0 OTHER 0 OTHER 0 INSTEM TEST AND EVALUATION 0 CONSTRUCTION 1 OTHER (Specify) 1 OTHER (Specify) 1 OTAL COST LESS (G AND A) 1 TOTAL COST LESS (G AND A) 1 TOTAL COST LESS (G AND A) 1 TOTAL COST LESS (G AND A) 2 INTER (Specify) 1 TOTAL COST LESS (G AND A) 2 INTER (Specify) 1 TOTAL COST LESS (G AND A) 3 INTER (Specify) 4 INTER (Specify) 1 TOTAL COST 4 INTER (Specify) 1 TOTAL COST 1 INTER (Specify) 1 IN		11			1			
2 OVERMEAD OTHER 790,000 2 SYSTEM FEBOLUCATION 790,000 3 SYSTEM TEST AND EVALUATION 486,179 4 56,957		12		I				
c ornem 790,000 c system rest and evaluation 486,179 d stytem rest and evaluation 486,179 s Data 56,957 - total systems management 622,770 c Construction 94,002 H Training 94,002 - Total systems management 622,770 c Construction 94,002 H Training 94,002 - Total Cost Less (G AND A) 5,893,593 K - Canoa - Total Cost Less (G AND A) 5,893,593 K - Canoa 24.6% L - Total Cost Less (G AND A) 5,893,593 K - Canoa 24.6% L - Total Cost Less (G AND A) 5,893,593 K - Canoa 24.6% L - - Total Cost Less (G AND A) K - - - - Total Cost Less (G AND A) - - -		1 -			1			
C PROTOTYPE PRODUCTION 790,000 D STATEM TEST AND EVALUATION 486,179 C DATA 56,957 F TOTAL SYSTEMS MANAGEMENT 622,770 G CONSTRUCTION 94,002 M TRAINING 94,002 I OTHER (Specify) PEP J TOTAL COST LESS (G AND A) 5,893,593 K C AND A 24.6% I TOTAL COST 9.1% M TOTAL COST 9.1% M TOTAL COST 8,011,668 PROMIT OF FEE 8,011,668 PRIMARKS TOTAL PRICE RUMARKS Total Contractor Man Hours 219,681.5 Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 TVPED NAME AND TITLE SIGNATURE Extension PREPARING OFFICIAL 18 Dec 74		·			d Anteriot			
0 - SYSTEM TEST AND EVALUATION 486,179 5 DATA 56,957 7 TOTAL SYSTEMS MANAGEMENT 622,770 6 - CONSTRUCTION M - TOTAL SYSTEMS MANAGEMENT 6 - CONSTRUCTION M - TOTAL SYSTEMS MANAGEMENT 6 - CONSTRUCTION M - TOTAL SYSTEM TEST AND EVALUATION M - CONSTRUCTION M - TOTAL SYSTEM TEST AND EVALUATION M - CONSTRUCTION M - CONSTRUCTION J - CONSTRUCTION J - CONSTRUCTION J - TOTAL COST Y PEP 1,702,115 J - TOTAL COST Y PACHT OR FEE 80,011,668 PRIMARKS - TOTAL PRICE Total Contractor Man Hours = 219,681.5 Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 C TYPED NAME AND	c	1.		TION		790,000		
E DATA 56,957 F TOTAL SYSTEMS MANAGEWENT 622,770 G CONSTRUCTION 94,002 M TRAINING 94,002 J TOTAL COST LESS (G AND A) 5,893,593 K C AND A 24.6% L TOTAL COST LESS (G AND A) 5,893,593 K C CAND A 24.6% L TOTAL COST 7,343,417 M FREMENT OR FRE 9.1% N TOTAL PAICE 8,011,668 FRIMARKS TOTAL CONTRACTOR MAN HOURS = 219,681.5 as Follows: Development Engr. 86,206 PEP 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 * TYPED NAME AND TITLE SIGNATURE Extension DATE PREPARING OFFICIAL SIGNATURE 4255 18 Dec 74 Reviewing OFFICIAL Reviewing OFFICIAL 18 Dec 74	-	1.	and the second sec			486,179		
r TOTAL SYSTEMS MARAGEMENT 622,770 G CONSTRUCTION 94,002 H TRAINING 94,002 I OTMER (Specify) PEP I OTMER (Specify) PEP I TOTAL COST LESS (G AND A) 5,893,593 K G AND A 24.6% L TOTAL COST 24.6% L TOTAL COST 7,343,417 M FROFIT OR FEE 9.1% N TOTAL COST 8,011,668 FRIMARKS TOTAL CONTRACTOR MAN HOURS 219,681.5 as Follows: Development Engr. 86,206 PEP 80,071.5 TOOLING 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 TVPED NAME AND TITLE SIGNATURE Extension PREPARING OFFICIAL NOY F. SCHWEGLER 4255 18 Dec 74 Reviewing OFFICIAL 18 Dec 74	-	1.						
G CONSTRUCTION M TRAINING 1 OTHER (Specify) 2 OTHER (Specify) 1 OTHER (Specify) 2 TOTAL COST LESS (G AND A) 5 7, 343, 417 M TOTAL COST 1 TOTAL COST 2 TOTAL COST 1 TOTAL COST 1 TOTAL COST 2 TOTAL COST 1 TOTAL COST 2 TOTAL COST 2 TOTAL COST 1 TOTAL COST 2 TOTAL COST 2 TOTAL PRICE 1 Below 1 TOTAL PRICE 1 Below 1 TOTAL PRICE 1 Below 1 <td></td> <td>11</td> <td></td> <td>AGEMENT</td> <td></td> <td></td> <td></td> <td></td>		11		AGEMENT				
H • TRAINING 94,002 I • OTHER (Specify) PEP 1,702,115 J • TOTAL COST LESS (G AND A) 5,893,593 K • CAND A 24.6% L • TOTAL COST 7,343,417 PROFIT OR FEE 9.1% 7,343,417 N • TOTAL COST 9.1% N • TOTAL COST 9.1% N • TOTAL COST 9.1% N • TOTAL COST 8,011,668 PROFIT OR FEE 9.1% 8,011,668 PREVENT Booth Hours = 219,681.5 Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 * * PREPARING OFFICIAL ROY F. SCHWEGLER SIGNATURE PREPARING OFFICIAL ROY F. SCHWEGLER 4255 Mechanical Engineer 4255 Neviewing OFFICIAL 18 Dec 74		1.	and the second s			I		
1 OTHER (Specify) PEP 1,702,115 J TOTAL COST LESS (G AND A) 5,893,593 K G AND A 24.6% L TOTAL COST 7,343,417 M FROFIT OR FEE 9.1% N TOTAL COST 7,343,417 M FROFIT OR FEE 9.1% N TOTAL PRICE 9.1% FROFIT OR FEE 9.1% 7,343,417 M FROFIT OR FEE 9.1% M TOTAL PRICE 9.1% N TOTAL PRICE 9.1% FROFIT OR FEE 9.1% 7,343,417 M FROFIT OR FEE 9.1% M TOTAL PRICE 8,011,668 FREMARKS Total Contractor Man Hours = Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 * PREPARING OFFICIAL ROY FLOATE SIGNATURE Extension Mechanic	н	1.	···· ··· ··· · ··· ·			94,002		
j TOTAL COST LESS (G AND A) 5,893,593 K GAND A 24.6% L TOTAL COST 7,343,417 M FROFIT OR FRE 9.1% N TOTAL COST 9.1% N TOTAL PRICE 8,011,668 FRIMARKS Total Contractor Man Hours = Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 TYPED NAME AND TITLE SIGNATURE EMEPARING OFFICIAL SIGNATURE ROY F. SCHWEGLER 4255 Mechanical Engineer 4255	ï	1.		PEP				
k . GANDA 24.6% L . TOTAL COST 7,343,417 M . PROFIT OR FEE 9.1% N . TOTAL PRICE 8,011,668 PRIMARKS Total Contractor Man Hours = 219,681.5 as Follows: Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 4 YPED NAME AND TITLE SIGNATURE EXTENSION PREPARING OFFICIAL 18 Dec 74 ROY F. SCHWEGLER 4255 Mechanical Engineer 4255	j.							
M PROFIT OR FEE 9.1% N TOTAL PRICE 8,011,668 FREMARKS Total Contractor Man Hours = 219,681.5 as Follows: Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 * TYPED NAME AND TITLE SiGNATURE Extension PREPARING OFFICIAL 80,071.5 ROY F. SCHWEGLER 4255 Mechanical Engineer 4255 Netwing OFFICIAL 18 Dec 74	ĸ	1.	G AND A	24.6%		1		
M PROFIT OR FEE 9.1% N TOTAL PRICE 8,011,668 FREMARKS Total Contractor Man Hours = 219,681.5 as Follows: Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 * TYPED NAME AND TITLE SiGNATURE Extension PREPARING OFFICIAL 80,071.5 ROY F. SCHWEGLER 4255 Mechanical Engineer 4255 Netwing OFFICIAL 18 Dec 74	L	1.	TOTAL COST			7,343,417		
PEMARKS Total Contractor Man Hours = 219,681.5 as Follows: Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 Typed NAME AND TITLE SIGNATURE Extension PREPARING OFFICIAL ROY F. SCHWEGLER 4255 18 Dec 74 Reviewing OFFICIAL Is Dec 74 18 Dec 74	M	1.	PROFIT OR FEE	9.1%				
FPEMARKS Total Contractor Man Hours = 219,681.5 as Follows: Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4,857 * TYPED NAME AND TITLE PREPARING OFFICIAL SIGNATURE ROY F. SCHWEGLER 4255 Mechanical Engineer 4255 Neviewing Official 18 Dec 74	N	! -	TOTAL PRICE			8,011,668		
Development Engr. 86,206 PEP 80,071.5 Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 TYPED NAME AND TITLE SIGNATURE EXTENSION DATE PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer 4255 18 Dec 74	REM	ARK						
Tooling 8,328 System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 'TYPED NAME AND TITLE SIGNATURE PHEPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer 4255 . REVIEWING OFFICIAL 18 Dec 74		To	Developm		s = <u>2</u>	86,206	Follows:	
System Test & Eval 17,179 Total Syst Mgmt 23,040 Training 4.857 TYPED NAME AND TITLE SIGNATURE PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer 4255 Reviewing OFFICIAL 18 Dec 74								
Total Syst Mgmt 23,040 Training 4.857 TYPED NAME AND TITLE SIGNATURE EXTENSION PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer 4255 18 Dec 74 Reviewing OFFICIAL 4255 18 Dec 74				ost & Fusi				
Training4.857TYPED NAME AND TITLESIGNATUREEXTENSIONDATEPREPARING OFFICIALROY F. SCHWEGLER Mechanical Engineer425518 Dec 74Reviewing OfficialReviewing Official18 Dec 74								
TYPED NAME AND TITLE SIGNATURE EXTENSION DATE PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer 4255 18 Dec 74 Reviewing Official 4255 18 Dec 74								
PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer Reviewing Official		TYP			SIGN		EXTENSION	DATE
Mechanical Engineer 4255 18 Dec 74	. 4	PREP	ARING OFFICIAL					
REVIEWING OFFICIAL								
		Me	chanical Engi	neer			4255	18 Dec 74
		REV	IEWING OFFICIAL				1	
e. APPROVING OFFICIAL								

AMC FORM 10110-R

Mary Mar 1657 Methodal States and the

INDEPENDENT GOVERNMENT COST ESTIMATE--RESEARCH AND DEVELOPMENT (AMCR 7/5-22)

1. PREPARING INSTALLATION

Į.

In	PLIES ON SERVICES -House Monito ontract, XM235	ring of Red	irected	SAWS Developm PEP Included	ent	3. <u>.</u> Q	NA
4. SYS	TEM(S) SUPPORTED	THIS PROCURE	MENT	S. WORK BRE	AKDOWN	A. 6	STIMATE PREPARE
Sq	uad Automatic	Weapon Sys	tem	4		18	December 19
	RESEARCH AN	DEVELOPMENT		COST		REFE	RENCE
	7	•	9	10		1	1
c	OST CATEGORIES	HOURS	RATE	ESTIMATE	_	SCHE	DULE
	ENGINEERING						
······································		56,615	-	475,207			
2				3,600			
- ī			85%	403,926			
				72,403			
	TOOLING						
- [j	DIRECT LABOR						
2	MATERIAL						
3							
	OTHER						
c .	PROTOTYPE PRODUC	TION					
0 .	SYSTEM TEST AND ET			138,738			
ε .	DATA						
	TOTAL SYSTEMS MAN	AGEMENT		·			
c † .	CONSTRUCTION						
-	TRAINING						
₩ • •	OTHER (Specity)	• • •	PEP	533,978			
. .	TOTAL COST LESS (G			1,627,852			*********
<u>к</u>	G AND A			12/02/1032			
	TOTAL COST			+			
5	PROFIT OR FEE			+			
N I	TOTAL PRICE	····		++			
36	KS Month Effort						
	PED NAME AND TITLE		SIG	NATURE	EXTEN	510N	DATE
RC	PARING OFFICIAL DY F. SCHWEGLE chanical Engi				425	55	18 Dec 74
	VIEWING OFFICIAL				+		

AMC FORM 10110-2

ARTICLESS THE PARTY OF A DECOMPOSITION

品をし

C. APPROVING OFFICIAL

XM-235 (HIGH COST AREA) CONTRACTOR MAN HOUR SUMMARY

ſ

.

And Bridge Bridge - Carden State

Contract PEP Activity Development Eng. *PEP Material Tooling **Other D.C.	FY77 28,490 7,850 -0- 8,328 11,237	FY78 28,956 64,520.5 -0- -0- 11,949	FY79 23,760 7,701 -0- 21,890	TOTAL 86,206 80,071.5 -0- 8,328 45,076
Total Hours	55,905	105,425.5	58,351	219,681.5
Man Years (1800 Hrs)	31.06	58.57	32.42	122.05
<pre>**O.D.C. D-3 System Test & Eval. E-3 Data F-2 Total Syst Mgmt. E-4 Training Total O.D.C.</pre>	3,557 7,680 <u>-0-</u> 11,237	4,269 INCLUDED IN 1 7,680 <u>-0-</u> 11,949	-	17,179 23,040 <u>4,857</u> 45,076
*PEP PEP Dev Eng Quality Control Indust. Facil. O.D.C.	7,701 -0- 149 -0-	30,802 26,837 596 6,285.5	7,701 -0- -0- -0-	46,204 26,837 745 6,285.5
Total PEP	7,850	64,520.5	7,701	80,071.5

XM-235 (HIGH COST AREA) ENG. DEV. R.D.T.&E.

	<u>FY77</u>	<u>FY78</u>	<u>FY79</u>	TOTAL		
<pre>1.1 Contract 1.11 Dev. Eng/Val 1.12 PEP 1.13 Tooling 1.14 Mfg. Proto. 1.15 Other</pre>	564,118 182,384 389,944 -0- 346,182	573,128 1,368,141 -0- 526,667 369,630	614,380 151,590 -0- 263,333 544,096	1,751,626 1,702,115 389,944 790,000 1,259,908		
FY Cost (Less G&A) G&A (24.6%)	1,482,628	2,837,566	1,573,399	5,893,593		
FY Cost Profit (9.1%)	1,847,355	3,535,607	1,960,455	7,343,417		
FY Total Price	2,015,464	3,857,347	2,138,857	8,011,668		
<pre>1.2 In-House 1.21 Dev. Eng. 1.22 PEP 1.23 Tooling **1.24 Mfg. 1.25 Other In-House Cost</pre>	379,361 179,774 -0- -0- 559,135	298,278 177,993 -0- -0- 476,271	277,497 176,211 -0- -0- 138,738 592,446	955,136 533,978 -0- -0- <u>138,738</u> 1,627,852		
TOTAL R&D PROG.	2,574,599	4,333,618	2,731,303	9,639,520		
** DT/OT(ARMCOM) \$23,123/MOI=4 mosII=6 mos.						
* Other Syst Test & Eval. Data Total Syst Mgmt. Training	81,635 56,957 207,590 -0-	162,040 -0- 207,590 -0-	242,504 -0- 207,590 94,002	486,179 56,957 622,770 94,002		
TOTAL	346,182	369,630	544,096	1,259,908		

١

「たいい」のないというないないないというない

1/10

28

SAW WEAPON XM-235 (HIGH COST AREA) PRODUCIBILITY ENGINEERING & PLANNING ENG. DEV., R.D.T & E.

Contract PEP	<u>FY77</u>	<u>FY78</u>	FY79	TOTAL
Other Direct Costs M.P.E. Travel Reproduction	-0- 847 177	121,700 847 177	-0- 1,745 708	121,700 3,439 1,062
Total O.D.C.	1,024	122,724	2,453	126,201
Direct Labor	71,003	283,995	71,003	426,001
Material	30	120	30	180
Overhead	78,104	312,393	78,104	468,601
TOTAL ENGINEERING	150,161	719,232	151,590	1,020,983
Tooling	27,850	111,398	-0-	139,248
Quality Control	-0-	520,018	-0-	520,018
Data	1,488	5,953	-0-	7,441
Indust.Facilities	2,885	11,540	-0-	14,425
TOTAL PEP	182,384	1,368,141	151,590	1,702,115

.

v

TANK STORE AND AND THE STORE STORE

CONTRACTOR DEVELOPMENT ENG PEP

Rationale:

• The Contractor PEP effort is estimated to address the following areas:

a. Producibility Engineering and Planning Studies.

b. Product Engineering and Tolerance Studies.

Tasks are identified in each area, required manhours are estimated for each task and the total estimated manhours determined. These manhours are multiplied by appropriate labor and overhead rates to obtain total values for Direct Labor and Overhead, \$150 is estimated for Materials and these values of Direct Labor, Overhead, and Material cost are added to Other Direct Costs which are defined in a separate section.

CONTRACTOR DEVELOPMENT ENG PEP

A. Producibility Engineering and Planning Studies:

TASK MANHOURS 2614 1. Review Part Drawings Prepare Draft Process Sheets Determine Unique Operations 6532 224 4. Conduct Process Capabilities Study 3541 5. Determine Difficult Items and Make Recommendations 1770 6. Prepare Reports 52 7. Maintain Supervision 6035 TOTAL "A" 20768 hours

B. Product Engineering and Tolerance Studies:

1.	Review Drawings	586
2.	Review Mil. Standards & Specs.	274
3.	Select and Conduct Redesign	3784
4.	Prepare Reports	51
5.	Review Data/Identify Areas for Study	611
6.	Conduct Tolerance/Dimension Study	3399
7.	Determine Revisions and Prepare Report	706
8.	Maintain Supervision	6035
	TOTAL "B"	15446 hours

TOTAL MANHOURS (A & B) 36,214

A-2 PEP

TASSAR MANY MARCHATTARS THE

SAW-XM-235 (HIGH COST AREA) CONTRACTOR DEVELOPMENT ENG PEP

Total ManHours Data Item ManHo Total ManHours	\$ 36,214 hrs 9,990 hrs 46,204			
Direct Labor Ra Direct Labor Cc Overhead Rate 1	\$ 9.22/hr. \$426,600.88			
Overhead Cost	\$468,600.97			
Engineering Cos Direct Labor Material Overhead O.D.C. Total Engine	\$426,001 180 468,601 <u>126,201</u> 1,020,983			
	¥Y77	<u>FY78</u>	<u>FY79</u>	TOTAL
0.D.C.	1,024	122,724	2,453	126,201
Direct Labor	71,003	283,995	71,003	426,001
Material	30	120	30	180
Overhead	78,104	312,393	78,104	468,601
Total Eng.	\$150,161	\$719,232	\$151,590	\$1,020,983

A-3 PEP

OTHER DIRECT COSTS CONTRACTOR PRODUCIBILITY ENGINEERING & PLANNING (PEP)

RATIONALE: Other Direct Costs are assumed to consist of three (3) categories:

- a. Manufacturing Processing Engineering
- b. Travel
- c. Reproduction Costs
 - (1) PEP Studies
 - (2) Product Engineering and Tolerance Studies

XM-235 (HIGH COST AREA) OTHER DIRECT COSTS CONTRACTOR PEP

A. Manufacturing Process Engineering is the Engineering effort to prepare and process routing sheets and other documentation defining in detail the manufacturing processes to be used for each component.

Estimated manufacturing operations	967
Estimated Eng Hrs per operation	6.5 hrs.
Direct Labor Rate	\$9.22/hr
Overhead	110%

Required ManHrs.	96/ X 6.5	6285.5
Direct Labor	6285.5 x \$9.22	\$57,952.31
Overhead	\$57,952.31 x 1.10	63,747.54
Total M.P.E.		\$121,699.85

B. O.D.C. Travel

Estimated travel consists of 2 trips to RIA by 1 man in FY77 at 2 x \$449 = \$898, plus 2 trips by 2 men at \$847 per trip (1 trip in FY76/77 and 1 trip in FY77).

		<u>FY77</u>	FY78	FY79	TOTAL
l man 2 man		\$847	\$847	\$898 \$847	
	Travel	<u>\$847</u> \$847	\$847	\$1745	\$3439

ODC/-2 PEP

XM-235 (HIGH COST AREA) OTHER DIRECR COSTS CONTRACTOR PEP

c. Reproduction

1) Estimated for Producibility Engineering and Planning Studies:

	<u>FY77</u>	F	<u>Y78</u>		<u>FY79</u>		TOTAL
	41.00	4	1.00		164.0	00	\$246.00
2) Studies:	Estimated	for P	roduct	Engir	ncerin	ng and To	lerance
Dedutes	<u>FY77</u>	F	¥78		<u>FY79</u>		TOTAL
	136.00	1	36.00		544.0	00	\$816.00
3)	Total Reprodu		ion/FY				
	<u>FY77</u>	F	¥78		FY79		TOTAL
	177.00		177.00 708.		708.0	0	\$1,062.00
0.D.C. s	Summary	F	277	FY78	3	FY79	TOTAL
Total	M.P.E. Travel Reproducti		0- 847 <u>177</u>	121,	700 847 177	-0- 1,745 	121,700 3,439 1,062
TOTAL O.	D.C	i	1,024	122,	724	2,453	\$126,201

ODC/-3 PEP

SAW LIFE CYCLE COST ESTIMATE

APPENDIX

APPENDIX 1

SAW LIFE CYCLE COST ESTIMATES

The start of the s

3 . , 1

ESTIMATED COSTS FOR SAWS OPTIONS

Cost Estimations for the various SAW options of weapon mechanisms and ammunition have been developed by preparing Basic Estimated Cost Packages to cover each of the optional mechanism concepts and ammunition types and the conversion efforts required to combine certain mechanism concepts to specific ammunition types. A list of the Basic Estimated Cost Packages for weapons is as follows: (See Appendix 2 for details)

I. Advanced Development (Phase I) Weapon Only

A. 7.62mm conversion from 6.00mm 9 months effort

B. 5.56mm conversion from 6.00mm 12 months effort (also covers Fabrique Nationale 63 grain 5.56mm)

*C. Conceptual effort with extensive changes, 18 months effort

*D. Added cost for Contractor without previous SAW experience, 6 months effort.

II. Full Scale Development (Phase II) (Includes PEP) Weapon Only

A. XM-233 Contracted by Maremont in 6.00mm

B. XM-234 Contracted by Philco-Ford in 6.00mm

C. XM-235 Contracted in a Low Cost Area in 6.0mm.

D. XM-235 Contracted in a High Cost Area in 6.0mm.

E. Conceptual Contracted by an average U.S. Contractor in 6.00mm or F/N Contracted by an average U.S. Contractor in 5.56mm/ 63 grain.

III. Initial Limited Production of 1000 Weapons

- A. XM-233
- B. XM-234
- C. XM-235

D. The average of A., B, & C is used for Conceptual & F/N weapons.

*These packages were not used in the Decision Risk Analysis (DRA)

IV. Full Scale Production - 42,000 Weapons

Λ. XM-233

B. XM-234

C. XM-235

CTAL SHE CASE POR MANNE

D. The average of A., B. & C above is used for F/N and Conceptual Weapons.

V. A series of cost estimates for ammunition have been prepared by Frankford Arsenal to cover the various related ammunition options manufactured by NGEP or Conventional means. Cost of manufacture by conventional means is used for the DRA.

By combining the appropriate Weapon and Ammunition estimates, a completion estimate of system costs can be made.

The following assumptions have been made in preparing the cost estimates.

I. The effort is divided between In-House (Government) activities and related cost and Contractor activities and related cost.

II. The In-House activities are to monitor and direct contractor activities, and perform Configuration Management, PEP efforts and conduct Development and Operational Tests.

III. The Contractor is to perform detail engineering and fabrication of hardware.

IV. In-House costs are based on Step 5 labor rates, 150 hours per month, 31% fringe benefits, and 55% Overhead.

V. Contractor labor costs are based on equivalent GS Grade hours of effort with labor rate and overhead rates derived from historical data supplied by the Cost Analysis Section of the Comptrollers Office.

VI. No allowance for overtime has been made.

VII. Total limited production is assumed to be 1000 weapons at a rate of 100 per month.

VIII. Total full scale production is assumed to be 42,000 weapons at 2,000 per month and 609,000,000 rounds of ammunition.

The Decision Risk Analysis considers only certain combinations of options as follows:

- 1. XM-233 contracted by Maremont in 6.00mm (IIA)
- 2. XM-234 Contracted by Philco-Ford in 6.00mm (IIB)
- *3. XM-235 contracted in a Low Cost Area in 6.0mm (IIC)
- *4. XM-235 contracted in a High Cost Area in 6.0mm (IID).
 - 5. Conceptual weapon by average U.S. Contractor in 6.00mm (IIE)
 - Conceptual weapon by average U.S. Contractor in 5.56mm (IIE, IB)
 - 7. Conceptual weapon by average U.S. Contractor in 7.62mm (IIE, IA)
 - Fabrique Nationale weapon by average U.S. Contractor in 5.56mm/63 grain (IIF)

*The cost shown on the Performance Potential Questionnaire for the XM235 is the average of these two costs.

RECOMMENDATIONS ESTIMATED LIFE CYCLE COSTS FOR THE SAW WEAPONS CANDIDATES

1. It is recommended that the Estimated Life Cycle Costs and the RDT&E Costs shown for the Best Conceptual Weapon (BC) combined with the XM732 ammunition be considered as representative of the costs for the weapon-ammunition combination which most completely addresses the SAW requirements.

2. It is further recommended that the Best Conceptual Weapon (BC) Cost Estimates are most representative of the probable weapon costs which will be incurred in developing a superior SAW weapon regardless of the ammunition selected.

CONCLUSIONS ESTIMATED LIFE CYCLE COSTS FOR THE SAW WEAPONS CANDIDATES

1. The Life Cycle Cost Estimates are divided into three sections RDT&E Costs, Limited Production Costs and Full Scale Production Costs. (Sunk Costs are not considered in this estimate).

2. The weapons with the lowest Estimated Life Cycle Cost are: (Lowest first)

- a. XM235/XM732 (East Coast Contractor)
- b. XM235/XM732 (West Coast Contractor)
- c. Best Conceptual Weapon/XM732 (Average U.S. Contractor)

3. The weapons with the highest Estimated Life Cycle Cost are: (Highest last)

- a. Fabrique Nationale/M193
- b. Fabrique Nationale/63 grain 5.56
- c. XM233/XM732

4. The weapons with the lowest Estimated RDT&E Cost are: (Lowest first)

- a. XM235/XM732 (East Coast Contractor)
- b. XM233/XM732 (East Coast Contractor)
- c. Best Conceptual Weapon/XM732 (Average U.S. Contractor)

5. The weapons with the highest Estimated RDT&E Cost are: (Highest Last)

a. XM234/XM732

b. Best Conceptual Weapon/any caliber other than XM732

c. Fabrique Nationale/either M193 or 63 grain round

6. The Best Conceptual Weapon is assumed to be a weapon incorporating desirable features selected by the Government from among all of the SAW candidate weapons. No allowance has been made for royalties or licenses when estimating costs for the Best Conceptual Candidates.

a. The Best Conceptual Candidate having the lowest Life Cycle is the BC/XM732

b. The Best Conceptual Candidate having the highest Life Cycle Cost is the BC/M80

												1		preseration (
		* j										, ,	1	(Can be used as cut sheets or water copy preparation
		2	11.1761	9, 418) 7, 505 1, 913	3,527)	1.097	5. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	(162.02		607 4		-+		<u> </u>
	•	22												
	•	1												
								-					•	
	•	MC*	13	(0,210) 6,656 1,522	. 3, 514	1.097	2,120	E27, 688	22,101	1		i i	i i	
		TEST DAST	167.8.36	(909,1) 7,197 1,512	(3,224) -0-	1,047	2.87	(12, 546) (27, 669		-0-0				
		E ST DUJS	(656,51)	(6,949) 5,468 1,521	() 2, 2, 2 ()	1,047	1.000	(22, 746)	121 121 121 121 121 121 121 121 121 121	-0				
•	-	20024	13	(10,401) 7,878 1,523	3.663)	1.146	22.2			-0-0- -0-7-	1			
ONLY (KS	-	10233	13	5,963	1 3,655)	1,098	2,260			(0 . 0 0 . 0 0 . 0		1		1
TS NEALON	-	Line Me	40,582)	2.740)		1,097	2,115		27 52 55 55 55 55 55 55 55 55 55 55 55 55	-0-0			1	
LIFE CYCLE COSTS NEAPON ONLY (KS)	-	NC. KNZ87	(40,814)	2.010	((612,6	1.097	2,119	20	22, 250 2, 407 2, 407	-0-	1	1		
LI II	-	80. 63 gr	(40,710) (2.010	3.501)] (1.097	2,117	27.456)) [(27.256) [(h	-0-		<u> </u>		
	-	BC*	10.642)	2.010	1, 510) () -0-	1.097	2,116	(27,933))(28,013)) ((27,379))((27,456)) (27,179) (27,256) (27,179) (27,256)		-0-				
	-		1) (196.29	10,796) (7,743 2,010	3,525) (1.007	2.117) ((cto.81) (10,00,00)	22, 119 1403 2, 403	202)		+		
	-	FI M193	42.266) [4	(10,796 11 7,743 2,010	_	1. 397	2.116	2) (000,7)		300)				
	_	MIGAI	Ĩ					<u>99</u>		~~				
	-	1981 1981												
	-	Characterístic	LIFL CYCLE CGTS-WEAPON	1. RUTEL (Meapon) Eng. (Contract Eng (La House Foreion Lanase & Data Package	 Limited Production Foreign Royalty 	Contract Agent the	ANVEST ASCULTING Contract In-House	2 2	 Expirestag Touing Control Quainty Control Mundacturing Amadate Adminatestive (N Profit of Faes 10) 	In-Bouse Eng Support Royalty				🗮 SARRI Form 900-638, I Dec 74 (07)

TTO COLUMN STREET

SUMMARY OF S.A.W. PROGRAM TIME AND COST

Elapsed time for completion of RDT&E, Limited Production (1000 weapons), and Full Scale Production for the various weapons combinations is listed below:

		RDT&E	LP	FSP	TOTAL
1. 2. 3. 4. 5.	FN/M193 FN/63 gr. BC/M193 BC/63 gr. BC/XM287	44 mos. 44 mos. 44 mos. 44 mos. 44 mos.	12 mos. 12 mos. 12 mos. 12 mos. 12 mos. 12 mos.	24 mos. 24 mos. 24 mos. 24 mos. 24 mos.	80 mos. 80 mos. 80 mos. 80 mos. 80 mos.
6. 7. 8. 9. 10. 11.	BC/WAMBEE XM233/XM732 XM234/XM732 XM235/XM732 BC/XM732 BC/M80	44 mos. 32 mos. 32 mos. 32 mos. 32 mos. 41 mos.	12 mos. 12 mos. 12 mos. 12 mos. 12 mos. 12 mos.	24 mos. 24 mos. 24 mos. 24 mos. 24 mos. 24 mos.	80 mos. 68 mos. 68 mos. 68 mos. 68 mos. 77 mos.

The 32 month RDT&E schedule tasks are:

1. Correct design deficiencies revealed during Validation Testing of Selected weapon mechanism.

2. Confirm that the resultant weapon design meets performance requirements by conducting the Research and Development Acceptance Test (RDAT) and evaluating the results.

3. Complete the Technical Data Package for Limited Production (TDP/LP).

4. Fabricate 100 prototype weapons in accordance with TDP/LP for Development Testing and Operational Testing (DT-II/OT-II).

5. Conduct DT-II/OT-II and evaluate results.

6. Conduct In Process Review for Limited Production (IPR/LP).

7. Type Classify the weapon for Limited Production (TC/LP).

The 41 month RDT&E schedule addresses the same tasks as the 32 month schedule plus the additional tasks required to convert the subject weapon mechanism from the XM732, 6mm round to the M80, 7.62mm round. The 41 month RDT&E schedule tasks are:

1. Redesign the selected mechanism concept to function with the M80 series ammunition.

2. Fabricate 10 prototype weapons, 3 for Preliminary Testing and 7 for DT-I/OT-I.

3. Conduct a limited DT-I/OT-I of approximately 4 months duration to develop data required to confirm the performance potential in accordance with SAW requirements.

4. Evaluate DT-I/OT-I data and determine performance potential and design deficiencies to be corrected.

5. Correct design deficiencies and prepare preliminary TDP.

6. Confirm that the resultant weapon design meets performance requirements by fabricating 4 prototype weapons, conducting the RDAT and evaluating the results.

7. Complete the TDP/LP.

8. Fabricate 100 prototype weapons in accordance with TDP/LP for DT-II/OT-II.

9. Conduct DT-II/OT-II and evaluate results.

10. Conduct IPR/LP.

Shiften Shiften Long

11. Type Classify the weapon for Limited Production (TC/LP).

The 44 month RDT&E schedule addresses the same tasks as the 32 month schedule plus the additional tasks required to convert the subject weapon mechanism from the XM732 6mm round to the alternate 5.62mm round listed. (Note that this schedule is applicable to both options of the FN weapon because of the lack of indepth performance data and known mechanical failures in limited firing tests). The 44 month RDT&E schedule tasks are:

1. Redesign the selected mechanisms concept to function reliably with the lower impulse of the selected 5.56mm ammuni-tion.

2. Fabricate 11 prototype weapons, 4 for Preliminary Testing and 7 for DT-I/OT-I.

3. Conduct a limited DT-I/OT-I of approximately 4 months duration to develop data required to confirm the performance potential in accordance with SAW requirements.

4. Evaluate DT-I/OT-I data and determine performance potential and design deficiencies to be corrected.

5. Conduct IPR prior to completing Engineering Development.

6. Correct design deficiencies and prepare preliminary TDP.

7. Confirm that the resultant weapon design meets performance requirements by fabricating 4 prototype weapons, conducting the RDAT and evaluating the results.

8. Complete the TDP/LP.

9. Fabricate 100 prototype weapons in accordance with TDP/LP for DT-II/OT-II.

10. Conduct DT-II/OT-II and evaluate results.

11. Conduct IPR/LP.

12. Type Classify the weapon for Limited Production (TC/LP).

The Limited Production schedule includes completion of the following tasks in accordance with the TDP/LP.

1. Fabricate Tooling.

2. Order Materials.

3. Establish a production rate of 100 weapons per month.

4. Produce 1000 weapons.

5. Conduct DT-III/OT-III and evaluate results.

6. Update the TDP for Full Scale Production (TDP/FSP).

7. Conduct IPR for Full Scale Production.

8. Type Classify the weapon for Full Scale Production.

The Full Scale Production (FSP) Schedule includes completion of the following tasks to establish a production rate of 2000 weapons per month and product 42,000 weapons:

- 1. Prepare Request for Proposal (RFP) for FSP.
- 2. Conduct Pre-Contract Award Survey.
- 3. Award Contract.

- 4. Design, fabricate and install tooling.
- 5. Procure materials.
- 6. Product 42,000 weapons.
- 7. Monitor Production.
- 8. Accept Weapons.

Representative Life Cycle Cost estimates were prepared for 11 of the 17 combinations of Weapon and Ammunition follows:

1. Estimated Life Cycle Costs for the Weapon only are: (\$K)

2. M16A1 W 3. Fabrique Nationale (FN) M 4. FN 5 5. Best Conceptual (BC) M 6. BC 5 7. BC X 8. BC W 9. XM233 X 10. XM234 X 11. XM235 (maremont) X 12. XM235 (Philco-Ford) X 13. BC X 14 M14 M 15. M14A1 M	180	No \$42,266 \$42,344 \$40,642 \$40,642 \$40,710 \$40,816 \$40,582 \$43,146 \$42,419 \$32,959 \$34,879 \$39,341 No No No No \$41,176

2. The following two weapons (considering the weapons only) gave the lowest Life Cycle Weapon Cost (Lowest Cost First):

	SAW Candidates	<u>\$K</u>		
1.	XM235/XM732	\$32,959-\$34,8		
2.	BC/XM732	\$39,341		

3. Further examination of the Life Cycle Cost Data reveals the following three weapons (considering the weapons only) had the lowest RDT&E cost prior to entering Limited Production: SK

1.	XM235 (East Coast)/XM732	\$6 ,9 89
2.	XM233/XM732	\$7,495
3.	BC/XM732	\$8,218

4. Estimated Life Cycle Ammunition Costs for 609,000,000 rounds are:

<u>\$K</u>

,879

1.	5.56mm	M193/M196	\$48,835.7
2.	5.56mm	H&K 68 grain	\$55,744.1
3.	5.56mm	68 grain Conceptual	\$55,903.9

4.	5.56mm	63 gr. Con Jual	\$61,600.5
5.	5.56mm	FN 63 grai	\$61,707.1
6.	6.00mm	Brass XM732	\$63,563.6
7.	7.62mm	M80/M62	\$74,720.7
8.	6.00mm	Steel XM732	\$82,474.3

1

5. An explanation of the rationale used in compiling the estimated program costs is presented in the body of this report.

6. The best Conceptual Weapon (BC) appears in both the most favorable Life Cycle Weapon Cost Group and the most favorable RDT&E Cost Group.

7. The Fabrique Nationale (FN) Weapon is estimated to require about the same development effort and production effort as the BC Weapon but incurs known additional costs in the form of royalties and licenses.

8. The XM235 presents the lowest Life Cycle Cost of all SAW weapons.

9. The original SAW Weapon concepts are known to require some modification to incorporate new or additional design features, however a substantial performance data base and validated performance analysis technique is available to predict the effectiveness of proposed modifications with considerable accuracy and thus minimize unanticipated expenses.

10. The Fabrique Nationale Weapon will require considerable redesign and analysis to correct known mechanical and structural failures experienced in very limited firing tests. At the present there is almost a complete absence of significant Engineering and Production data on this weapon, specifically lacking are:

a. Engineering and/or Production Drawings.

b. Engineering analysis of the weapon mechanism.

c. A substantial weapon performance data base or even adequate test reports.

d. Validated analytical techniques for predicting weapon performance.

The absence of the above information makes accurate prediction of the effectiveness of proposed modifications very difficult and thus maximizes the probability of incurring a substantial unanticipated increase in expense of time and funds.

11. The Best Conceptual Weapon is based on a combination of the features of the original SAW Weapons plus some additional modifications. Since there is a substantial amount of validated Engineering information available on each of these Weapons it appears that adequate prediction of the effectiveness of most proposed modifications may be made and that unanticipated major increases in expense of time and funds will be avoided.

CONCLUSIONS:

1. The Best Conceptual Weapon (BC) compares favorably relative to both Life Cycle Cost and RDT&E Cost.

2. The FN and BC weapons have comparable RDT&E Costs but the FN weapon will incur additional royalty and license costs.

3. The XM235 has the lowest Life Cycle Costs of all Weapons.

4. Development of the XM233, XM234 or the XM235 minimizes risk of unanticipated increases in time or cost.

5. The FN Weapon is presented with negligible supporting engineering data, therefore development invites a maximum risk of unanticipated major increases in time and cost.

6. The BC Weapon development is supported extensively by existing engineering data and promises the features and performance necessary for a superior SAW weapon can be incorporated while avoiding major unanticipated increases in time and cost.

RECOMMENDATIONS:

1. It is recommended that the Estimated Life Cycle Costs and the RDT&E Costs shown for the Best Conceptual Weapon (BC) combined with the XM732 ammunition be considered as representative of the costs for the weapon-ammunition combination which most completely addresses the SAW requirements.

2. It is further recommended that the Best Conceptual Weapon (BC) Cost Estimates are most representative of the probable weapon costs which will be incurred in developing a superior SAW weapon regardless of the ammunition selected.

The following Regulations and Standards were used for guidance in preparing the subject Cost Estimates:

- AR37-18 "Weapon/Support Systems Cost Categories and Elements"
- AR70-1 "Army Research and Development"

5

With the second s

- AR70-32 "Work Breakdown Structures for Defense Material Items"
- Mil-Std-881 "Work Breakdown Structures for Defense Material Items"

Letter of Instruction (LOI) for Implementing the New Material Acquisition Guidelines dated 23 August 1972.

SUPPORTING RATIONALE LIFE CYCLE COSTS-WEAPON

The "Summary of Performance/Physical Characteristics-SAWS Candidates" lists the following Mechanism/Ammunition candidate systems:

1. M16A1/M193 2. M16A1/WAMBEE 3. FN/M193 4. FN/63gr. 5. BC/M193 6. BC/ 63 gr. 7. BC/XM287 8. BC/WAMBEE 9. XM233/XM732 10. XM234/XM732 11. XM235/XM732 Low Cost Area Contractor 12. XM235/XM732 High Cost Area Contractor 13. BC/XM732 14. M14/M80 15. M14A1/M80 16. M60/M80 17. BC/M80 Also listed are: 18. MN Requirement 19. Recommended Value

Items numbered 1, 2, 14, 15, 16, 18 and 19 are not addressed.

The following individual Summary Sheets give brief statements of rationale and identify specific Support Packages wherein more detailed information is presented.

FN/M193 SUMMARY SHEET

A. RDT&E

- Pack I-B 1) Phase I effort is assumed equivalent to that required to convert an existing 6MM SAW candidate to 5.56MM. Time required 12 months since most of a standard validation effort must be performed to establish data to evaluate performance potential.
 - Pack II=E 2) Phase II effort is assumed equivalent to that required for a Best Concept weapon contracted by an average U.S. Contractor.

3) A license fee of \$660,000 and a data package at \$396,000 is required by Fabrique Nationale.

B. Limited Production (1000 weapons)

1) Royalty of \$660,000 for first 50,000 weapons is asked by FN, i.e. \$13.20 per weapon or \$13,200 for 1000 weapons. This is rounded up to \$14,000.

Pack III-D 2) Investment Non Recurring is assumed equal to a Best Concept effort and is an average of XM233, XM234, and XM 235 estimated costs.

3) Investment Recurring is assumed equal to a Best Concept effort with material cost reduced proportional to the Impulse ratio of the XM193 and XM732 rounds thus, 27.29 (1.3-1.57)=4.69, a conservative \$4,000 reduction is assumed. (1.57)

C. Full Scale Production (42,000 weapons)

Pack IV-D 1) Contract effort is assumed equal to Best Concept effort with the material cost reduced proportional to the Impulse ratio of the XM193 and the XM732 rounds. A \$197,000 reduction is assumed.

2) In-house engineering support is assumed to require 2.5 men for 24 months or \$200,000.

3) Royalty is prorated at \$13.20 per weapon for 42,000 weapons and rounded down to \$554,000.

FN/63 GRAIN SUMMARY SHEET

- A. RDT&E
- Pack I-B 1) Phase I effort is assumed equivalent to that required to convert a 6.0MM SAW candidate to 5.56MM. Time required 12 months since most of a standard validation effort must be performed to establish data to evaluate performance potential.
- Pack II-E 2) Phase II effort is assumed equivalent to that required for a Best Concept Weapon contracted by an average U.S. Contractor.

3) A license fee of \$660,000 and a data package at \$396,000 is required by Fabrique Nationale.

B. Limited Production (1000 weapons)

1) Royalty of \$660,000 for first 50,000 weapons is asked by FN i.e. \$13.20 per weapon or \$13,200 for 1,000 weapons this is rounded up to \$14,000.

- Pack III-D 2) Investment Non Recurring is assumed equal to a Best Concept effort and is an average of XM233, XM234 and XM235 estimated costs.
- Pack III-D 3) Investment Recurring is assumed equal to a Best Concept effort with material cost reduced proportional to Impulse ratios of the 5.56, 63 grain FN round and the XM732 round thus, 27.29 (<u>1.39-1.57</u>)=-3.13, a conservative \$3000 reduction is 1.57 assumed.
 - C. Full Scale Production (42,000 weapons)
- Pack IV-D 1) Contract effort is assumed equal to Best Concept effort with material cost reduced proportional to Impulse ratio. A \$131,000 reduction is assumed.

2) In-House engineering support is assumed to require 2.5 men for 24 months or \$200,000.

3) Royalty is prorated at \$13.20/weapon for 42,000 weapons and rounded down to \$554,000.

BC/M193 SUMMARY SHEET

RDT&E Α.

Pack I-13

- 1) Phase I effort is that required to convert a 6MM SAW candidate to 5.56MM. Time required is 12 months since most of a standard validation effort must be performed to establish data to evaluate performance potential.
- Pack II-E 2) Phase II effort is assumed to be the average of the XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.

3) Not applicable.

- B. Limited Production (1000 weapons)
 - 1) Not applicable.
- Pack III-D Investment Non Recurring is assumed to be the aver-2) age of XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
- Pack III-D Investment Recurring is assumed to be the average of 3) XM233, XM234 and XM235 efforts with a material cost reduction proportional to the Impulse ratios of M193 versus 6MM thus 27.29 (1.3-1.57) = -4.69, a conservative 1.57

\$4000 reduction is assumed.

- C. Full Scale Production (42,000 weapons)
- 1) Contract effort is assumed to be the average of XM233, Pack IV-D XM234 and XM235 efforts with the material cost reduced proportional to the Impulse Ratio. A reduction of 197,000 is assumed. $(42,000 \times -.4169 = -196,980)$

In-House engineering support is assumed to require 2) 2.5 men for 24 months or \$200,000.

3) Not applicable.

BC/63 grain SUMMARY SHEET

A. RDT&E

- Pack I-B 1) Phase I effort is required to convert a 6MM SAW candidate to 5.56MM. Time required is 12 months since most of a standard Validation effort must be performed to establish data to evaluate performance potential.
- Pack II-E 2) Phase II effort is assumed to be the average of the XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.

3) Not applied.

- B. Limited Production (1000 weapons)
 - 1) Not applied
- Pack III-D 2) Investment Non Recurring is assumed to be the average of XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
- Pack III-D 3) Investment Recurring is assumed to be the average of XM233, XM234 and XM235 efforts with a material cost reduction proportional to the Impulse ratio of 5.56, 63 grain versus 6MM. Thus 27.29 (1.39-1.57)=-3.13, a conservative \$3000 reduction is 1.57 assumed.
 - C. Full Scale Production (42,000 weapons)
- Pack IV-D 1) Contract effort is assumed to be the average of XM233, XM234 and XM235 efforts with the material cost reduced proportional to the Impulse ratio (42000 x -3.13)= -\$131,460). A reduction of \$131,000 is assumed.

2) In-house engineering support is assumed to require 2.5 men for 24 months or \$200,000.

3) Not applied.

BC/XM287 SUMMARY SHEET

Α. RDT&E

- Pack I-B 1) Phase I effort is required to convert a 6MM SAW candidate to 5.56MM. Time required is 12 months since most of a standard Validation effort must be performed to establish data to evaluate potential performance.
- Pack II-E 2) Phase II effort is assumed to be the average of the XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
 - 3) Not applicable.
 - B. Limited Production (1000 weapons)
 - 1) Not applicable
- Pack III-D 2) Investment Non Recurring is assumed to be the average of XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
- Pack III-D 3) Investment Recurring is assumed to be the average of XM233, XM234 and XM235 efforts with a material cost reduction proportional to the Impulse rations of XM287 vs. XM732 rounds thus 27.29 (1.50-1.57)= -1.22, a conservative \$1000 reduction is assumed. 1.57

C. Full Scale Production (42,000 weapons)

Pack IV-D 1) Contract effort is assumed to be the average of XM233, XM234 and XM235 efforts with the material cost reduced proportional to the XM287 versus XM732 Impulse ratio thus, (42,000 x -\$1.22= -\$51,200). A reduction of \$51,000 is assumed.

2) In-house engineering support is assumed to require 2.5 men for 24 months or \$200,000.

3) Not applicable.

A STATISTICS AND A STATISTICS

BC/WAMBEE SUMMARY SHEET

- A. RDT&E
- Pack I-B 1) Phase I effort is required to convert a 6MM SAW candidate to the 5.56 WAMBEE. Time required is 12 months since most of a standard Validation effort must be performed to establish data to evaluate potential performance.
- Pack II-E 2) Phase II effort is assumed to be the average of the XM 233, XM234 and XM235 efforts performed by an average U.S. Contractor.
 - 3) Not applicable.
 - B. Limited Production (1000 weapons)
 - 1) Not applicable
- Pack III-D 2) Investment Non-Recurring is assumed to be the average of XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
- Pack III-D 3) Investment Recurring is assumed to be the average of XM233, XM234 and XM235 efforts with a material cost reduction proportional to be Impulse ratio of the WAMBEE versus XM732 rounds, thus 27.29 (<u>1.23-1.57</u>)=-5.91. A reduction of \$5000 is assumed. 1.57
 - C. Full Scale Production (42,000 weapons)
- Pack IV-D 1) Contract effort is assumed to be the average of XM233, XM234 and XM235 efforts with the material cost reduced proportional to the WAMBEE versus XM732 Impulse ratio, thus, (42,000 x -\$5.91=-\$248,200). A reduction of \$248,000 is assumed.

2) In-house engineering support is assumed to require 2.5 men for 24 months or \$200,000.

3) Not applicable.

XM233/XM732 SUMMARY SHEET

A. RDT&E-To be performed by Maremont Corp.

1) A very minimal Phase I effort is assumed as being part of the Phase II effort.

Pack II-A 2) The Phase II effort is summarized as follows:

	Dev.Eng.Hrs.	PEP Eng.Hrs.	Total Man Hrs.
Contract In-House	83,856 52,526	38,503 32,055	122,359 84,581
Total	136,382	70,558	206,940

Total elapsed time is 32 months.

3) No foreign license included.

B. Limited Production (1000 weapons)

1) No foreign royalty included.

Pack III-A 2) Investment-Non Recurring is detailed in Package III-A.

3) Investment-Recurring is detailed in Package III-A.

C. Full Scale Production (42,000 weapons)

Pack IV-A 1) Contract effort to produce 42,000 weapons is pro-rated from the 80,000 weapon estimate detailed in Support Package IV-A.

2) In-house engineering support is estimated to require 2.5 men for 24 months or \$200,000.

3) No Foreign royaltys are included.

XM234/XM732 SUMMARY SHEET

Α. RDT&E-To be performed by Philco-Ford.

A very minimal Phase I effort is assumed as being 1) included in the Phase II effort.

Pack II-B

The Phase II effort is summarized as follows: 2)

	Dev. Eng. Hrs.	PEP Eng. Hrs.	Total Hrs.
Contract	82,245	38,503	120,748
In-House	51,426	32,055	83,481
Total	133,671	70,558	204,229

3) No foreign license cost included.

B. Limited Production (1000 weapons)

1) No foreign royalty cost included.

Pack III-B 2) Investment-Non Recurring is detailed in Package III-B.

> 3) Investment Recurring is detailed in Package III-B.

C. Full Scale Production (42,000 weapons)

Pack IV-B Contract effort to produce 42,000 weapons is prorated 1) from the 80,000 weapon estimate detailed in Support Package IV-B.

> 2) In-house engineering effort is estimated to require 2.5 men for 24 months or \$200,000.

3) No foreign royalty is included.

XM235/XM732 SUMMARY SHEET

A. RDT&E-To be performed by a Low Cost Area Contractor.

1) A very minimal Phase I effort is assumed as being included in the Phase II effort.

Pack II-C

2)

The Phase II effort is summarized as follows:

	Dev.Eng.Hrs.	PEP Eng. Hrs.	Total Man Hrs.
Contract	75,800	38,503	114,303
In-house Total	51,426 127,226	32,055 70,558	83,481 197,784

3) No foreign license cost is applicable.

B. Limited Production (1000 weapons)

1) No foreign royalty is applicable.

Pack III-C 2) Investment nonrecurring is detailed in Package III-C.

- 3) Investment recurring is detailed in Package III-C.
- C. Full Scale Production (42,000 weapons)
- Pack IV-C
- 1) Contract effort to produce 42,000 weapons is prorated from the 80,000 weapon estimate detailed in Support Package IV-C.

2) In-house engineering support effort is assumed to require 2.5 men for 24 months or \$200,000.

3) No foreign royalty is applicable.

XM235/XM732 SUMMARY SHEET

A. RDT&E-To be performed by a High Cost Area Contractor.

1) A very minimal Phase I effort is assumed as being included in the Phase II effort.

Pack II-D 2) The Phase II effort is summarized as follows:

	Dev.Eng.Hrs.	PEP Hrs.	Total Hrs.
Contractor ln-House	75,800 50,788	38,503 32,055	114,303 82,843
Total	126,588	70,588	197,146

3) No foreign license cost is applicable.

B. Limited Production (1000 weapons)

1) No foreign royalty is applicable.

Pack III-C 2) Investment non-recurring is detailed in Package III-C.

3) Investment recurring is detailed in Package III-C.

C. Full Scale Production (42,000 weapons)

Pack IV-C 1) Contract effort to produce 42,000 weapons is prorated from the 80,000 weapon estimate detailed in Support Package IV-C.

2) In-house engineering support effort is assumed to require 2.5 men for 24 months at a cost of \$200,000.

3) No foreign royalty is applicable.

BC/XM732 SUMMARY SHEET

A. RDT&E-To be performed by an average U.S. Contractor located on the West Coast with Engineering hourly rate of \$6.69 per hour and Engineering Overhead of 184%. A very minimal Phase I effort is assumed as being 1) included in the Phase II effort. Pack II-E 2) The Phase II effort is summarized as follows: Dev.Eng.Hrs. PEP Hrs. Total Man Hrs. Contract 38,503 117,928 79,425 In-House 51,542 32,055 83,597 Total 130,967 70,558 201,525 3) No foreign license cost is applicable. Β. Limited Production (1000 weapons) 1) No foreign royalty is applicable. Pack III-D 2) Investment Non-recurring is detailed in Package III-D. 3) Investment recurring is detailed in Package III-D. Full Scale Production (42,000 weapons) C. Pack IV-D 1) Contract effort to produce 42,000 weapons is prorated from the average of the 80,000 weapon estimate detailed in Support Packages IV-A, IV-B, and IV-C. 2) In-house engineering support effort is assumed to require 2.5 man hours for 24 months at a cost of \$200,000. 3) No foreign royalty is included.

States and the second second

BC/M80 SUMMARY SHEET

- A. RDT&E
- Pack I-A 1) Phase I effort is required to convert a 6MM SAW candidate to the 7.62MM M80 round. Time required is 9 months since a portion of the Validation effort must be performed to establish data to evaluate potential performance.
- Pack II-E 2) Phase II effort is assumed to be the average of the XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
 - 3) Not applicable.
 - B. Limited Production (1000 weapons)
 - 1) Not applicable
- Pack III-D 2) Investment Non-recurring is assumed to be the average of XM233, XM234 and XM235 efforts performed by an average U.S. Contractor.
- Pack III-D 3) Investment Recurring is assumed to be the average of XM233, XM234 and XM235 efforts with a material cost increase proportional to the Impulse ratio of the M80 versus the XM 732 rounds, thus 27.29 (2.3-1.57)=12.69. An increase of \$13,000 is assumed. 1.57
 - C. Full Scale Production (42,000 weapons)
- Pack IV-D 1) Contract effort is assumed to be the average of XM233, XM234 and XM235 efforts with material cost increased proportional to the M80 versus the XM732 Impulse ratio, thus (42,000 x \$12.69=\$532,980). An increase of \$533,000 is assumed.

2) In-house engineering support is assumed to require 2.5 men for 24 months or \$200,000.

3) Not applicable.

APPENDIX 2

BASIC ESTIMATED COST PACKAGES

.

中国の国家事業の法法の法律の法律の行動の意思を行いため、

NUMBER I-A

BASIC ESTIMATED COST PACKAGE ADVANCED/ENGINEERING DEVELOPMENT 7.62MM CONVERSION FROM 6.00MM

9 MONTHS EFFORT

INDEPENDENT GOVERNMENT COST ESTIMATE--RESEARCH AND DEVELOPMENT (AMCR 715-22)

1. PREPARING INSTALLATION

CADDT IC C

The second state of the se

īsu In-	RI-LS-C PPLIES OR SERVICES TO House Effort to Mo	nitor Valida			3	QUANTITY
Contract Effort to Convert to 7.62mm from 6.00 system(s) supported by THIS PROCUREMENT Squad Automatic Weapon System				S. WORK DRE STRUCTU	AKDOWN Ne Level	NA B. ESTIMATE PREPARED AS OF 30 Nov 74
RESEARCH AND DEVELOPMENT			COST	R	FERENCE	
	7	······································	•	10		11
	COST CATEGORIES	HOURS	RATE	ESTIMATE	5	CHEDULE
T	ENGINEERING				· ···· · · · · · · · · · · · · · · · ·	
	DIRECT LABOR	17,550		144,936		
	MATERIAL			900		
Ļ	OVERHEAD		85%	123,196		
+	OTHER		*****	29,068		
+	TOOLING			•••		
	DIRECT LABOR					
1	2 MATERIAL		and the second second			
	OVERHEAD					
İ	4 OTHER	AN		• • • • • • • • • • • • • • • • • • •	·····	······································
ł	SYSTEM TEST AND EVAL	and a restrict when reflect		92,492		
1						
ł	DATA TOTAL SYSTEMS MANAG			h		
t	CONSTRUCTION			*** *********************************		
!	TRAINING					
1	OTHER (Specity)					
	TOTAL COST LESS (G A	ND A)		390,592		
+	G AND A					· · · · · · · · · · · · · · · · · · ·
1	TOTAL COST					
	PROFIT OR FEE					
1	TOTAL PRICE					
	Month Effort e I-H/l (VAL-ED)-9	through I-H	/5 (VAL-EC))-9 for ration	ale.	
	PED NAME AND TITLE		SIGN	ATURE	EXTENSIO	N DATE
RO	Y F. SCHWEGLER					
	chanical Engineer				4255	30 November 74
	VIEWING OFFICIAL					
AI	PROVING OFFICIAL					
NC	FORM 1011e-R					_1

PHASE I -7.62MM-RATIONALE IN-HOUSE VALIDATION ENGINEERING (VAL) FOR EXTENDED ENGINEERING DEVELOPMENT (ED)

RATIONALE: It is assumed that one type of weapon mechanism has been selected for conversion to 7.62MM NATO from the SAW 6.00MM ammunition.

The major Validation type effort will be contracted as part of the Engineering Development effort and will entail redesign of the mechanism to accept the 7.62MM ammunition and conduct those portions DT-I/OT-I necessary to develop data required to confirm performance potential in accordance with SAW requirements.

Time of this effort 5 months FY75, 4 months FY76, for a total of 9 months.

	<u>FY75</u>	<u>FY76</u>	Total. (VAL/ED)
Engineering DT-OT/APG	155,926	142,174 92,492	\$298,100 92,492
TOTAL	155,926	234,667	\$ <u>390,592</u>

1-H/1 (VAL/ED)-9

PHASE I -7.62MM-RATIONALE IN-HOUSE VALIDATION ENGINEERING (VAL)FOR EXTENDED ENGINEERING DEVELOPMENT (ED)

In-House Staf	FY7	5(5 mos)	FY76(4 mos)			
Title	Grade	Hrs	<u>\$</u>	Hrs	<u>\$</u>	
Project Eng	14	750	9,435	600	7,548	
Mech. Eng	13	750	8,048	600	6,434	
Mech. Eng	12	1500	13,635	1200	10,908	
Mech.Eng.Tech	11	1500	11,445	1200	9,156	
Q.A. Tech	11	-0-	-0-	-0	-0-	
Mech.Eng.Tech	9	750	4,748	600	3,798	
Draftsman	7	750	3,893	600	3,114	
Draftsman	5	750	3,143	600	2,514	
Math Analyst	12	750	6,818	600	5,454	
RAM Eng	12	750	6,818	600	5,454	
Q.A. Eng	12	750	6,818	600	5,454	
Q.A. Tech	12	-0-	-0-	-0-	-0-	
Model Maker	WB	750	5,723	600	4,578	
Direct Labor FY	75	9,750	\$80,524			
FY	76			7800	\$64,412	
Total Direct La	Total Direct Lab (VAL) 17,550 Hrs					
Overhead (85%) FY75 \$68,446 FY76 <u>54,750</u> Total Overhead \$ <mark>123,196</mark>						

L-H/2 (VAL/ED)-9

かわいい

(VAL/ED) ENGINEERING

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc. and is estimated at \$100/month.

FY75	5 x 100	500
FY76	4 x 100	400
TOTAL		900

1-H/3(VAL/ED)-9

(VAL/ED) IN-HOUSE-OTHER DIRECT COSTS

RATIONALE: Other Direct Costs are assumed to consist of Computer Expenses at \$600 per month and Travel expenses as broken down on the following page.

A. Computer Expense

.

FY75	5	x	600	\$3,000
FY76	4	x	\$600	2,400
TOTAL				\$5,400

B. Travel Expense

FY75	4	\$ 3,456
FY76		20,212
TOTAL		\$23,668

C. Total O.D.C.

FY75	\$6,456
FY76	22,612
TOTAL	\$29,068

1-H/4 (VAL/ED)-9

(VAL/ED IN-HOUSE TRAVEL COST

Estimate of Travel Cost (West Coast Contractor)

ι.	Design Reviews at Contractor 3 days 3 men x \$35/day Car Rental 2 days-\$60/trip Air Fare \$2 59 x 3 men/trip	FY75 3 \$945 \$180 \$2,331	FY76 3 \$945 \$180 \$2,331	trips
2.	Support of APG Test (DT-I) l man x \$35/day Car Rental \$30/day Air Fare \$141 x 12 trips		100 \$3,500 \$3,000 \$1,692	days
3.	Support of Ft. Benning Test (1 man x \$35/day Car Rental \$30/day Air Fare \$172 x 12 trips	OT-I)	100 \$3,500 \$3,000 \$2,064	days
	Total/FY	\$3,456 \$	20,212	
	TOTAL (VAL/ED) TRAVEL	Ş	523,668	

1-H/5 (VAL/ED)-9

PRE	PARING INSTALLATI	0N					
	RI-LS-C						
	PLIES OR SERVICES)			S. QUA	NTITY
Con	version to 7.62	mm from 6.00m	m				
Va1	idation Enginee	ring Contract					NA
	ad Automatic We		M 12, F1 1	S. WORK DRE STRUCTUI 4	RELEVEL	8. EST AS	30 Nov 74
	RESEARCH AN	ID DEVELOPMENT		COST		REFERE	NCE
• ••	7		9	10		11	· · · · · · · · · · · · · · · · · · ·
со	DST CATEGORIES	HOURS	RATE	ESTIMATE		SCHED	JLE
1.	ENGINEERING			<u>+</u> +-			
	DIRECT LABOR	20,250	\$6.69	135,473			
2	MATERIAL			1.800			
Ĵ	OVERHEAD		184%	249,270			
4	OTHER			29,748			
	TOOLING		3	╃ ───── ┽ ╌			
	DIRECT LABOR						······································
2	OVERHEAD		<u></u>	**			
3	OVERHEAD	-					
1]	PROTOTYPE PRODUC	TION	-	45,000			
1:	SYSTEM TEST AND EN			56,000			
1.	DATA						
[.	TOTAL SYSTEMS MAN	AGEMENT		62,034			
•	CONSTRUCTION						
•	TRAINING	a . 2		k			
•	OTHER (Specity)			F70 205			
+ :	TOTAL COST LESS (C	-0-		579,325			
+	G AND A TOTAL COST			579,325			
1	PROFIT OR FEE	10%		1			
!.	TOTAL PRICE			637,257			
	onth Effort						
ee	A-1 (VAL/ED)-9	through A-3 (VAL/ED)-9	tor rationale.			
	ED NAME AND TITLE	, T		ATURE			
		2 .)) s.b	3194		EXTENS		DATE
OY	F. SCHWEGLER						
	anical Engineer				425	5 3	0 November 74
	IEWING OFFICIAL	· · · ·		······			
REV		1					

PHASE I -7.62MM-RATIONALE CONTRACTOR (WEST COAST) VALIDATION ENGINEERING (VAL) FOR EXTENDED ENGINEERING DEVELOPMENT (ED)

RATIONALE: It is assumed that the contractor is required to convery one existing 6.00MM SAW candidate weapon mechanism into a 7.62MM weapon and repeat the performance of the Research and Development Acceptance Test. The contractor will supply 3 prototype weapons for contractor tests and 7 prototype weapons for DT-I/OT-I testing plus limited technical support.

This contractor effort will be included in the Engineering Development Contract and will represent the time period of 5 months in FY75 and 4 months in FY76.

The contractor's Engineering Costs are broken down as 'ollows:

		FY75	FY76	TOTAL
1.	(VAL/ED) Engineering 1.1 Direct Labor 1.2 Overhead 1.3 Material 1.4 O.D.C.	220,111 75,263 138,484 1,000 5,364	196,180 60,210 110,786 800 24,384	\$416,291 135,473 249,270 1,800 29,748
2.	Prototypes 21. 3 Preliminary 2.2 7 DT/OT	45,000 -0-	-0- 56,000	\$ <u>101,000</u> 45,000 56,000
3.	System Management (1.7 150 x 1.7 x \$27.03/mo.		4 mos. 27,571	\$ <u>62,034</u>
4.	Total Contract(VAL/ED)	299,574	279,751	\$ <u>579,325</u>
5.	Contract Price (10% Profit)	329,531	307,726	\$ <u>637,257</u>

A-1(VAL/ED)-9

PHASE I -7.62MM-RATIONALE CONTRACTOR VALIDATION ENGINEERING (VAL) FOR EXTENDED ENGINEERING DEVELOPMENT (ED-9)

Engineering Direct Labor (15x150x5)

An average Contrad	ctor's Hourly	Rate of	\$6.69	is	assumed.
FY75 (5 months)	11,250 hrs.				\$75,268
FY76 (4 months)	9,000 hrs				60,210
Total (VAL/ED)	20,250 hrs				\$135,473

Engineering Overhead

ł

An average Contractor's Overhead of 184% is assumed. FY75 \$138,484 FY76 Total (VAL/ED) \$249,270

Engineering Material (Paper, Supplies, etc) \$200/month. FY75 (5 months) \$ 1,000 FY76 (4 months) <u>300</u> Total (VAL/ED) \$ 1,800 Engineering Other Direct Charges.

FY75 FY76	,	 .	\$,364 ,384	
Total	(VAL/FD)		\$,748	

A-2 (VAL/ED)-9

PHASE I -7,62MM-RATIONALE CONTRACTOR (VAL/ED)

RATIONALE: .er Direct Charges to Engineering								
A. Computer \$600 Month								
FY75 (5 months) FY76 (4 months) Total Computer		\$ 3,000 \$ 2,400 \$ 5,400						
B. Travel	,							
	<u>FY75</u>	<u>FY76</u>						
 Informal Reviews at RIA 3 days x 2 men x \$35/day Car Rental 2 day-\$60/trip Air Fare \$259 x 2 men 	3 \$ 630 190 \$1554	3 \$ 630 \$ 180 \$1554						
2. Support of APG Test (DT-I l man x \$35/day Car Rental-\$30/day AirFare \$355 x 10 trips)	100 days \$3500 \$3000 \$3550						
3. Support Ft. Benning Test 1 man x \$35/day Car Rental \$30/day Air Fare \$307 x 10 trips		100 days \$3500 \$3 0 00 \$3070						
4. Total Travel/FY	\$2364	\$21,984						
5. TOTAL TRAVEL \$24,34	8							

C. Other Direct Charges to Engineering Summary

	FY75	FY76	TOTAL
Computer Travel	3,000 2,364	2,400 21,984	5,400 24,348
TOTAL O.D.C.	\$5,364	\$24,384	\$29,748

A-3(VAL/ED)-9

INDEPENDENT GOVERNMENT COST ESTIMATE -- RESEARCH AND DEVELOPMENT (AMCR 715-22)

I. PREPARING INSTALLATION

The second s

SARRI-LS-C							
	supplies on services to be procured In-House Effort to Monitur Full Scale Development						
	Contract to Convert to 7.62mm From 6.00mm						
4. SYSTEM(S) SUPPORTED BY			S. WORK BRE	AKDOWN	NA		
	STRUCTURE LEVEL			ELEVEL	ASOF		
Squad Automatic Wea	pon System		4		30 Nov 74		
RESEARCH AND	DEVELOPMENT		COST		FERENCE		
7	•	9	10		11		
COST CATEGORIES	HOURS	RATE	ESTIMATE	5(CHEDULE		
A . ENGINEERING			1				
I DIRECT LABOR	51,554		432.022				
2 MATERIAL			3,200				
J OVERHEAD		85%	367,244				
4 OTHER			85,285				
B - TOOLING							
1 DIRECT LABOR							
2 NATERIAL							
3 OVERHEAD					-		
4 OTHER							
C . PROTOTYPE PRODUCT	ION						
D - SYSTEM TEST AND EV	LUATION						
E DATA							
F . TOTAL SYSTEMS MANA	GEMENT						
G - CONSTRUCTION							
H - TRAINING							
I . OTHER (Specity)							
J - TOTAL COST LESS (G	AND A)		887,751				
K - GANDA			+				
L - TOTAL COST			+				
M - PROFIT OR FEE			+				
N - TOTAL PRICE			-L				
32 Month Effort See I-H/1 (FSD/ED)-	9 through I-H	/6 (FSD/E	D)-9 for ration	ale.			
12. TYPED NAME AND TITLE	TYPED NAME AND TITLE SIGNATURE EXTE						
. PREPARING OFFICIAL							
ROY F. SCHWEGLER				4055	20 11-1 74		
Mechanical Engineer				4255	30 November 74		
5. REVIEWING OFFICIAL							
. APPROVING OFFICIAL							
AMC FORM 10110-2							

PHASE II -7.62MM-RATIONALE IN-HOUSE FSD - EXTENDED ENGINEERING DEVELOPMENT

RATIONALE: The 7.62mm SAW weapon is judged to have 6 areas requiring major redesign, specifically:

- (1) Weight
- (2) Receiver
- (3) Gas System
- (4) Bolt/Operating Group
- (5) Firing Mechanism
- (6) Magazine

The Major FSD-Engineering effort to redesign these areas will be conducted 8 months of FY76, 3 months of 76/77 and 6 months of FY77.

The final 6 months of FY77 and 9 months of FY78 will be used to finalize detail design, testing, data acquisition, data processing, data evaluation and evaluation of proposed production related modifications in conjunction with the concurrent PEP Effort.

Two basic prob lems appear to exist:

(1) Increasing the size and strength of the weapon to accomodate the 7.62MM round may increase weapon weight to an unacceptable value.

(2) If the locking lug area requires extensive modification to insure adequate weapon life an extensive redesign and testing of the operating mechanism may be required.

1-H/1 (FSD/ED)-9

PHASE II -7.62MM-SUMMARY OF COSTS FSD-IN-HOUSE ENGINEERING

FY76 (8 months)	\$256,281
76/77 (3 months)	92,935
FY77 (12 months)	317,150
FY78 (9 months)	221,385
TOTAL	\$887 , 751

.

の以合いのないないないない

The above totals are broken down as to Direct Labor, Overhead, Material, and Other Direct Charges on the following pages of the section:

1-H/2 (FSD/ED)-9

PHASE II -7.62MM-IN-HOUSE FSD-IN-HOUSE ENGINEERING

The In-House FSD Engineering Team Effort is summarized as follows:

	GRADE	FY76 8 mos. HRS \$	76/77 5 mos. HRS	\$	FY77 12 m HRS	os.	FY78 9mos IRS	\$
Proj. Eng	14							
Mech. Eng	13							
Mech. Eng	12							
Mech. Tech	12	5x2003=10,01						
Q.A. Tech	11	$\frac{3\times1903=5,70}{8}$ mos. 15,72						
Mech. Tech	9		3x1903=	=5,70	9			
Draftsman	7					=13,321		
Draftsman	5				$\frac{5\times1200}{12}$ mos.	$= \frac{6,000}{19,321}$		200=10,800
Math.Analy.	12							
RAM Eng.	12							
Q.A. Eng	12							
Q.A. Tech	12							
Model Maker								
Direct Labo	FY76 FY76/ FY77 FY78		,761 5,709	\$47,	847 19,321			¢00 504
Direct Labor Overhead (89 Overhead (F9	(FSD) 5%)		,002 ,690 ,624 ,928	2		1	.0,800	\$90 , 504

1-H/3 (FSD/ED)-9

PHASE II -7.62MM-IN-HOUSE GSD-EXTENDED ENGINEERING DEVELOPMENT

RATIONALE: Engineering Material Cost covers office supplies, drafting paper, etc., and is estimated at \$100/month.

FY76	8 mos. x \$100	\$ 800
FY76/77	3 mos. x \$100	300
F¥77	12 mos. x \$100	1200
FY78	9 mos x \$100	900
TOTAL		\$3200

4

これにないない 二十二日ののかのである

1-H/4 (FSD/ED)-9

PHASE II -7.62MM-IN-HOUSE ESTIMATE OF TRAVEL COST FSD-EXTENDED ENGINEERING DEVELOPMENT

		<u>FY76</u>	FY76/77	FY77	FY78
A.	Reviews at West Coast Contractor	6	2	8	6
	3daysx3menx\$35/day Car Rental \$60/trip Air Fare/\$259 x 3 men	\$1,890 360 4,662	\$ 630 120 1,554	\$2,520 480 6,216	\$1,890 360 4,662
в.	Support APG (RDAT- DT-II)				275 days
	lmanx\$35/dayx275 days lmanx\$35/dayx30 days Car Rental \$30/day x 2 Air Fare \$141 x 38 tri				9,625 1,050 8,250 5,358
c.	Support Ft. Benning OT-II				180 days
	l man x \$35/day x 180 l man x \$35/day x 18 d Car Rental \$30/day x 1 Air Fare \$172 x 24 tri	lays 180 days			6,300 630 5,400 4,128
	TOTAL/FY	\$6 , 912	\$2,304	\$9,216	\$47,653
	TOTAL TRAVEL				\$66,085

1H/5 (FSD/ED)-9

.

HARDAL FURNISH SHARE

PHASE II -7.62MM-IN-HOUSE SUMMARY OF OTHER DIRECT COSTS FSD-EXTENDED ENGINEERING DEVELOPMENT

RATIONALE: Other Direct Costs are assumed to consist of Computer Expenses at \$600 per month and Travel Expense based on a West Coast Contractor.

A. Computer Expense

FY76	8	х	\$600	\$4,800
FY76/77	3	х	\$600	1,800
FY77	12	х	\$600	7,200
FY78	9	x	\$600	5,400
TOTAL				\$19,200

B. Travel Exepnse

FY76	\$ 6,912
FY76/77	2,304
FY77	9,216
FY78	47,653
TOTAL	\$66,085

C. O.D.C./FY

FY 76	\$11,712
FY76/77	4,104
FY77	16,416
FY78	_53,053

D. TOTAL OTHER DIRECT CHARGES \$85,285

1/H6 (FSD/ED)-9

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22)

1. PREPARING INSTALLATION

SUPPLIES OR SE In-House PEP 7.62mm from	Extended		g Developm	ent		3. QL	JANTITY		
System(s) supp Squad Automa	AKDOWN Re Level	6. ESTIMATE PREPAR							
RESE	ARCH AND D	DEVELOPMENT	MENT COST				REFERENCE		
7			9	10		1	1		
COST CATEGO	RIES	HOURS	RATE	ESTIMATE		SCHE	DULE		
- ENGINEERI	ig l								
I DIRECT L		24,639	-	192,375					
2 MATERIAL	2			4,800			-		
3 OVERHEA			85%	163,519		·			
4 OTHER 1	n FSD			-					
- TOOLING									
I DIRECT L	BOR								
2 MATERIAL									
3 OVERHEA	· · · ·								
4 OTHER	Ł		link, and a						
- PROTOTYPE	PRODUCTIO	N			·				
- SYSTEM TES	T AND EVAL	UATION							
: DATA		-				······			
- TOTAL SYST	ENS MANAGE	MENT							
- CONSTRUCT	ION								
- TRAINING									
		ig. Control	Board	153,006					
- TOTAL COS	T LESS (G AN	ID A)		513,700					
- GANDA									
- TOTAL COS							<u></u>		
- PROFIT OR									
- TOTAL PRI	<u>.</u>					<u> </u>			
See I-H/7 (F	EP/ED)-9	through I-H	/10 (PEP/E	D)-9 for ratic	onale.				
				EXTENS	IION	DATE			
PREPARING OFFIC		•							
ROY F. SCHWE							20 N		
Mechanical E	ngineer				4255		30 November 74		
REVIEWING OFFIC	IAL								
APPROVING OFFI	CIAL								
					1				

PHASE II -7.62MM-IN-HOUSE RATIONALE PEP EXTENDED ENGINEERING DEVELOPMENT

The In-House PEP Engineering Team Effort is summarized as follows:

	GRADE	8mos FY76	3mos FY76/77	121005 FY77	9mos FY78
Project Eng	. 14				
Mech. Eng	13				
Mech Eng.	12				
Mech Tech	11			(4816x7.96 38,835) + (3500x7.59 26,565)= <u>6</u>	=
Mech Tech	9	$5 \times 1125 = 5$ $\frac{3}{8} \times 688 = 2$ $\frac{3}{8} \times 5$	064		
Draftsman	7		3x688=2064	1 7x6.88=48	16
Draftsman	5	(5625x8.3 46,800) (2064x7.9 16,429)=	+ 16,429 6=	$96 = 5 \times 700 = 35$	0 <u>0</u> 9x700=6300
Math Anal.	12				6300x7.59=47,817
*Eng Materia TOTAL ENG M		\$1200	\$450 <u>\$480(</u>	\$1800 <u>)</u>	\$1350
Direct Lab	FY76 FY76/77 FY77 FY78	7689 \$63,2	29 2064 \$16,4	129 8316 \$64,	900 6300 \$47,817
Total Direct	t Labor	(PEP) 24,63	9 hrs \$192,	,375	

*Engineering Material Cost is estimated at \$150/month.

The Aller Base

1-H/7 (PEP/ED)-9

Overhead (8	15%)
-------------	------

-

FY76	\$53,745
FY76/77	13,965
FY77	55,165
FY78	40,644

Total Overhead (PEP) \$163,519

(1-H/8 (PEP/ED)-9

PHASE II -7.62MM-RATIONALE IN-HOUSE-CONFIGURATION CONTROL BOARD PEP-EXTENDED ENGINEERING DEVELOPMENT

RATIONALE:

A CONTRACTOR

Control of Configuration Management will be assumed by the Government.

A Configuration Control Board (CCB) will be established and will exercise its authority throughout the FSD period and potentially continue in the same manner at somewhat diminished levels of effort through the Limited Production and the Full Scale Production Periods.

During the FSD period from 1 Nov 76 to 1 May 78 (32 months) the CCB will utilize the following people to the extent indicated:

		Grade	Hrs	\$DL	\$0verhe
40% Configur 40% Engineer 20% Procurer 20% Q.A. Eng SQUAPS) 20% Maintena 20% Supply S	nent Spec. g (Gages & ance Spec.	14 13 13 13 12 11	1920 1920 960 960 960 960 960	24,154 20,602 10,301 10,301 8,726 7,325	20,531 17,511 8,756 8,756 7,417 6,426
TOTAL	-			\$81,409	\$69,197
These expenses FY76 FY76/77 FY77 FY78	8 months 3 months 12 months 9 months		<u>\$DL</u> 20,352 7,632 30,528 22,897	<u>\$0H</u> 17,299 6,487 25,949 19,462	<u>37,651</u> 14,119 56,477 42,359
TOTAL (CCB)					\$150,606

1-H/9 (PEP-CCB/ED)-9

PHASE II -7.62MM-IN-HOUSE RATIONALE

PEP SUMMARY-EXTENDED ENGINEERING DEVELOPMENT

		FY76	FY76/77	FY77	<u>FY78</u>	TOTAL
A.	Engineering					
	Direct Labor Material (\$150/	63,229	16,429	64,900	47,817	192 ,37 5
•	month) Overhead (85%) O.D.C. (in FSD)	1,200 53,745 -	450 13,965 -	1,800 55,165 -	1,350 40,644 -	4,800 163,519 -
	TOTAL A	118,174	30,844	121,865	89,811	\$ <u>360,694</u>
в.	Configuration Co	ntrol				
	Direct Labor Material (\$75/	20,352	7,632	30,528	22,897	81,409
	month) Overhead (85%) O.D.C. (in FSD)	600 17,299 -	225 6,487	900 25,949 -	675 19,462 -	2,400 69,197 -
	TOTAL B	38,251	14,344	57,377	43,034	\$ <u>\$1.53,006</u>
	A & B	156,425	45,188	179,242	132,845	

TOTAL IN-HOUSE PEP

\$513,700

1-H/10(PEP/ED)-9

NUMBER I-B

BASIC ESTIMATED COST PACKAGE ADVANCED/ENGINEERING DEVELOPMENT 5.56MM CONVERSION FROM 6.00MM (INCLUDING FABRIQUE NATIONALE 63 GRAIN 5.56MM)

12 MONTHS EFFORT

	INDEPEND	DENT GOVERNMEN	AT COST ES	TIMATERESEARC	H AND DEVE	LOPMENT	
PRE	PARING INSTALLATI	0N					
	SARRI-LS-C						
	Duse Effort to		Adam Frank			S. QUANTITY	
In-Ho	ract to Convert	to 5 56mm from	τιοn Engii m 6 Ωmm	heering		NA	
	EM(S) SUPPORTED		ENT	B. WORK BRE	RE LEVEL	8. ESTIMATE PREPARE AS OF	
Squad	d Automatic Wea	pon System		4		30 November 1974	
	RESEARCH AN	D DEVELOPMENT	<u></u>	COST		REFERENCE	
		-1	9	10			
				+			
CO	ST CATEGORIES	HOURS	RATE	ESTIMATE		SCHEDULE	
	ENGINEERING	22 400		100.055			
1.	DIRECT LABOR	23,400		<u> 193,256</u> 1,200			
	MATERIAL		85%	164,267			
	OVERHEAD		00%	36,628			
	OTHER						
	DIRECT LABOR			\ \			
	MATERIAL			<u> </u>			
2.3	OVERHEAD			tt-			
12	OTHER			• · · · • • • · · · · · · · · • • • • •			
	PROTOTYPE PRODUC	TION		• • • • • • • • • • • • • • • • • • • •			
	SYSTEM TEST AND EN			92,492	tatua dia mandri ana amin' in dia		
	DATA			· · · · · · · · · · · · · · · · · · ·		an a fallan haran da an	
	TOTAL SYSTEMS MAN	AGENENT		•••••••••••••••••••••••			
, + ····	CONSTRUCTION			**************************************			
	TRAINING						
•	OTHER (Specify)					and and a second s	
1.1	TOTAL COST LESS (G	AND A)		287,843	an a		
	G AND A			1			
	TOTAL COST						
·] -	PROFIT OR FEE						
	TOTAL PRICE	· · · · · · · · · · · · · · · · · · ·					
MARKS	s onth Effort						
	-H/1(Va1/ED-12)) Through I-H/!	5 (Val/ED-	12) for ration	ale		
	ED NAME AND TITLE		SIGN	ATURE	EXTENS	ION DATE	
	. SCHWEGLER nical Engineer				4255	30 Nov 74	
	IEWING OFFICIAL						
APP	ROVING OFFICIAL						
MC	FORM 1011e-E						

PHASE I -5.56MM-RATIONALE IN-HOUSE VALIDATION (VAL) ENGINEERING

RATIONALE: It is assumed that one type of weapon mechanism has been selected for conversion to 5.56mm M193 from the SAW 6.00mm ammunition.

The major Validation effort will be to redesign the mechanism to accept the 5.56mm ammunition and conduct those portions of DT-I and OT-I necessary to develop data required to confirm performance potential in accordance with SAW requirements.

*Engineering DT-I/OT-I	<u>FY75</u> 158,229 -0-	<u>FY76</u> 237,122 92,492	<u>TOTAL</u> 395,351 92,492
TOTAL	158,229	329,164	487,843

*Engineering costs are broken down as Direct Labor, Overhead, Materials, and Other Direct Charges on the following pages.

1-H/1 (VAL/ED-12)

When the state of
PHASE I -5.56-CONCEPTUAL IN-HOUSE VALIDATION ENGINEERING

<u>TITLE</u>	RADE	FY75(5 <u>HRS</u>	mos) <u>\$</u>	(FY76(7) <u>HRS</u>	mos) <u>\$</u>
Project Eng	14	750	9,435	1050	13,209
Mech Eng	13	750	8,048	1050	11,267
Mech Eng	12	1500	13,635	2100	19,089
Mech Eng Tech	11	1500	11,445	2100	16,023
Q.A. Tech	11	-	-	-	-
Mech Eng Tech	9	750	4,748	1050	6,647
Draftsman	7	750	3,893	1050	5,450
Draftsman	5	750	3,143	1050	4,400
Math Analyst	12	750	6,818	1050	9,545
RAM Eng	12	750	6,818	1050	9, 545
Q.A. Eng	12	750	6,818	1050	9,545
Q.A. Tech	12	-	-	-	-
Model Maker		750	5,723	1050	8,012
Direct Labor FY75 FY76	9	,750	80,524	13650Hrs.	112,732
Total Direct Labor	(VAL)	23,400	Hrs.	\$193,256	
Overhead (85%)	FY75 FY76	\$68,449 95,822			
Total Overhead	164,2	67 (123)	,200)		

1-H/2 (VAL/ED-12)

-5.56MM-IN-HOUSE (VAL) ENGINEERING MATERIAL

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY75	5 x 100	\$500
FY76	7 x 100	700
TOTAL		\$1200

日本にないたいないないであった。

Cadles of the solution of the

1-H/3 (VAL/ED-12)

-5.56MM-IN-HOUSE (VAL) IN-HOUSE-OTHER DIRECT COSTS

RATIONALE: Other Direct Costs are assumed to consist of Computer Expenses at \$600 per month and Travel Expense.

A. Computer Expense

FY75	5 x	600	\$3,000
FY76 TOTAL	7 x	600	$\frac{4,200}{$7,200}$

B. Travel Expense

FY75	\$5,760
FY76	23,668
TOTAL	29,428

C. Total O.D.C./FY

FY75	\$8,760
FY 76	27,868
TOTAL	\$36,628

1-H/4 (VAL/ED-12)

-5.56MM-IN-HOUSE (VAL) IN-HOUSE-TRAVEL COST

Estimate of Travel Costs:

٩

•

	FY75	<u>FY76</u>
Review West Coast Contracts 3 men x 3 days x \$35/day Car Rental-\$60/trip Air Fare \$259 x 3 men/trip	5 1575 300 3885	360
Support of APG Test (DT-I) l man x \$35/day Car Rental \$30/day Air Fare \$141 x 12 trips		100 days 3500 3000 1692
Support of Ft. Benning Test (OT-I) 1 man x \$35/day Car Rental \$30/day Air Fare \$172 x 12 trips		100 days 3500 3000 2064
TOTAL/FY	\$5,760	\$23668

TOTAL (VAL) TRAVEL

The second se

1-H/5 (VAL/ED-12)

\$29428

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22)

1. PREPARING INSTALLATION

No.

SARR I-LS-C

	SARVI- ES-C							
	IES OR SERVICES T)				3 . C	UANTITY
Conversion to 5.56mm from 6.0mm Validation Engineering Contract					1	NA		
	SYSTEMISI SUPPORTED BY THIS PROCUREMENT S. WORK BREAKDOWN						STIMATE PREPARED	
Squad A	Squad Automatic Weapon System				STRUCTURE LEVEL		AS OF 30 November 1974	
				-1			50	november 13 4
	RESEARCH AND DEVELOPMENT		COST			REFERENCE		
	7	•	9	-	10			11
COST	CATEGORIES	HOURS	RATE	E	TIMATE		5СНІ	EDULE
				-				
	NGINEERING Direct Labor	27,000	\$6.69	18	0.631			
	MATERIAL				0,631 2,400		· · · · · · · · · · · · · · · · · · ·	
	OVERHEAD		184%		2,360			
	OTHER				3,124			
	DOLING		•	•				
	NATERIAL							
1 - 1 -	OVERHEAD	+·····						
	OTHER		· · · · · · · · · · · · · · · · · · ·					an a
<u>c</u> . P	ROTOTYPE PRODUCT	ION		1 11	6,000			
	STEM TEST AND EVA	LUATION						
£ : D	ATA		· · · · · · ·	+	82,712			
4 · · · · · · · · · · · · · · · · · · ·	DTAL SYSTEMS MANA	GEMENT		8				
1 1	DNSTRUCTION							······
	RAINING	·		+			_	
	THER (Specify) OTAL COST LESS (G)	AND A)		74	7,227			
	AND A		0-	1				
L . T	OTAL COST			747,727				
	ROFIT OR FEE		0.0/					
N . T	OTAL PRICE		0%	82	,949			
	Month Effort A-1 (VAL/ED-	12) through .	A-3 (VAL/E	D-12)	for Rati	onale		
			ATURE		EXTEN	SION	DATE	
Mechani	PREPARING OFFICIAL OY F. SCHWEGLER echanical Engineer				425	5	30 Nov 74	
REVIEW	ING OFFICIAL							
APPRO	ING OFFICIAL							
AMC , FOI	TM 1011e-R	I						I

PHASE I -5.56MM-RATIONALE CONTRACTOR (WEST COAST) VALIDATION ENGINEERING (VAL) FOR 12MO EXTENDED ENGINEERING DEVELOPMENT (ED)

RATIONALE: It is assumed that the contractor is required to convert one existing SAW candidate weapon mechanism into a 5.56MM (M193) weapon and repeat the performance of a Research and Development Acceptance Test (RDAT). The contractor will supply 4 prototype weapons for contractor tests and 7 prototype weapons for DT-I/OT-I testing plus limited technical support.

This contractor effort will be included in the Engineering Development Contract and will represent the time period of 5 months in FY75 and 7 months in FY76.

The contractor's Engineering Costs are estimated as follows:

		FY75	FY76	TOTAL
	l. (VAL/ED-12) Engineering			
	<pre>1.1 Direct Labor 1.2 Overhead 1.3 Materials (200/mo) 1.4 O.D.C.</pre>	75,263 138,484 1,000 <u>5,364</u> 220,111	105,368 193,876 1,400 <u>27,760</u> 328,404	180,631 332,360 2,400 <u>33,124</u> 548,515
	 Prototypes 1 4 Preliminary 2 7 DT-I/OT-I 	45,000 -0-	15,000 56,000 71,000	60,000 56,000 116,000
3.	System Management (1.7 Men) 150 x 1.7 x \$27.03/Mo.	5 mos. 34,463	7 mos. 48,249	82,712
	4. Total Contract (VAL/ED12)	299,574	447,653	747,227
	5. Contract Price (10% Profit)	329,531	492,418	821,949

A-1 (VAL/ED-12)

THE REPORT OF THE PARTY OF THE

PHASE I -5.56MM-RATIONALE CONTRACTOR VALIDATION ENGINEERING (VAL) FOR 12MO EXTENDED ENGINEERING DEVELOPMENT (ED-12)

Engineering Direct Labor (15 men x 150 hr/mo) FY75 (5 months) 11,250 hrs. FY76 (7 months) <u>15,750</u> hrs. <u>27,000</u> hrs.	\$6.69/hr \$75,263 <u>105,368</u> \$180,631
Engineering Overhead (184%) FY75 FY76 Total	\$138,484 <u>193,877</u> \$332,361
Engineering Material (\$200/mo) FY75 (5 months) FY76 (7 months) Total	1,000 1,400 \$2,400
Engineering Other Direct Charges FY75 FY76 Total	5,364 27,760 33,124

A-2 (VAL/ED-12)

「なないないないので

ARK - PAR

PHASE I -5.56MM-RATIONALE CONTRACTOR (WEST COAST)

RAT	IONALE: Other Direct Charge	s to Engine	ering:	
Α.	Computer \$600/Month			
	FY75 5 months FY76 7 months Total		4,	000 200 200
в.	Travel	FY	75 FY	76
	<pre>1. Informal Reviews at RIA 3 days x 2 men x \$35/day Car Rental-\$60/trip Air Fare \$259 x 2 men</pre>	3 63 18 1,55	0 1,0 0 3	50 00
	2. Support of APG (DT-I) l man x \$35/day Car Rent-\$30/day Air Fare-\$355 x 10 trips		1 3,5 3,0 3,5	00
	3. Support Ft. Benning (OT- 1 man x \$35/day Car Rent-\$30/day Air Fare-\$307 x 10 trips		1 3,5 3,0 <u>3,0</u>	00
	4. Total Travel/FY	\$2,36	4 \$23,5	60
	5. Total Travel		\$25,9	24
с.	Other Direct Charges-Summar	У		
		FY75	<u>FY76</u>	TOTAL
	Computer	3.000	4.200	7.200

Computer3,0004,2007,200Travel2,36423,56025,924Total5,36427,76033,124

A-3 (VAL/ED-12)

あるのないのないにない

INDEPENDENT GOVERNMENT COST ESTIMATE -- RESEARCH AND DEVELOPMENT (ANCR 715-22)

1. PREPARING INSTALLATION

SARR I-LS-C							
a supplies on services to per procureo In-House Effort to Monitor Full Scale Development					S. QUANTITY		
Contract to Convert to 5.56mm from 6.0mm					N	A	
4. SYSTEM(S) SUPPORTED	THIS PROCUREN	AENT	S. WORK BPE	AKDOWN	6. ESTI	MATE PREPARED	
Squad Automatic Weapon System			STRUCTURE LEVEL		30 November 1974		
RESEARCH AND DEVELOPMENT			COST		REFEREN	ICE	
7		9	10	14 45	11		
COST CATEGORIES	HOURS	RATE	ESTIMATE		SCHEDU	LE	
A . ENGINEERING							
1 DIRECT LABOR	51,542		432,112				
2 MATERIAL		050	3,200				
J OVERHEAD		85%	367,296				
4 OTHER							
B - TOOLING		and the second second	+ +			·····	
			1				
2 MATERIAL 3 OVERHEAD		the second second	•				
4 OTHER			····				
C . PROTOTYPE PRODUC	TION		1 1	• • • • • • • • • • • • • • • • • • •			
D - SYSTEM TEST AND EN							
E DATA							
F . TOTAL SYSTEMS MAN	AGEMENT						
G . CONSTRUCTION							
H . TRAINING							
· OTHER (Specify)							
J . TOTAL COST LESS (G	AND A)		873,399	· · · · · · · · · · · · · · · · · · ·		······································	
K - GANDA			+++				
L - TOTAL COST			↓↓↓	·			
M - PROFIT OR FEE		•	++				
N - TOTAL PRICE			· · · · · · · · · · · · · · · · · · ·				
32 Month Effort See I-H/1 (FSD/ED-12	?) through I-H	/6 (FSD/EC	0-12) for Ration	nale			
TYPED NAME AND TITLE		SIGNATURE		EXTEN	SION	DATE	
ROY F. SCHWEGLER Mechanical Engineer				4255	5 3	U Nov 74	
REVIEWING OFFICIAL							
APPROVING OFFICIAL						~	
AMC FORM 10110-2						•	

PHASE II EXTENDED PROGRAM RATIONALE -5.56MM-IN-HOUSE FSD-ENGINEERING

RATIONALE: The 5.56mm SAW weapon is judged to have 6 areas requiring major redesign, specifically:

- (1) Power
- (2) Receiver
- (3) Gas System
- (4) Bolt/Operating Group
- (5) Firing Mechanism
- (6) Magazine

The major FSD-Engineering efforts to redesign these areas will be conducted in 5 months of FY76, 3 months 76/77, and 10 months of FY77.

The final 2 months of FY77 and 12 months of FY78 will be used to finalize detail design, testing, data acquisition, data processing, data evaluation, and evaluation of proposed production related modifications in conjunction with the concurrent PEP effort.

Two basic problems appear to exist:

(1) Scaling down the mechanism to operate on the substantially less energy available from the 5.56mm round may severly limit weapon reliability especially under adverse conditions.

(2) If the locking lug areas require extensive modification to insure adequate weapon life an extensive redesign and testing of the operating mechanism may be required.

1-H/1 (FSD/ED-12)

-5.56MM-SUMMARY OF COSTS FSD-IN-HOUSE ENGINEERING

FY76	\$163,592
76/77	92,310
FY77	345,045
FY78	272,452
TOTAL	\$873 ,39 9

The above totals are broken down as to Direct Labor, Overhead, Materials, and Other Direct Charges on the following pages of this section.

1-H/2 (FSD/ED-12)

-5.56MM-IN-HOUSE FSD-ENGINEERING

GRADEProj Eng14Mech Eng13Mech Eng12	FY76 5 mos <u>HRS</u> \$	76/77 3 mo: HRS \$	s FY77 l2mos <u>HRS \$ HR</u>	FY78 12 mos S \$
Mech Eng 13				
-				
Mech Eng 12				
Mech Tech 12				
Q.A. Tech 11				
Mech Tech 9				
Draftsman 7				
Draftsman 5				
Math Analyst 12				
RAM Eng 12				
Q.A. Eng. 12				
Q.A. Tech 12				
Model Maker				
	2003hrs/mo	1903hrs/mo	o 1785hrs/mo	1200hrs/mo
Direct Labor FY7 76/ FY7 FY7	77 7	,406 5710 \$4	7,910 21,416 \$	179,415 14,400 \$120,3
Direct Labor (FS	D) 51,542 hr:	s \$432,112 ()	Average \$8.38/	hr)
F	6/77 \$40 ¥77 152	,746 ,724 ,502 ,324		
Overhead (FSD)	\$367			

7

.

A SATA APPENDIAL

茶

The In-House FSD Engineering Team Effort is summarized as follows:

1-H/3 (FSD/ED-12)

-5.56MM-FSD-ENGINEERING MATERIAL IN-HOUSE ENGINEERING

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY76	5 x	\$100	\$500
76/77	З ж	\$100	\$300
FY77	12 x	\$100	\$1200
FY78	12 x	\$100	\$1200

1-H/4 (FSD/ED-12)

-5.56MM-ESTIMATE OF TRAVEL COSTS FSD-IN-HOUSE ENGINEERING

1200 200 States - August

	FY76	76/77	<u>FY77</u>	FY78	
A. Reviews at West Coast Contractor 3 days x 2 men x \$35/day Car Rental 2 days-\$60/trip Air Fare-\$259¥ 2 men	5 1050 300 2590	2 420 120 1036	6 1260 360 3108	6 1260 360 3108	
B. Support of APG Test (RDAT-I l man x \$35/day Car Rental @ \$30/day Air Fare \$141 x 28 trips	DT-II)			275 da 9625 8250 3948	ays
C. Support of Ft. Benning Test l man x \$35/day Car Rental @ \$30/day Air Fare \$172 x 18 trips	- (OT-II)		180 da 6300 5400 3096	ays
TOTAL/FY	\$3940	\$1576	\$4728	\$41347	
TOTAL TRAVEL				\$51,591	

1-H/5 (FSD/ED-12)

-5.56MM-OTHER DIRECT COSTS FSD-IN-HOUSE ENGINEERING

RATIONALE: Other Direct Costs are assumed to consist of Computer Expense at \$600 per month and Travel Expense based on a West Coast Contractor.

A. Computer Expense

FY76 76/77 FY77 FY78	3 12	x x	\$600 \$600 \$600 \$600	\$	3,000 1,800 7,200 7,200
TOTAL				\$]	19,200

B. Travel Expense

FY76	\$ 3,940
76/77	1,576
FY77	4,728
FY78	41,347
TOTAL	\$51,591

C. Total O.D.C./FY

	FY76 76/77 FY77 FY78	\$ 6,940 3,376 11,928 48,547
D.	TOTAL O.D.C.	\$70,791

1-H/6 (FSD/ED-12)

106

,

INDEPENDENT GOVERNMENT COST ESTIMATE--RESEARCH AND DEVELOPMENT (AMCR 715-22)

1. PREPARING INSTALLATION

:

SARRI-LS-C

n-H Conv	PLIES ON SERVICES TO ouse PEP Extended ert to 5.56mm fro	Engineering				s. quan N/	۱ <u>ــــــــــــــــــــــــــــــــــــ</u>	
	d Automatic Weapo		ENT	S. WORK BRI Structu 4		AS O	vember 1974	
	RESEARCH AND	DEVELOPMENT		COST		REFERENCE		
	7	•	•	10		11	· ·	
c	DST CATEGORIES	HOURS	RATE	ESTIMATE		SCHEDULE		
1.	ENGINEERING							
1	DIRECT LABOR	24.375		192,138				
2	MATERIAL			2,400				
1	QVERHEAD		85%	163,317				
4	OTHER IN FSD							
1.	TOOLING				· . 			
D	DIRECT LABOR							
12	MATERIAL							
]]	OVERHEAD							
4	OTHER					_		
	PROTOTYPE PRODUCT	ON						
	SYSTEM TEST AND EVA	LUATION						
1.	DATA							
11	TOTAL SYSTEMS MANAG	EMENT			·			
†	CONSTRUCTION							
1.	TRAINING							
1.	OTHER (Specity)	onfig. Contr	ol Board	153,006				
1.	TOTAL COST LESS (G A	ND A)		510,861				
+.	G AND A							
+	TOTAL COST							
1.	PROFIT OR FEE							
۱.	TOTAL PRICE							
	lonth Effort I-H/7 (PED/ED-12)) through I-H	/9 (CCB/ED	-12) for Ratic	onale			
TYPED NAME AND TITLE SIGN				TURE	EXTENS	10N	DATE	
	PARING OFFICIAL							
	F. SCHWEGLER				1055		Nov 74	
	anical Engineer				4255		30 Nov 74	
APP	PROVING OFFICIAL							
	FORM 10116-2							

PHASE II
EXTENDED PROGRAM
-5.56MM-
IN-HOUSE PEP
SUMMARY

•

	FY76	76/77	<u>FY77</u>	FY78	Total
A. Engineering					
Direct Labor Material (\$75	•	16,419	65,192	63,748	192,138
month)	375	225	900	900	2,400
Overhead (85%) 39,762	13,956	55,413	54,186	163,317
O.D.C. (in FS	D) -	-	-	-	-
TOTAL A	86,916	30,600	121,505	118,834	357,855
B. Configuration	Control	Board			
Direct Labor Material (\$75	12,720	7,633	30,528	30,528	81,409
month)	375	225	900	900	2,400
Overhead(85%)		6,487	25,949	25,949	69,197
O.D.C. (in FSD		-	-	-	-
TOTAL B	23,907	14,345	57,377	57,377	153,006
A & B	110,823	44,945	178,882	176,211	

TOTAL IN-HOUSE PEP

ŧ

\$510,861

.

1-H/7 (PEP/ED-12)

PHASE II EXTENDED PROGRAM -5.56MM-IN-HOUSE PEP ENGINEERING

TITLE	GRADE	FY75 5mos HRS	\$	76/7 3mos HRS		FY77 12mos HRS	\$	FY78 12mos HRS	\$
Project Eng	14								
Mech Eng	13								
Mech Eng.	12								
Mech Tech.									
Mech Tech.	9								
Draftsman	7								
Draftsman	5								
Math Analyst	12								
RAM Eng.	12								
Direct Labor									
FY76		5625 \$40	5,779	2062	61 <i>6</i> 41	0			
76/7 FY77				2063	\$16,41	9 8287 \$(65,19	2	
FY78								8400 \$	63,748
Total Direct	Labor (PEP) 24,37	5 Manl	hours	\$192 (A	,138 verage l	ManHr	\$7.88)	
Overhead (85%									
FY76 76/7				9,762					
FY77				5,413					
FY78			5	4,186					
TOTA	L OVERHEAD	(PEP)	16	3,317					

1-H/8 (PEP/ED-12)

Y

PHASE II EXTENDED PROGRAM -5.56MM-IN-HOUSE-CONFIGURATION CONTROL BOARD

RATIONALE:

Control of Configuration Management will be assumed by the Government.

A Configuration Control Board (CCB) will be established and will exercise its authority throughout the FSD period and potentially continue in the same manner at somewhat diminished levels of effort through the Limited Production period and the Full Scale Production period.

During the FSD period from 1 February 1976 to 1 October 1978 (32 months) the CCB will utilize the following people to the extent indicated:

TITLE	Grade	Hours	\$DL	\$0verhead
40% Configuration				
Manager	14	1920	24,154	20,531
40% Engineer	13	1920	20,602	17,511
20% Procurement				
Specialist	13	960	10,301	8,756
20% QA Engineer			·	·
(Gages & SQAPS)	13	960	10,301	8,756
20% Maintenance			•	·
Specialist	12	960	8,726	7,417
20% Supply Specialis	t 11	960	7,325	6,226
	TOTA	L	\$81,409	\$69,197

These Expenses occur as follows:

FY76	\$12,720	\$10,812
76/77	7,633	6,487
FY77	30,528	25,949
FY78	30,528	25,949

1-H/9 (CCB/ED-12)

NUMBER I-C

40

「ないないでいれるのです」

Same and the second sec

BASIC ESTIMATED COST PACKAGE ADVANCED/ENGINEERING DEVELOPMENT CONCEPTUAL WEAPON SYSTEM WITH EXTENSIVE CHANGES

18 MONTHS EFFORT

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22)

1. PREPARING INSTALLATION

AND AND A THE REAL PROPERTY AND A DESCRIPTION OF
De	ve	lies on services lop Best Com dation Engine	bined Concep		apon			3. QI	NA	
		EM(S) SUPPORTED	-		1	WORK BRE	AKDOWN	6. ESTIMATE PREPARED		
Sq	lua	d Automatic N	Weapon Syste	m		4			November	1974
		RESEARCH AN	D DEVELOPMENT		c	DST		REFEI	RENCE	
				9	-	10		1	l .	
	co	ST CATEGORIES	HOURS	RATE	EST	IMATE		SCHE	DULE	
Ă		ENGINEERING							******	
-		DIRECT LABOR			27	,945				
-	2	MATERIAL				1,500				
	3	OVERHEAD			49	3,539				
	4	OTHER			4.	1,988				
		TOOLING								
- 34	Ļ).	DIRECT LABOR	-							
-	2	MATERIAL								
	3	OVERHEAD	-	en e se se se en e esta a recentra en esta a recentra en esta e	· · · ·					
•	1	OTHER			16	,000				
<u>C</u>	:	PROTOTYPE PRODUC			+					
0	-	· · · · · · · · · · · · · · · · · · ·	ALUATION							
E F	- :	TOTAL SYSTEMS MAN	AGENENT		12	,068				
		CONSTRUCTION			+					
H		TRAINING	_ · · ····							
		OTHER (Specity)			T					
,		TOTAL COST LESS (G			1,10	,040				
K	•	G AND A		-0-						
L	• • •	TOTAL COST			1 ,10.	,040				
M		PROFIT OR FEE		10%				·		
N	ARK	TOTAL PRICE			1,21	,144		·		
		onth effort A-1 (VAL/ED-1	18) through 2	A-4 (VAL	./ED-1	.8) for 1	rational	le .		
		ED NAME AND TITLE		SIGN	ATURE		EXTEN	SION	DATE	

TYPED NAME AND TITLE SIGNATURE EXTENSION DATE •. PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer •. Reviewing official •. APPROVING OFFICIAL

AMC FORM 10110-2

112

.

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT (AMCR 715-22)

1. PREPARING INSTALLATION

SARRI-LS-C

•

ŧ

In-H	PLIES OR SERVICES T OUSE Monitori neering of a	ng of Contra	act for tual Wea	Validation apon	3 . (C	NA	
SYST	EM(S) SUPPORTED BY	THIS PROCUREME	INT	S. WORK BRE	ELIVEL	AS OF November 197	
Juu		D DEVELOPMENT				RENCE	
	RESEARCH AND			10			
24 G.M.	7	•	•	4	11		
co	ST CATEGORIES	HOURS	RATE	ESTIMATE	SCH		
A	ENGINEERING	35,100	_	225 167			
-	DIRECT LABOR	35,100		325,167			
2	MATERIAL		103%	1,800 334,922			
- 1 3	OVERHEAD		TO 74	44,836			
	OTHER						
	TOOLING	.		·			
-+	DIRECT LABOR						
12-	NATERIAL OVERHEAD			*		·····	
3	OTHER			·····			
	PROTOTYPE PRODUCT	TION		**····		······································	
	SYSTEM TEST AND EV	and desired a second se		92,492			
	DATA				**************************************		
- T	TOTAL SYSTEMS MANA	GENENT		+ 		· · · · · · · · · · · · · · · · · · ·	
	CONSTRUCTION			+			
1			a				
-				· • · · · · · · · · · · · · · · · · · ·			
	TOTAL COST LESS (G	AND A)		799,217			
; † .	GAND A						
	TOTAL COST			· • · · · · · · · · · · · · · · · · · ·			
	PROFIT OR FEE						
	TOTAL PRICE						
	s onth Effort I-H/l (VAL/ED	-18) Through	n I-H/7	(VAL) for Ra	tionale		
	ED NAME AND TITLE		SIGN	ATURE	EXTENSION	DATE	
	ARING OFFICIAL					1	
	F. SCHWEGLER						
Mech	anical Engine	er			4255	30 Nov 74	
REVI	EWING OFFICIAL						
APPI	ROVING OFFICIAL					+	
MC	FORM 10116-8	l				L	

WE WAR HE E SHARWAR , INCOMPANY

ar 13

SAW CONCEPTUAL WEAPON --PHASE I-VALIDATION ENGINEERING-18 MONTH CONTRACTOR/IN-HOUSE TASKS

	TASK	CONTRACTOR	IN-HOUSE
1. 2.	Review System Requirements Review Weapon Concepts	Perform Perform	Direct Direct
3.	Review Recommended Additions/Revisions	Perform	Direct
4.	Prepare Revised Weapon Dynamic Model	Perform	Approve
5.	Prepare Revised Weapon Layouts	Perform	Approve
6.	Exercise Model to Establish new Design		
	Parameters	Perform	Direct
7.	Coordinate New Parameters with Revised		
	Design	Perform	Direct
8.	Prepare Detail Drawings	Perform	Approve
9.	Fabricate Preliminary Test Hardware	Perform	Approve
10.	Conduct Preliminary Testing	Perform	Approve
*11.	Prepare "VEAT" Detail Design	Perform	Direct
12.	Fabricate "VEAT" Hardware	Perform	Approve
13.	Conduct "VEAT" Tests	Perform	Approve
14.	Evaluate "VEAT" Test Results	Monitor	Perform
15.	Prepare DT-I/OT-I Detail Design	Perform	Direct
16.	Fabricate DT-I/OT-I Hardware	Perform	Approve
17.	Conduct DT-I/OT-I Tests	Assist	Perform
	Evaluate DT-I/OT-I Tests	Monitor	Perform
	Conduct Validation IPR	-	Perform

*VEAT - Validation Engineering Acceptance Test

(VAL/ED-18)

RATIONALE: It is assumed that one type of weapon mechanism has been selected and that various selected features of each of the SAW candidates have been selected to be incorporated into the projected Engineering Development concept. It is also assumed that extensive ammunition development will be on-going during the Weapon Validation Phase. Based on these assumptions revision and verification of the dynamic models will be required and extensive testing will be required to establish a significant data base for RAM evaluation.

	<u>FY75</u>	<u>FY76</u>	76/77	TOTAL
*Engineering **DT-I/OT-I TOTAL	\$192,618 \$192,618	\$471,394 <u>\$69,369</u> \$540,763		\$706,725 <u>\$92,492</u> \$799,217

*Engineering Costs are Broken Down as Direct Labor, Materials, ** and Other Direct Charges on the following pages. DT-I/OT-I costs are based on previous costs rationalized in Appendix.

1-H/1 (VAL/ED-18)

and the second second second

		FY7 5mo		FY76 12mos		76/7 1 mo	
TITLE	GRADE	HRS	\$	HRS	\$	HRS	\$
Proj. Eng.	14	750	10,455				
Mech Eng	13	750	8,918				
Mech Eng	12	1500	15,090				
Mech Eng Tech	11	1500	12,660				
Q.A. Tech	11	-0-	-0-	-0-	-0-	-0-	-0-
Mech Eng Tech	9	750	5,250				
Draftsman	7	750	4,298				
Draftsman	5	750	3,473				
Math Analyst	12	750	7,545				
RAM Eng.	12	750	7,545				
Q.A. Eng.	12	600	6,036				
Q.A. Tech	12	-0-	-0-	-0-	-0-	-0-	-0-
H.F. Eng.	12	150	1,509				
Model Maker	WB	750	7,545				
Direct Labor	FY75 FY76 76/7		\$90,324	23,400	\$216,77	'8 1950	\$18,065
Total Direct Lab Overhead (1.31 x		-1=2.03-)3%)			

FY75 =	\$93,034
FY76 =	223,281
76/77 =	18,607
TOTAL OVERHEAD	\$334,922

いたないのである

1/H2 (VAL/ED-18)

116

4

i

ENGINEERING MATERIAL

A REAL PROPERTY OF THE REAL PR

RATIONALE: Engineering Material Cost covers office supplies, drafting paper, etc., as is estimated at \$100 per month.

FY75	5 x \$	5100	\$ 500
FY76	12 x \$		1200
76/77	1 x \$		<u>100</u>
TOTAL			\$1800

1-H/3 (VAL/ED-18)

(VAL) IN-HOUSE - OTHER DIRECT COSTS

RATIONALE: Other Direct Costs are assumed to consist of Computer Expenses at \$600 per month and Travel Expense.

A. Computer Expense

F ¥ 75	5 x \$600	\$ 3,000
F¥76	12 x \$600	6,200
76/77	1 x \$600	600
TOTAL COMPUTER	EXPENSE	\$10,8 00

TOTAL COMPUTER EXPENSE

B. Travel Expense (See 1-H/5)

FY75	\$ 5,760
FY76	22,935
76/77	5,341
TOTAL TRAVEL	\$34,036

C. Total O.D.C./FY

FY75	\$ 8,760
FY76	30,135
76/77	5,941
TOTAL O.D.C.	\$44,836

1-H/4 (VAL/ED-18)

(VAL) IN-HOUSE TRAVEL COST

Estimate of Travel Costs	FY75	FY76	76/77
Review West Coast Contractor	(Trips) 5	9	1
3 men x 3 days x \$35/day	1575	2835	315
Car Rental-\$60/trip	300	540	60
Air Fa re	3885	6993	777
Support of APG Test (DT-I)		75 days	25 days
l man x \$35/day		2625	875
Car Rental-\$30/day		2250	750
Air Fare \$141 per trip (12)		1269	423
Support of Ft. Benning Test	(OT-I)	75 days	25 days
1 man x \$35/day		2625	875
Car Rental-\$30/day		2250	750
Air Fa re \$172 per trip (12)		1548	516
TOTAL/FY	\$5760	\$22935	\$5341

TOTAL (VAL) TRAVEL \$34,036

14

1-H/5 (VAL/ED-18)

RATIONALE DT-I/OT-I VALIDATION ENGINEERING

This estimate is based on experience with DT-I/OT-I as performed on the XM233, XM234 and XM235 candidates. The following values were assumed to be representative of those tests.

DT-I 9 months duration

ARMCOM FUNDING	\$180,110
TECOM FUNDING	98,000
TOTAL (Available &	
Spent)	278,000

OT-I 9 months duration

42,000 MANHOURS

ARMCOM FUNDING	\$ 53,000
TECOM FUNDING	192,000
TOTAL AVAILABLE	\$245,000

Since the ARMCOM \$53K was for construction of special range facilities these facilities are assumed to be still available. (Actually it appears that only \$28,000 of this fund was expended).

It also appears that the related Military Payroll amounted to about \$268,000.

1-H/6 (VAL)

Summarizing the actual ARMCOM SAW Program Expense experienced for DT-I/OT-I during FY74/FY75 on the Test sites.

	DT-I	\$180,110
	OT-I	28,000
	TOTAL	\$208,000
	DURATION	9 months
	EXPENSE RATE	\$23,123/month
New DT-I/ DURATION	OT-I	4 months
Estimated Cost	a dt-1/ot-1	\$92,493

*

NOTE: Apparently Ft. Benning's facilities may come under control of TRADOC in the near future. At that time this cost estimate will not be valid since undoubtedly accounting procedures will change.

1-H/7 (VAL)

SAW CONCEPTUAL WEAPON -PHASE I-CONTRACTOR VALIDATION ENGINEERING

RATIONALE: It is assumed that the contractor is required to modify one of the existing SAW candidate weapon mechanisms to incorporate selected features from other SAW candidate weapons as well as features suggested by previous SAW efforts. In addition an unspecified amount of modification will be required to accommodate an as yet undefined round of ammunition.

Thus the contractor effort will include extensive preliminary testing, performance of a Validation Engineering Acceptance Test and support for a DT-I/OT-I test. From this testing a data base will be established on which to base a decision to proceed into a Full Scale Development Program.

The time period for this effort will total 18 months including 5 months in FY75, 12 months in FY76 and 1 month of 76/77 transition period.

A-1 (VAL/ED-18)

SAW CONCEPTUAL WEAPON -PHASE I-CONTRACTOR VALIDATION ENGINEERING

The Contractors Engineering Costs are Estimated as:

Υ.

	FY75 5mos	FY76 12mos	76/77 1 mo.	TOTAL
 Engineering 1.1 Direct Labor 1.2 Overhead 1.3 Materials 1.4 O.D.C. 	75,263 138,483 600 5,364	180,630 332,359 3,600 30,000	15,052 27,697 300 _6,624	270,945 498,539 4,500 41,988
TOTAL ENG.	\$219,710	\$546,589	\$49,673	\$815,972
 Prototypes 1 7 Preliminary 2 7 DT-I/OT-I TOTAL PROTOTYPES 	45,000 -0- \$45,000	60,000 56,000 \$116,000	-0- -0- -0-	105,000 <u>56,000</u> \$161,000
3. System Manageme 150x1.7x\$27.03/mo	nt (1.7 men) \$ <u>34,463</u>	\$ 82,712	\$ 6,893	\$124,068
4. Total Contract(VAL)\$299,173	\$745,301	\$56,566	\$1,101,040
5. Total Price (10 Profit)	2	\$819,831	\$62,223	\$1,211,144

A-2 (VAL/ED-18)

SAW CONCEPTUAL WEAPON -PHASE I-CONTRACTOR VALIDATION ENGINEERING

Engineering Direct Labor (15 men x 150/hrs.mo x \$6.69/hr)

F¥75	(5 mos)	11,250 hr:	180,630
FY76	(12 mos)	27,000 hr:	
76/77	(1 mo)	2,250 hr:	
TOTAL		40,500 hrs	\$270,945

Engineering Overhead (184%)

FY75	\$138,483
FY76	332,359
76/77	27,697
TOTAL	\$498,539

Engineering Material (\$300/mo.)

あいないとなるのないないないないないである

FY75 (5 mos) FY76 (l2 mos) 76/77 (l mo)	3,6	00 00 00
TOTAL	\$ 4,5	00

A-3 (VAL/ED-18)

SAW CONCEPTUAL WEAPON -PHASE I.-CONTRACTOR VALIDATION ENGINEERING

RATIONALE: Other Direct Charges to Engineering include Computer and Travel Costs.

A. Computer Costs \$600/month

R,

Carles State Brank Lake Balls & Calorent H. a. R. de

	FY75 (5 mos) FY76 (12 mos) 76/77 (1 mo) TOTAL		\$3,000 7,200 <u>600</u> \$10,800	
в.	Travel	FY75	<u>FY76</u>	76/77
	l) Informal Review at RIA (trips) 3 days x 2 men x \$35/day Car Rental-\$60/day Air Fare \$259 x 2 men	3 630 180 1554	9 1890 540 4662	1 210 60 518
	2) Support of APG (DT-I) l man x \$35/day Car Rental-\$30/day Air Fare-\$355 x l2 trips		75 days 2625 2250 3195	75 days 875 750 1065
	3) Support Ft. Benning (OT-I) 1 man x \$35/day Car Rental-\$30/day Air Fare \$307 x 12 trips		75 days 2625 2250 2763	25 days 875 750 921
	4) TOTAL TRAVEL/FY	\$2364	\$22800	\$6024
	5) TOTAL TRAVEL		\$	31,188
c.	Other Direct Charges-Summary Computer Travel Total	3000 2364 \$5364	7200 22800 \$30000	$\begin{array}{r} & \underline{\text{TOTAL}} \\ 600 & 10,800 \\ \underline{6024} & \underline{31,188} \\ \underline{6624} & \underline{541,988} \end{array}$

A-4 (VAL/ED-18)

NUMBER I-D

BASIC ESTIMATED COST PACKAGE ADVANCED/ENGINEERING DEVELOPMENT ADDED COST FOR CONTRACTOR WITHOUT PREVIOUS SAWS PROGRAM EXPERIENCE

6 MONTH EFFORT

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT (AMCR 715-22)

PREBABING INSTALLATION

	I-LS-C					
2. SUP In-H	PLIES OR SERVICES TO O Ouse Monitoring Experience	of Contr	actor wit	hout Previo		QUANTITY NA
4. 5757	EMIS SUPPORTED BY T	HIS PROCUREM	ENT	S. WORK BRE	AKDOWN 6.	ESTIMATE PREPARED
Squa	d Automatic Wea	apon Syste	em	4	3(November 1974
	RESEARCH AND D	EVELOPMENT	Ī	COST	REF	ERENCE
19-	7	•	•	10		11
со	ST CATEGORIES	HOURS	RATE	ESTIMATE	SCH	EDULE
	DIRECT LABOR *	960	\$317.60	150,158		
2	MATERIAL			900		
2	OVERHEAD **		103%	154,738		
	0THER					
.	TOOLING					
	DIRECT LABOR					
2	OVERHEAD		And the Point of the Annual Point			••••••••••••••••••••••••••••
	OTHER					
<u>ç</u> .	PROTOTYPE PRODUCTION	N				
0 .	SYSTEM TEST AND EVALU					
I .	PATA					
# L	TOTAL SYSTEMS MANAGE	MENT				
G .	CONSTRUCTION					
H ·	TRAINING				· · · · · · · · · · · · · · · · · · ·	
1 .	OTHER (Specify)			305,796		
<u>, і і і і і і і і і і і і і і і і і і і</u>	TOTAL COST LESS (G AN G AND A					
<u> </u>	TOTAL COST					
	PROFIT OR FEE					
N I	TOTAL PRICE					
*Inc 6 St	nth Effort ludes entire SA Months x 160 ho aff Rate=\$317.0 cludes 31% frin	ours/month 60/hr.	n=960 sta:		1.55)-1] ×	100 = 103%
	ED NAME AND TITLE	•••	SIGNA	TURE	EXTENSION	DATE
	F. SCHWEGLER					
	anical Engineer	r			4255	30 Nov 74
	IEWING OFFICIAL					
. APP	ROVING OFFICIAL					1

AMC FORM 10110-2

The second s

T TING ST

INDEPENDENT GO	DVERNMENT COST	ESTIMATE RESE	ARCH AND	DEVELOPMENT

(AMCR 715-22)

1. PREPARING INSTALLATION

SARRI-LS-C

SA	RR.	1-19-0						
Co	nt	PLIES OR SERVICES ract to Famil ram	TO BE PROCURE Liarize a N	ew Contrac	tor with t	he SAWS	8. QUANTITY N.'s	
4. 1	5751	EMIS SUPPORTED	THIS PROCURE	MENT	S. WORK BI	REAKDOWN	6. ESTIMATE PREPARED	
Sq	Squad Automatic Weapon System RESEARCH AND DEVELOPMENT			STRUCTURE LEVEL		30 November 1974		
				COST		REFERENCE		
		7	•	•	10		11	
	co	COST CATEGORIES HOURS RATE		RATE	ESTIMATE		SCHEDULE	
A	•	ENGINEERING						
		DIRECT LABOR	9,600	\$9,22	88,512			
	2	MATERIAL			15,000			
	3	OVERHEAD		110%	97,363			
_	4	OTHER						
		TOOLING						
	Ēi.	DIRECT LABOR						
	2	MATERIAL						
	3	OVERHEAD		N				
		OTHER						
£.	1.	PROTOTYPE PRODUC	TION					
D	17	SYSTEM TEST AND E	VALUATION		52,175			
E	1.	KACA RAM Plan		on	80,000			
F	1.	TOTAL SYSTEMS MAN			T			
G	t	CONSTRUCTION			1			
H		. KKXXXXX Weapon Mechanism Program			70,000			
+	•	OTHER (Specify)						
J		TOTAL COST LESS (C			388,050			
K		G AND A	2	4.68				
L	•	TOTAL COST			483,511			
M		PROFIT OR FEE	1	08				
		TOTAL PRICE			531,862			

REMARKS

*6 Months Effort

 12.
 TYPED NAME AND TITLE
 SIGNATURE
 EXTENSION
 DATE

 •. PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer
 4255
 30 Nov 74

 •. REVIEWING OFFICIAL
 4255
 30 Nov 74

t

AMC PORM 1011e-2

NEW CONTRACTOR FAMILIARIZATION ESTIMATE OF ADDED COST

The estimated cost to familiarize a new contractor with the SAWS program is tabulated as follows:

1. Contractor Costs

	Number of men		10
	Period		6 months
	Man hours		9600
	Rate \$9.22/Hr.		~
	Direct Labor (9600 hrs)		88,512.00
	Overhead 110%		97,363.20
	RAM Plan Preparation		80,000.00
	Weapon Mechanism program		70,000.00
	System Test & Evaluation		
	Labor (1920 hrs)	17,702.40	
	Overhead 110%	19,472.64	
	Material \$2500/mo.	15,000.00	
	TOTAL SYSTEM TEST & EV	VALUATION	52,175.04
	Total Contractor Cost (Les	ss G&A)	388,050.24
	Total Contractor Cost (24,	.6% G&A)	483,510.60
	Total Contractor Price (10)% Profit)	531,861.66
2.	In-House Costs (SARRI-LS-C	C Staff)	
	Cost/hr		317.60/hr.
	Cost/month (160 hrs)		50,816 .00
	Total In-house Labor (6 m	onths)	304,896.00
	In-house Material (\$150/mc	onth)	900.00
	Total In-House Cost		\$305,796.00

3. Total added Program Cost (1. + 2.) \$837,657.66

4. Tasks for Familiarization of New Contractor with SAWS Program.

I. Review System Requirements

II. Review candidate Weapon and Ammunition Performance

III. Review and Design Computer Programs:

a. RAM

b. Dynamic Models

IV. Review Existing Drawings and Specifications

V. Review Trade-Off Determinations.

VI. Determine Weapon and Ammunition Shortcomings.

VII. Review previous configuration changes.

VIII. Establish familiarity with H.F.E. Data.

IX. Establish familiarity with RAM Data.

X. Establish familiarity with Safety Data.

XI. Conduct Trade-Off Determinations.

XII. Prepare RAM Plan.

XIII. Prepare Development Plan.

XIV. Secure Approval of RAM and Development Plans.

NUMBER II-A

1

;

ŧ

URANGE FERRET BUILDING

BASIC ESTIMATED COST PACKAGE ENGINEERING DEVELOPMENT XM233 CONTRACTED IN A LOW COST AREA IN 6.00MM

INDEPENDENT GOVERNMENT COST ESTIMATE -- RESEARCH AND DEVELOPMENT

(AMCR 715-22) LOW COST AREA CONTRACT

1. PREPARING INSTALLATION

SARRI-LS-C

. 5	UP	PLIES OR SERVICES				8. QUANTITY
		XM233 Low Co	ost Area Con	tract (1	PEP Included)	NA
). S	Y 51	Squad Automa	atic Weapon		5. WORK BREAKD STRUCTURE LI 4	OWN EVEL 6. ESTIMATE PREPARED AS OF 30 November 197
		RESEARCH AN	D DEVELOPMENT		COST	REFERENCE
	37	7	•	9	10	11
	c	DST CATEGORIES	HOURS RATE		ESTIMATE	SCHEDULE
		ENGINEERING			1,640,106	
	i.	DIRECT LABOR	186,216	-		
	2	MATERIAL		n dia ka		
	1	OVERHEAD		350%		
	4	OTHER		1000 (1000) 1000 (1000)		
1		TOOLING			479,149	
	11.	DIRECT LABOR				· · · · · · · · · · · · · · · · · · ·
1	2	MATERIAL				
	3	OVERHEAD				
į	•	OTHER		and the second second second	912,323	
<u>c</u> .		PROTOTYPE PRODUC			448,515	
2	-	SYSTEM TEST AND EN			56,957	
		DATA TOTAL SYSTEMS MAN	AGENENT	-	-0-	
F.	-	CONSTRUCTION			-0-	·····
		TRAINING			90,886	
		OTHER (Specity)	PEP		1,568,787	
		TOTAL COST LESS (G	AND A)		5,196,723	
ĸ	•	G AND A	5%			
		TOTAL COST			5,456,560	
4		PROFIT OR FEE	9.3%			
N	۱.	TOTAL PRICE			5,964,020	

12. TYPED NAME AND TITLE	SIGNATURE	EXTENSION	DATE
. PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer		4255	30 Nov 74
6. REVIEWING OFFICIAL			
C. APPROVING OFFICIAL			

AMC FORM 10110-2

5

₹₽

いのないのないのないないない

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT (AMCR 715-22) IN-HOUSE SUPPORT

1. PREPARING INSTALLATION

- Sale

į.

SUPPLIES OR SERVICES TO BE		LOW COOL			QUANTITY N.A.
IN-HOUSE SUPPOR	CT XM233	LOW COST	(PEP INCLUD		
SYSTEM(S) SUPPORTED BY TH	IS PROCUREM	ENT	S. WORK BRE	AKDOWN C	AS OF
Squad Automatic	: Weapon	System			30 November 197
RESEARCH AND DE	VELOPMENT		COST	RE	FERENCE
,			10		31
COST CATEGORIES	HOURS	RATE	ESTIMATE	50	CHEDULE
- ENGINEERING			882,209		
I DIRECT LABOR	52,526	-	· · · · · · · · · · · · · · · · · · ·		
2 MATERIAL					
J OVERHEAD		85%			
4 OTHER					
- TOOLING			· · · · · · · · · · · · · · · · · · ·		
I DIRECT LABOR	-				
2 MATERIAL			+		
3 OVERHEAD					
4 OTHER		1. W.	۰۰۰۰۰ م		
PROTOTYPE PRODUCTION			138,738		
- SYSTEM TEST AND EVALUA	TION *		1		
DATA			↓		
- TOTAL SYSTEMS MANAGEM	ENT		↓		
- CONSTRUCTION		••••••••••••••••••••••••••••••••••••••	· • · · · · · · · · · · · • · • • • • •		
. TRAINING			E20 172		
OTHER (Specify) PEP TOTAL COST LESS (G AND			520,173 1,541,120		
· GANDA	NA		++/342/420		
. TOTAL COST	NA		+		
. PROFIT OR FEE	NA		1	· · · · · · · · · · · · · · · · · · ·	
- TOTAL PRICE	NA		h		
*DT/OT-II of 6					
TYPED NAME AND TITLE		SIGN	ATURE	EXTENSIO	N DATE
PREPARING OFFICIAL					
ROY F. SCHWEGLE					
Mechanical Engi	neer			4255	30 Nov 74
REVIEWING OFFICIAL					
APPROVING OFFICIAL					
MC FORM 1011e-E					12

6.0MM XM233 (LOW COST AREA) RESEARCH & DEVELOPMENT

	<u>FY75</u>	FY76	76/77	<u>FY77</u>	<u>FY78</u>	TOTAL
l.lContract l.ll Dev Eng (Val/Ed) l.l2 PEP l.13 Tooling l.l4 Mfg. Proto *1.15 Other	271,489 -0- -0- -0- 49,492	650,506 -0- 479,149 -0- 120,116	12 9 ,903 213,200 -0- 304,108 99,365	588,208 1,355,587 -0- 608,215 327,385	- 0- - 0- - 0- - 0- - 0-	1,640,106 1,568,787 479,149 912,323 596,358
FY-Cost (Less G & A)		1,249,771	<u>_ (1999) 1997 </u>	2,879,395	-0-	5,196,723
G & A (5%) FY-Cost	337,030	1,312,260	783,905	3,023,365	-0-	5,456,560
Profit (9.3%) FY-Total Price	368,374	1,434,300	856,808	3,304,538	-0-	5,964,020
<pre>1.2 In-House 1.21 Dev Eng 1.22 PEP 1.23 Tooling 1.24 Mfg. **1.25 Other</pre>	173,312 110,860 -0- -0- -0- -0-	391,620 179,774 -0- -0- -0-	60,596 44,054 -0- -0- -0-	256,681 185,485 -0- -0- 138,738	-0- -0- -0- -0- -0-	882,209 520,173 -0- -0- 138,738
In-House Cost	284,172	571,394	104,650	580,904	-0-	1,541,120
Total Prog R&D	652,546	2,005,694	961,458	3,875,709	-0-	7,505,140
* Other/Contract Syst. Test & Eva. Data Total Syst Mg. Training Total	1 32,740 16,752 -0- -0- 49,492	79,911 40,205 -0- -0- 120,116	99,365 -0- -0- -0- -0- 99,365	236,499 -0- -0- 90,886 327,385	-0- -0- -0- -0- -0-	448,515 56,957 -0- 90,886 596,358

**DT/OT (ARMCOM) \$23,123/Mo,-I=4 months,-II=6 months

BREAKDOWN OF "OTHER" EXPENSES SHOWN

ON SPREAD SHEET (XM233)

OTHER	<u>FY75</u>	FY76	76/77	FY77	TOTAL
System Test & Evaluation	32,740	79,911	99,36 5	236,499	448,515
Data (FSD)	16,752	40,205	-0-	-0-	56,957
Total System Management	-0-	-0-	-0-	-0-	-0-
Training		-0-	-0-	90,886	90,886
TOTAL	49,492	120,116	99,365	327,385	596,358

ţ

CONTRACTOR'S MAN HOUR SUMMARY XM-233

14

Sate State

からい

ACTIVITY	FY75	FY76	76/77	FY77	TOTAL
A-2 Dev Eng *PEP Material B-2 Tooling ** Other	14,220 -0- -0- -0-	34,116 -0- -0- 9,473	6,760 9,418 -0- -0-	28,760 64,506 -0- -0-	83,856 73,924 -0- 9,473
Direct C.	1,600	3,203	1,600	12,560	18,963
TOTAL HOURS	15,820	46,792	17,778	105,826	186,216
MAN YEARS (1800 HRS)		26.0	9.88	58.79	103.46
<pre>** Other Direct D-3 Syst Test & Evaluation E-3 Data</pre>		3,203 (INCLUDE	1,600 D IN DEV.	9,353 ENG.)	15,756
F-l Total Syst Management E-4 Training	-0-	-0-	-0-	-0-	-0-
D 4 II dIMING			0	3,207	3,207
TOTAL O.D.C.	1,600	<u>-0-</u> 3,203	<u> </u>	<u>3,207</u> 12,560	<u>3,207</u> 18,963
TOTAL O.D.C. *PEP A-3PEP/E-4	<u></u>	3,203	1,600	12,560	
TOTAL O.D.C. *PEP A-3PEP/E-4 PEP Dev Eng	<u></u>				
TOTAL O.D.C. *PEP A-3PEP/E-4 PEP Dev Eng C-2 PEP Qual.Cont.	1,600	3,203	1,600	12,560	18,963
TOTAL O.D.C. *PEP A-3PEP/E-4 PEP Dev Eng C-2 PEP	1,600	3,203	1,600	12,560	18,963 38,503

RATIONALE XM-233 IN-HOUSE FSD ENGINEERING

RATIONALE: The XM-233 is judged to have 6 areas requiring major redesign; specifically:

- (1) Excessive weight
- (2) Bolt
- (3) Feed Tray
- (4) Feed Mechanism
- (5) Firing Mechanism
- (6) Magazine

The state of the s

The major FSD Engineering effort to redesign these areas will be conducted in 5 months of FY75 and 12 months of FY76.

The fiscal transition period of 3 months, 76/77 and 12 months of FY77 will be used to finalize detail design, testing, data acquisition, data processing, data evaluation, and evaluation of proposed production related modifications in conjunction with the concurrent PEP effort.

Two basic problems appear to exist:

(1) If the weight of the components is reduced as indicated structural integrity of the weapon may become a problem.

(2) The dynamics of the feed mechanism must be changed to eliminate link failure. This may drastically alter the dynamics of the operating group.

XM233 IN-HOUSE FSD - ENGINEERING

The In-House FSD-Engineering Team effort is summarized as follows:

		F	Y75	FY	76	76	/77	F	Y77
	Grade	Hrs	8	Hrs	8	Hrs	8	Hrs	å
Project Eng Mech Eng Mech Eng Mech Eng Tech OA Tech	14 13 12 12 11	750 750 1500 1500 750	9,435 8,048 13,635 13,635 5,723	1800 1800 3600 3600 1800	22,644 19,314 32,724 32,724 13,734	450 300 300 300 300	5,661 3,219 2,727 2,727 2,289	900 1200 1200 1200 1200 1200	11,322 12,876 10,908 10,908 9,156
Mech Tech Draftsman Draftsman Math Analyst RAM Eng QA Eng QA Tech Model Maker	9 7 5 12 12 12 12 12	750 750 750 536 563 750 750 750 500	4,748 3,893 3,143 5,118 5,118 6,818 6,818 3,815	1800 1800 1800 1350 1350 1200 1200 1200	11,394 9,342 7,542 12,272 12,272 10,908 10,908 9,156	300 300 300 300 800 225 225 225 0	1,899 1,557 1,257 2,727 2,727 2,046 2,046 0	1200 1200 1200 1200 1200 1200 900 900 0	7,596 6,228 5,028 10,908 10,908 8,181 8,181 0

Direct Labor FY75	10,626 89,947			
FY76		24,300 204,934		
76/77			30,882	
FY77				13,500 112,200

Total Direct Labor (FSD) 52,526 Man Hours 437,963

Overhead	(85)	FY 75	\$ 76,455
		FY76	174,194
		76/77	26,250
		FY77	95,370

Total Overhead (FSD) \$372,269

1

(ALL CONTENDERS) FSD-ENGINEERING MATERIAL

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY75	5	x \$	100	\$500
FY76	12	x \$	100	1200
76/77	3	x \$	100	300
FY77	12	x \$	100	1200
TOTAL				\$3200

Other direct charges are covered in either FSD or PEP.

Sale and the second second

t

XM233

FSD - ENGINEERING - OTHER DIRECT COSTS

Rationale: Other Direct Costs are assumed to consist of Computer expense at \$600 per month and Travel Expense.

A. C	ompu	ter	Exp	ense
------	------	-----	-----	------

FY75	5	x	\$600	\$ 3,000
FY76	12	x	\$600	7,200
76/77	3	x	\$600	1,800
FY77	12	X	\$600	7,200
Total				\$19,200

B. Travel Expense

FY75	3,410
FY76	4,092
76/77	1,364
FY77	40,711
Total	49,577

- C. Total O.D.C./FY FY75 6,410 FY76 11,292 76/77 3,164
- FY77 <u>47,911</u> D. Total O.D.C. 68,777

FSD-Engineering - Summary of In-House Costs

Total Eng.

FY75	173,312
FY76	391,620
76/77	60,596
FY77	<u>256,681</u>
Total	5882,209

XM233 IN-HOUSE TRAVEL COSTS (LOW COST AREA)

Estimate of Travel Costs

「「「「「「「」」」」」

1

The second state of the second state and state

	FY75	FY76	76/77	<u>FY77</u>	
Reviews at East Coast 3 days x 2 men x \$35/day Car rental 2 days - \$60/trip Air fare \$206 x 2 men	5 1050 300 2060	6 1260 360 2472	2 420 120 824	6 1260 360 2472	
Support of APG Test (RDAT-DT-II) l Man x \$35/day Car rental @ \$30/day Air fare \$141/28 trip:				275 9,625 8,250 3,948	days
Support test Fort Benning (OT-II l Man x \$35/day Car rental @ \$30/day Air fare \$141/18 trips)			180 6,300 5,400 3,096	days
Total/FY	3,410	4,092	1,364	40,711	
Total ED Travel	\$49,577				

1-H/5

XM233 ENGINEERING SECTION FULL SCALE DEVELOPMENT

1. Introduction:

a. The Engineering Section is divided into four (4) parts:

(1) Engineering Direct Labor.

(2) Engineering Material.

(3) Engineering Overhead.

(4) Other Direct Charges to Engineering.

b. Each Engineering part consists of description of the items included and the rationale for including and evaluating each item.

c. The costs accrued in each part were developed among the weapon elements according to the percentage of peculiar parts of the weapon system which make up the weapon element. Thus for the XM233:

Weapon Element	Peculiar Parts	<u>% Distribution</u>
Receiver & Operating Group	117	65
Barrel Assembly	6	4
Rear Sight	17	9
Magazine	7	4
Bipod	25	14
Sling	3	2
Maintenance Tools	4	2
Total	179	100

2. Rationale for Estimating Engineering Direct Labor Cost (FSDWEDL):

a. Total Engineering Direct Labor hours is the sum of two inputs:

(1) Engineering Direct Labor hours to accomplish the Engineering Tasks
 involved in finalizing the weapon design.

(2) Engineering Direct Labor hrs to prepare the info required for Data Items.

A-1

142

15 j 1

b. The value for each Direct Labor hour is an average hourly rate applied to all man hours expended in the Engineering effort and was determined for each contractor in coordination with AMSWE-PPX in the following manner:

(1) Estimate the total Direct Labor hours required for each Government GS grade.

(2) Multiply these totals by the respective step 5 hourly rate and add to get a total equivalent Government direct labor cost.

(3) Divide the total equivalent Government direct labor cost by the sum of the direct labor hours, regardless of grade, to obtain an average Government engineering hourly rate.

(4) Compare the average Government engineering hourly rate with the Step 5 hourly rates in the GS pay scale to determine the average grade level of skill employed.

(5) Compare the average grade level of skill with available information on the contractor's pay scale to estimate the average contractor's engineering hourly rate.

c. The average contractor's engineering hourly rate for LOW COst Area is computed to be \$4.16 per hour.

d. Engineering Direct Labor Hours and Costs for LOW Cost Area by Fiscal Year are estimated to be:

Fiscal Year	D. L. Hours	D. L. Costs
75	14,220	\$ 59,155
76	34,116	141,923
76/66	6,760	28,122
77	28,760	119,642
Total	83,856	\$348,842

Δ-2

3. Rationale for Estimating Engineering Material Costs (FSDWEMAT):

a. Engineering Materials are considered to consist of miscellaneous material used in performing the engineering effort for Full Scale Development. Layout paper, drafting supplies, bond paper, vellums, computer cards, and computer paper are typical major cost items in this category.

b. Engineering Material Costs are es timated to be:

FY75	275
FY76	660
FY 7 6/77	160
FY77	660

Total 1,755

.

4. Rationale for Estimating Engineering Overhead (FSDWEOH):

a. Based on historical data and information available in the Contract

Pricing Division, AMSWE-PPX, the Engineering Overhead Rate for Low Cost Area is estimated to be 350% of Engineering Direct Labor Cost:

b. Summary of Overhead costs is as follows:

Total	Overhead	FY75	\$	207,043
Total	0 verhe ad	FY76		496,731
Total	0 verhe ad	76/77		98,427
Total	Overhead	FY77	-	418,747
Total	0verhead		\$1	,220,948

4-3

5. Rationale for Estimating other Direct Charges to Engineering (FSDWEOT):

a. This category includes he cost of travel and charges for computer time during Full Scale Development.

(1) The estimated computer costs are for programming and exercising a dynamic model of the weapon, a heat transfer and stress analysis model of the barrel, and analysis of Maintainability and Reliability as follows:

FY75	2,970
FY76	7,100
76/77	1,830

FY77 7,100

Total Computer Cost 19,000

(2) The estimate of travel costs is as follows:

FY75	2,046.00
FY76	4,092.00
76/77	1,364.00
FY77	42,059.00

.z

Supporting computations may be found under "Estimate of Travel Costs".

b. Other Direct Charges to Engineering are summarized as follows:

	<u>FY75</u>	FY76	<u>76/77</u>	<u>FY77</u>
Computer Time	2,970	7,100	1,830	7,100
Travel Costs	2,046	4,092	1,364	42,059
Total by FY	5,016	11,192	3,194	49,159
FY75 FY76	5,016 11,192	271	FSD ENG. ,489	
76/77	3,194		,903	
FY77	49,159	588	,208	
Total O.D.C.	\$68,561	1,640,106 FSD ENG.		ENG.
		A-4		

d. Estimate of Travel Costs:

	FY75	FY76	<u>76/77</u>	<u>FY77</u>	
Informal Reviews at Rock Island	3	6	2	6	
3 days x 2 men x \$35/day	630	1,260	420	1,260	
Car Rental 2 days - \$60/trip	180	360	120	360	
Air Fare \$206 x 2 men	1,236	2,472	824	2,472	
Support of APG Test (RDAT-DT II)				275 days	
1 Man x \$35/day				\$9,625	
Car Rental @ \$30/day				\$8,250	
Air Fare \$139/28 days				\$3,892	
Support Test Fort Benning (OT II)				180 days	
1 Man x \$35/day				\$6,300	
Car Rental x \$30/day				\$5,400	
Air Fare \$250/18 days				\$4,500	
TOTAL TRAVEL	\$2,046	\$4,092	\$1,364	\$42,059	

A-5

LOW COST AREA SUMMARY OF FSDW TOOLING COSTS ESTIMATED IN 1975 DOLLARS

FSDWTL -

" Depart in some of the second second second

The cost model symbol gives reference to the cost of tooling, gages and manufacturing aids required to produce FSD prototype weapons, supporting equipment, and repair parts. All costs occur in FY76. LOW COST AREA FSD - TOOLING COST (LESS GSA) XM233 (179 UNIQUE PARTS, 1206 OPERATIONS)

fooling for 104 Prototype Guns Consists of:

		Hours	Amount
Α.	Purchase Tooling (Vendor Price)		
	'206 x \$112.48		\$135,651
8.	Purchase Gages (Vendor Price)		
	1206 x \$21.54		\$ 25,977
C.	Purchase Expendable Tooling (Vendor Price)		
	1206 x \$40.80		\$ 49,205
D.	Manufacture - Jigs & Fixtures		
	D.L. Rate \$4.16/hr, O.H. Rate 350%	4191	\$ 78,456
E.	Manufacture - Gages		
	D.L. Rate \$4.16/hrs, O.H. Rate 350%	287	\$ 5,372
	Subtotal		\$294,661
F.	Manufacture - Processing	2714	\$ 50,806
	D.L. Rate \$4.16/hr, O.H. Rate 350%		
G.	Tool & Gage Design		\$ 44,199
	(15% of ltems A thru E above)		
Η.	Estimating of Tools	1809	\$ 33,865
	D.L. Rate \$4.16/hr, O.H. Rate 350%		
I.	Purchasing Effort (on A-E above)	1397	\$ 26,152
	D.L. Rate \$4.16/hr, O.H. Rate 350%		
J.	Tool & Gage Inspection		\$ 29,466
	(10% of Items A thru E above)		
	Total Tooling Cost	9473 hrs.	\$479,149 (FY76)
	Unit Cost (104 Weapons)		\$ 4,607
	B-2		

B-2

XM233 FSD TOOLING MANUFACTURING PROCESSING

Planning for manufacturing processes is estimated at 2 hours per machine operation. There are 907 machine operations giving:

$\frac{1206}{2412}$ hrs

An additional .25 hour is estimated for methods and standards work per operation giving:

1206 .25 302 hrs

Total

派的后的法律》是用是是是是是

2412 hrs 302 hrs 2714 hrs

TOOL DESIGN

It is estimated from M16 G.M. Hydromatic that 20% design to mfg. From G.E. (M61) approx. 34%.

It is estimated that 30% is fair and reasonable. In prototype most detailed design would not be made - use 15%.

ESTIMATING OF TOOLS

907 Operations with 3 tools per operation - 1 cutter 1 fixture 1 gage

> 1206 <u>3</u> 3618 tools

It is estimated that .50 hr will be necessary for each tool.

3618 <u>.5</u> 1809 hrs

XM233

TOOL & GAGE INSPECTION

It is estimated that 10% of the purchase price will be used for initial inspection of tools and gages, based upon ARMCOM QA experience.

PURCHASING

Total procurement actions For items purchased finished Total operations - 1206 It is assumed that each operation will require: 1 cutter 1 fixture 1 gage Therefore 3 x 1206 = 3618 items will be procured. 3 Items over \$3000 1203 items less than \$3000 Use same standards for purchasing as manufacturing 1203 (.5176 hrs) (150%) = 932 hours 3 (17.223 hrs) (1506) = 78 hours 1010 hours For items manufactured - Manufacturing hours - 4478 Relationship of mfg to purchased = 38.3% Procurement hours for manufactured items - 1010 (38.3%) = 387 hours Total procurement effort - Mfg 387 hours Purchased 1010 hours 1397 hours

B-4

PROTOTYPE COSTS

XM233

Based on experience in manufacturing components for the XM235 at the Naval Air Rework Facility (NARF), Pensacola, Florida and assuming that the manufacturing cost is approximately related to the number of unique components in the weapon, the following costs are calculated:

RDAT Weapons 179 155 x 4 x \$10,000 46,194

DT/OT-	-II Weapons	5 <u>179</u> 155	x	100	x	\$7,500	866,129	
Total	Prototype	Weapon	Cos	st			912,323	

The prototype manufacturing effort continues over a period of three months in the 76/77 period and six months in the FY77 period. The prototype cost is assumed to be distributed proportionately.

76/77 3/9 x 912,323 = 304,108 FY77 6/9 x 912,323 = 608,215

R. E.A. MARTINE STATION

SYSTEM TEST AND EVALUATION SECTION FULL SCALE DEVELOPMENT FSDWTE

1. Introduction

a. The figures below represent an estimate of the contractor's cost to conduct System Test and Evaluation.

b. For computational purposes, the Total System Test and Evaluation activity was divided into three parts as follows:

> Part I - Acceptance Testing of the Prototype Weapons Part II - Research and Development Acceptance Test (RDAT) Part III - Preliminary Testing

c. The following were not included as part of this estimate:

(1) Weapons, spare barrels, and spare parts. These are included in the Prototype Cost. as other Direct Costs.

(2) Ammunition (MUCOM Item)

(3) Range utilization/rental costs, if required. This item was not included due to lack of supporting information as to where and under what arrangement the contractor will conduct testing.

(4) Shipping/transportation costs of materiel/personnel to various test sites, if required. It is assumed that testing would be within close proximity of the contractor's plant.

d. The same direct labor (time) and materials estimate was used for all three contractors. This is considered a reasonable assumption, since

D - 1

the test requirements are the same. Thus, differences in the cost estimates are the result of the various contractors' equivalent hourly rates and overhead figures. Contractor hourly rates and overhead were obtained from audited historical data.

2.	Summary of Costs	TOTAL
	Part I - Acceptance Testing	\$103,874
	Part II - RDAT	\$212,016
	Part III - Preliminary Testing	\$132,625
	•	

TOTAL - Weapon System Test and	
Evaluation Cost (FSDWTE)	\$448,515

D-2

いたちないというないというないないないであるという

3. Breakdown by Parts					
Part I - Acceptance Testing	FY75	FY76	76/77	FY77	TOTAL
Direct Labor (2950 hrs)	-0-	-0-	-0-	12,272	12,272
Materials	-0-	-0-	-0-	48,650	48,650
Overhead	-0-	-0-	-0-	42,952	42,952
Total				103,874	103,874
Part II - RDAT					
Direct Labor (6403 hrs)	-0-	-0-	-0-	26,637	26,637
Materials	-0-	-0-	79,391	12,760	92,151
Overhead	-0-	-0-	-0-	93,228	93,228
Total	-0-	-0-	79,391	132,625	212,016
**Part III - Prelim. Tstg.					
Direct Labor (6403 hrs)	4,440	17,758	4,439	-0-	26,637
Material	12,760	-0-	-0-	-0-	12,760
Overhead	15,540	62,153	15,535	-0-	93,228

* Direct Labor Rate = \$4.16/hr
Overhead = 350%

Total

** Preliminary Testing Period - May 1975 through Oct 1976

D - 3

32,740 79,911 19,974

154

132,625

-0-

DATA SECTION

FULL SCALE DEVELOPMENT

1. Introduction:

a. This section summarizes the costs for the FSD Data Items. The section contains a List of FSD Data Items and their costs. These costs make up the totals which are entered under DATA in the FSD Cost Model. The costs for the Functional Direct Labor hours are accounted for in the respective Direct Labor sections for Engineering and Training.

b. The Data Items for the Technical Data Package (TDP) are accounted for in the PEP Program and are so noted on the list of the Data Costs for each Data Item. The TDP Data Items which are started in FSD and continued in PEP are also noted in the list for cross reference and continuity.

c. The section also contains a Data Related Cost Summary for information on the total cost related to data items.

E-1

2. DATA RELATED COST SUMMARY

a. Direct Labor plus Overhead to prepare FSD Data Items is carried under the following categories and totals as follows:

Category

Engineering hours	29,800
Training hours	3,207
En gin eering Cost	557,856
Training Cost	60,035
Total \$/FY	617,891
b. Data Cost	56,957
a + b	674,848

- c. Total Data Related Cost FSD = \$674,848 (MM)
- NOTE: Engineering and Training Hourly Rate = \$4.16 + 350% Overhead = \$4.16 + \$14.56 = \$18.72/hour
 - c. Data Cost by Fiscal Year:

FY75 5/17 x 56,957 =\$16,752

FY76 12/17 x 56,957 =\$40,205

3. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE ENGINEERING DATA ITEMS

List of Engineering Data Item Numbers

<u>B#</u>	DI#	<u>B#</u>	<u>DI#</u>
01	DI-A-1014A (MOD)	32	DI-H-1329A
02	DI-E-1100 (MOD)	37	DI-M-1501 (MOD)
03	DI-E-1101A	38	DI-M-1502
04	DI-E-1103A	39	DI-M-1502
05	DI-E-1104	40	DI-M-1505
06	DI-E-1105	41	DI-M-1510
08	DI-E-1107	42	DI-P-1600
10	DI-E-1116	44	DI-R-1710 (MOD)
11	DI-E-1117	51	DI-R-1730 (MOD)
12	DI-E-1118 (MOD)	52	DI-R-1731 (MOD)
13	DI-E-1119 (MOD)	53	DI-R-1733 (MOD)
14	DI-E-1128	54	DI-R-1734 (MOD)
15	DI-E-11XX (MOD)	55	DI-R-1735 (MOD)
16	DI-E-XXX1	56	DI-R-1740 (MOD)
17	DI-F-6000	57	DI-R-1741 (MOD)
18	DI-F-60001	58	DI-R-1750 (MOD)
18A	DI-F-XXX1	59	DI-S-1800 (MOD)
19	DI-F-6004	60	DI-S-1804A
25	DI-H-1312	61	DI-S-1812
26	DI-H-1314	62	DI-S-1818 (MCD)
27	DI-H-1315	63	DI-S-1819 (MOD)
29	DI-H-1322A (MOD)	64	DI-S-18XX (MOD)
30	DI-H-1326A	65	DI-T-1906 (MOD)
31	DI-H-1327A (MOD)	66	DI-T-XXX1 (NEW)
		67	DI-V-1950 (MOD)
Direct	Labor Hours = $29,800$		

NOTE: These direct labor hours are included under Engineering.

E-3

WARAN MERGAMAN

4. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE TRAINING

DATA ITEMS

List of Training Data Items

B#	DI#

20	DI-H-1300	(MOD)
20	DI-H-1300	(MUD)

21 DI-H-1302

22 DI-H-1304

23 DI-H-1308

24 DI-H-1310

Direct Labor hours = 3,207

NOTE: These direct labor hours are included under Training.

1

.

SUMMARY OF COSTS - DATA ITEM CALL ITEMS - FSD

<u>B No.</u>	D ata Item No.	Data Item Title		
01	DI-A-1014A(MOD)	PERT		557
02	DI-E-1100(MOD)	Configuration Management Plan		246
03	DI-E-1101A	Configuration Stat Acct & Engr kecord		507
04	DI-E-1103A	Engineer Release Record	FSD/PEP	1620
05	DI-E-1104	Specifications	FSD/PEP	91
06	DI-E-1105	Characteristics & Description Book		168
07	DI-E-1106	Specs, Standards, Appl. List	PEP	0
08	EI-E-1107	Drawing Custodianship List	FSD/PEP	30
09	EI-E-1115A(MOD)	Technical Data Package	PEP	0
10	DI-E-1116	Stdz Comp & Select Control	FSD/PEP	58
1	DI-E-1117	Stdz Report of Common Items	PEP	0
12	DI-E-1118(MOD)	Drawings, Engr & Assoc Lists	FSD/PEP	645
13	DI-E-1119(MOD)	Environmental Criteria Report		3172
14	DI-E-1128	Electromag netic Interference Control Plan		84
15	(X)DI-E-11XX(MOD)	Interface Control Doc. for VRFWS		311
16	DI-E-XXX1	Dynamic Mathematical Model		288
17	DI-F-6000	Cost performance report		353
18	DI-F-6001(MOD)	Procurement Info Functional Cost- Hour Report		5
18A	DI-F-XXX1	Model for Eval of Design-To Unit Production Cost		29
19	DI-F-6004	Contract Funds Status Report		22
20	EI-H-1300(MOD)	Personnel & Training Requirements		150

E-5

'n

SUMMARY OF COSTS - DATA CALL ITEMS - FSD (Continued)

<u>B No.</u>	Data Item No.	Data Item Title	
21	DI-H-1320	New Equipment Training Plan	0
22	DI-H-1304	New Equipment Training Courses	1350
23	DI-H-1308	Training Course Reports	0
24	DI-H-1310	Graphic Aids	31444
25	DI-H-1312	Human Factors Engr Plan	53
26	DI-H-1314	Human Factors Engr Progress Rpt	179
27	DI-H-1315	Human Factors Engr Final Report	59
28	DI-H-1321A	Explosive Hazard Class. Data	See Ammo
29	DI-H-1322A(MOD)	Safety Statement	77
٦Ŋ	DI-H-1326A	Safety Anal. & Hazard Eval Rpts	212
J	DI-H-1327A(MOD)	Surface Danger Area Data	68
32	DI-H-1329A	Accident/Incident Report	20
33	DJ-H-1330(MOD)	Facilities Safety Data	0
34	DI-L-1407(MOD)	Preservation & Packaging Data	PEP
35	DI-L-1410	Ammunition Data Cards	Ammo
36	DI-M-1500(MOD)	Firing Table Manuscript	Ammo
37	DI-M-1501(MOD)	Validation Plan for Equip. Publication	ns l
38	DI-M-1502(MOD)	Equipment Publications	1176
39	DI-M-1502(MOD)	Equipment Publications	Included in B038
40	DI-M-1505(MOD)	Equip. Pub. Progress/Cost Reports	38
41	DI-M-1510	Maintenance Allocation Chart	11
42	DI-P-1600	Value Engr Data Report	135
3	DI-P-1602	Value Engr Plan	No Cost Plan is prepared and paid for in Contractor's

Proposal.

E-6

NARD STATE AND DIMENSION

SUMMARY OF COSTS - DATA CALL ITEMS - FSD (Continued)

14

<u>B No.</u>	Dat a It em No.	Data Item Title	
44	DI-R-1710(MOD)	Quality Program Plan	128
45	DI-R-1711(MOD)	Qual Engrg Acc Insp Req & Equip List	PEP
46	DI-R-1712(MOD)	Quality Engrg Supp QA Provision	PEP
47			PEP
48			PEP
49	DI-R-1717	Qual Engr Calibration Program Data	PEP
50	DI-R-1722(MOD)	Qual Insp Pamphlet	PEP
51	DI-R-1730(MOD)	Reliability Program Plan	17
52	DI-R-1731(MOD)	Reliability Reports	67
53	DI-R-1733(MOD)	Reliability Qualified Items List	3
54	DI- R-1734(M OD)	Rel Fail Modes Effects & Crit Anal Rpts	21
<u>-</u> J	DI-R-1735(MOD)	Rel Failed Item Analysis Report	114
56	DI-R-1740(MOD)	Maintainability Program Plan	17
57	DI-R-1741(MOD)	Maintainability Reports	20
58	DI-R-1750(MOD)	Assessment Program Plan	7
59	DI-S-1800(MOD)	Technical Reports	1179
60	DI-S-1804A	Corrosion Prevention & Matl Deterioration	49
61	DI-S-1812	Rpts and/or Studies Maintenance Engr Des Discrepancy Report	34
62	DI-S-1818(MOD)	Maintenance Engr Analysis	380
63	DI-S-1819(MOD)	Contractor Recommended Support Plan	31
64	(X)DI-S-18XX(MOD)	Support Model Data	6
65	DI-T-1906(MOD)	Test & Demonstration Reports	1105
66	DI-T-XXX1(New)	R&D Acceptance Test Plan	25
	DI-V-1950(MOD)	Provisioning Requirements for US Army Eq.	581
68	DI-V-1951(MOD)	Federal Item Identification Data	No Contractor
Total co	onverted to FY75 Doll	lars \$48,268 x 1.18 = <u>\$56,957</u>	Performance Reqd TOTAL \$48,268
		E-7	161

.

The Solar Parcel Network and Antonia and

Total Systems Management Section

The overall systems management team to be employed by Low Cost Area is considered to be a staff function that is responsible for the Contractor's overall program and execution.

Low Cost Area personnel on the management team are not included in the functional areas (i.e., engineering, manufacturing, testing, etc.). Instead because of the relatively small size of the company management team personnel are included in overhead and/or GSA. Thus there is no entry under cost of Total Systems Management.

These conclusions were determined from discussions with AMSWE-PPX.

IN-HOUSE TASKS

PEP RELATED

The major areas of In-House Direction and Support effort required during the PEP period are:

1. Producibility Engineering and Planning Studies.

2. Product Engineering Studies including Tolerance/Dimension Studies.

3. Engineering effort to prepare the Technical Data Package Data Call Items.

4. Engineering effort to enhance Reliability and Maintainability Engineering activities.

Configuration Management will be monitored in detail through acceptance testing.

Starting with RDT, Configuration Management will revert entirely to the Government as an In-House Task requiring effort as follows:

1. Prepare a Configuration Plan.

2. Update the Configuration Plan as required.

3. Review Engineering Change Proposals (ECPs):

a. Failure Related.

b. Production Related.

Other specific In-House Task areas are:

1. Review/monitor and direct Contractor and In-House conducted Producibility Engineering and Planning studies as follows:

a. Review each part/drawing.

b. Review Contractor Draft Process Sheets.

1-H/1 PEP

- c. Review unique processing operations.
- d. Review current and proposed processing capabilities.
- e. Review difficult/uneconomical manufactured items and recommended actions.
- f. Review Contractor PEP reports.

2. Review, monitor and direct Contractor and In-House conducted Froduction Engineering and Tolerance/Dimension Studies as follows:

a. Review components/drawings.

- b. Maintain conformity to Military Standards as specification as applicable.
- c. Review Contractor and In-House conducted redesign efforts.
- d. Review and prepare reports.
- e. Analyze available data and identify/approve areas for in-house or by contractor.
- E. Conduct and/or monitor tolerance/dimension studies.
- g. Review revisions and related reports.
- h. Maintain liaison with contractor project related supervision personnel.

3. Maintain cognizance of current and proposed manufacturing processes and procedures.

1-H/2 PEP

(ALL CONTENDERS) IN-HOUSE PEP-ENGINEERING

The In-House PEP Engineering team effort is summarized as follows:

		F	¥75	F	Y76		76/77		FY77
Title	Grade	Hrs	\$	Hrs	\$	Hrs	\$	Hrs	\$
Project Eng	14	75 0	9,435	900	11,324	225	2,831	900	11,324
Mech Eng	13	750	8,048	750	8,048	450	4,829	1800	19,316
Mech Eng	12	75 0	6,818	600	5,454	150	1,364	600	5,454
Mech Tech	11	375	2,861	600	4,578	150	1,145	600	4,578
Mech Tech	9	375	2,374	600	3,798	150	950	600	3,798
Draftsman	7	750	3,893	600	3,114	15C	779	600	3,114
Draft.sman	5	750	3,143	1800	7,542	450	629	1800	7,542
Math Analyst	12	375	3,409	600	5,454	150	1,364	600	5,454
κAM Eng	12	750	6,818	1800	16,36 2	225	2,046	900	8,181
1	FY75 FY76 76/77 FY77	5,625	46,7 9 9	8250	65,674	2100	15,937	8400	68,761
Total Direct	Labor	(PEP)	24,375 Ma	an Hou rs	\$197,1 7 1				
I	%) FY75 FY76 76/77		\$3 9 ,779 55,823						
	FY77) \$	13,547 58,447 167,596						

1-H/3 PEP

	(ALL CONTENDERS) IN-HOUSE PEP SUMMARY							
		<u>FY75</u>	FY76	76/77	<u>FY77</u>	TOTAL		
Α.	Engineering							
	Direct Labor	46,799	65,674	15,937	68,761	197,171		
	Material(\$75/Mo)	375	900	225	900	2,400		
	Overhead	39,779	55,823	13,547	58,447	167,596		
	Other D.C. (In- cluded in FSD)			-				
	Total A	86,953	122,397	29,709	128,108	\$367,167		
в.	Configuration Con	trol Board	1			ī		
	Direct Labor	12,720	30,528	7,633	30,528	81,409		
	Material(\$75/Mo)	375	900	225	900	2,400		
	Overhead (85%)	10,812	25,949	6,487	25,949	69,197		
	Other D.C. (In- cluded in FSD)			_	-			
	Total B	23,907	57,377	14,345	57,377	\$153,006		
	A plus B	110,860	179,774	44,054	185,485			
TO	TOTAL IN-HOUSE PEP COST \$520,173							

PEP ENGINEERING	24,375 Hrs.
C.C. Board	7,680 Hrs.
TOTAL MAN HOURS	32,055 Hrs.

1-H/4 PEP

(ALL CONTENDERS) IN-HOUSE CONFIGURATION CONTROL BOARD

Control of Configuration Management will be assumed by the Government.

A Configuration Control Board (CCB) will be established and will exercise its authority throughout the FSD period and potentially continue in the same manner but at somewhat diminished levels of effort through the Limited Production period and the Full Scale Production period.

During the FSD period from 1 February 1975 to 1 October 1977 (32 months) the CCB will utilize of the following people to the extent indicated:

Title	Grade	Hours	<u>\$DL</u>	\$0verhead
40% Configuration Mgr 40% Engineer 20% Procurement	14 13	1920 1920	24,154 20,602	20,531 17,511
Specialist	13	960	10,301	8,756
20% W.A. Engineer (Gages & SQAPS) 20% Maintenance	13	960	10,301	8,756
Specialist	12	960	8,726	7,417
20% Supply Specialist	11	960	7,325	6,226
	TOTAL	7,680	\$81,409	\$69,197
These expenses occur as	s follow:	s: FY75	12,720	10,812
		FY76	30,528	25,949
		76/77	7,633	6,487
		FY77	30,528	25,949

1-H/5 PEP

1

William Country of Manager and

SAW WEAPON XM-233 (LOW COST AREA) PRODUCIBILITY ENGINEERING & PLANNING SEP/OCT 74

COST CATEGORIES

AN	DELEMENTS					
DE	VELOPMENT-PEP	PEP TOTAL	FY75	<u>FY76</u>	76/77	FY77
Α.	Engineering Direct Labor Material Overhead Other	870,946 160,173 150 560,604 150,019	-0- -0- -0- -0- -0-	-0- -0- -0- -0- -0-	174,189	696,757
в.	Tooling (Software) 173,664	-0-	-0-	34,733	138,931
c.	Quality Control	502,789	-0-	-0-	-0-	502,789
D.	System Test & Evaluation	-0-	-0-	-0-	-0-	-0-
E.	Data	7,441	-0-	-0-	1,488	5,953
F.	Total System Mgm	t0-	-0-	-0-	-0-	-0-
G.	Industrial Facilities	13,947	-0-	-0-	2,790	11,157
н.	Training	-0-	-0-	-0-	-0-	-0-
I.	Miscellaneous	-0-	-0-	-0-	-0-	-0-
'TO'	TAL COST	1,568,787	-0-	-0-	213,200	1,355,587

PEP

CONTRACTOR DEVELOPMENT ENG PEP

Rationale:

Without Land State of Contraction of Contraction

The Contractor PEP effort is estimated to address the following areas:

a. Producibility Engineering and Planning Studies.

b. Product Engineering and Tolerance Studies.

Tasks are identified in each area, required manhours are estimated for each task and the total estimated manhours determined. These manhours are multiplied by appropriate labor and overhead rates to obtain total values for Direct Labor and Overhead, \$150 is estimated for Materials and these values of Direct Labor, Overhead, and Material cost are added to Other Direct Costs which are defined in a separate section.

The total thus obtained is distributed 1/5 in FY76/77 and 4/5 in FY77.

A-1 PEP

A. Producibility Engineering and Planning Studies:

TASK	MANHOURS
 Review Part Drawings Prepare Draft Process Sheet Determine Unique Operation Conduct Process Capabilit 	ns 176 ies Study 2788
 Determine Difficult Items Recommendations Prepare Reports Maintain Supervision TOTAL "A" 	and Make 1394 41 <u>4752</u> 16352 hours

B. Product Engineering and Tolerance Studies:

1.	Review Drawings	461	
2.	Review Mil. Standards & Specs.	216	
3.	Select and Conduct Redesign	2979	
4.	Prepare Reports	40	
5.	Review Data/Identify Areas for Study	481	
6.	Conduct Tolerance/Dimension Study	2676	
7.	Determine Revisions and Prepare Report	556	
8.	Maintain Supervision	4752	
	TOTAL "B"	12161	hours

TOTAL MANHOURS (A & B)

28,513

A-2 PEP

SAW-XM-233 (LOW COST AREA) CONTRACTOR DEVELOPMENT ENG PEF

Total Manhours (A&B, Data Item Manhours TOTAL MAN HOURS	28,513 hrs <u>9,990 hrs</u> 38,503
Direct Labor Rate Direct Labor Cost Overhead Rate 350%	\$4.16/hr \$160,172.48
Overhead Cost	\$560,603.68
Engineering Cost Summary Direct Labor	\$160 172
Material	\$160, 173 150
Overhead	560,604
0.D.C.	150,019
Total Engineering	\$870,946
FY76/77 \$870,946 x 1/5	\$174,189
FY77 \$870,946 x 4/5	\$696,757

A-3 PEP

.

THE REAL PROPERTY AND ADDRESS OF

OTHER DIRECT COSTS CONTRACTOR PRODUCIBILITY ENGINEERING & PLANNING (PEP)

- a. Manu. Jocuring Processing Engineering
- b. Travel
- c. Reproduction Costs
 - (1) PEP Studies
 - (2) Product Engineering and Tolerance Studies

ODC/-1 PEP

XM-233 OTHER DIRECT COSTS CONTRACTOR PEP

A. Manufacturing Process Engineering is the Engineering effort to prepare and process routing sheets and other documentation defining in detail the manufacturing processes to be used for each component.

125

Water Han Me and the

Estimated manufacturir	1206	
Estimated Eng. hrs per	6.5 hrs.	
Direct Labor Rate	\$4.16/hr.	
Overhead	350%	
Required Manhours Direct Labor Overhead Total M.P.E.	1206 x 6.5 7839 x \$4.16 \$32,610 x 3.50	7839 \$32,610.24 \$114,135.84 \$146,746.08

B. O.D.C. Travel Estimated travel consists of 2 trips to RIA by 1 man in FY77 at 2x\$449.00=\$898 plus 2 trips by 2 men at \$847.00 per trip (1 trip in FY76/77 and 1 trip in FY77).

	76/77	<u>FY77</u>	TOTAL
l man trip		\$898	
2 man trip	\$847	\$847	
Total Travel	\$847	\$1745	\$2592

ODC/-2 PEP

XM-233 OTHER DIRECT COSTS CONTRACTOR PEP

C. Reproduction:

(1) Estimated for Producibility Engineering & Planning Studies

\$165.00 x (1.24)	40.92	$\frac{FY77}{163.68}$	$\frac{1011}{204.60}$

(2) Estimated for Product Engineering and Tolerance Studies \$ 383.52 x (1.24) 95.11 380.45 475.56

Total	Reproduction		\$544.13	\$680.16

O.D.C. Summary

		76/77	<u>FY77</u>	Total
Total Total	M.P.E. Travel Reproduction O.D.C.			\$146,746.08 2,592.00 680.16 \$150,018.24

.

174

TOOLING SECTION (SOFTWARE) XM233 (LOW COST AREA)

Costs are incurred during design of special purpose production equipment and tooling to achieve quantity production. Based on part experience it is estimated that 35% of the initial tooling cost is used for design.

All design costs are shown against the weapon.

On the basis of part estimates for automatic weapons an average tooling cost of \$400 per operation is applied to cover the cost of Purchased Tooling, Purchased Gages, Expendable Tooling, Jigs and Fixtures, and Gages.

The corresponding Design Cost is thus estimated at .35 x \$400 = \$144 per operation.

N	10.	Operat	ions	x \$144			
					-	76/77	FY77
XM233		1206	\$1	73,664		\$34,733	\$138,9 31

OUALITY CONTROL SECTION

The estimates contained herein for Ouality Control are for the Quality Documentation that is part of the Technical Data Package. In addition, estimated hours for Ouality Control Engineering Supervisor are included at the rate of 160 hours per month for 11 months. The man hours estimated for the preparation of Quality Control Documentation are based on similar work performed by ARMCOM personnel.

Rationale is derived from a similar study performed on proposed Bushmaster weapons. The following Data Items are involved:

DI-E-1104*

DI-E-1118 (Mod)*

DI-R-1711 (Mod)

DI-R-1712 (Mod)

DI-R-1722 (Mod)

* In addition to Quality Control, there are man hours for these Data Items in the Engineering Section.

During the PEP Program, it is estimated all Q. C. software efforts will be accomplished in FY77.

SUMMARY OF MAN HOURS

GS-13	Supervisor	1,760
GS-12	Engineer	790
GS-11	Specialist Gage Designer/Checker	16,434
GS-09	Tech Writer, Illustrator	6,968
GS-05	Document Control Clerk	885
		26,837

「「「「「「「「「「「「「「」」」」」」

•

.

ŧ

· @

SUMMARY OF COSTS (LOW COST AREA)

Direct Labor Costs	26,837
Hourly Rate	4,26
Total D.L. Cost	111,642
Overhead (350%)	390, 74 7
Material	400
Total Q.C. Cost	502,789

C-2 PEP

DATA SECTION *

1. This section includes the rationale and a summary of direct labor manhours and costs for material and reproduction for each Data Call Item considered a part of the total Technical Data Package (TDP).

2. The summary of direct labor man hours for Engineering Data Items is incorporated in the Engineering Section under Data Items. The summary of direct labor man hours for Quality Control Data Items is incorporated in the Quality Control Section under Data Items. Data Call Items DI-E-1104 and DI-E-1118(MOD), which require both Engineering and Quality Control documentation, have separate summaries and rationale contained in this section.

3. The material costs for preparation of the Data Items include the costs of standard forms, such as drawings, supplementary quality assurance provisions, and packaging data sheets. These costs are summarized and shown in their respective functional areas.

4. A summary of Data Costs for all TDP related Data Items is included in this section and entered under Data in the Cost Model.

*Data Section Meets Requirements of the Following:

- 1. AR700-51
- 2. DOD Instruction DODO-5010,12
- 3. TD-3 Listing of DOD Data Items

E1-PEP

DATA SECTION

- 5. DATA RELATED COST SUMMARY
 - a. Cost of Direct Labor plus Overhead to prepare data items is as follows: <u>Category</u>

Engineering Direct Labor (Manhours)	9,990
Quality Control Direct Labor (Manhours)	26,837
Engineering Cost*	187,013
Quality Control Cost*	502,389
Total Direct Labor & Overhead	689,402
b. Data Cost	7,441

c. Total Related Data Cost - PEP (a + b) 696,843

* Hourly rate = \$4.16 + 350% overhead = 18.72/hour

「なないたいはないとない」と

SUMMARY OF DATA COSTS-PEP PROGRAM

<u>B. No.</u>	<u>Data Item No.</u>	Data Item Title	
0004	*DI-E-1103A	Engrg Release Record	\$ 203
0005	*DI-E-1104(QC)	Specifications	39
0005	*DI-E-1104(ENGR)	Specifications	93
0007	DI-E-1106	Specs, Stds, Application List	44
0008	*DI-E-1107	Drawing Custodianship List	68
0009	DI-E-1115A(MOD)	Technical Data Package	
010	*DI-E-1116	Standardization, Components, and Selection Control	6
011	DI-E-1117	Standardization-Report of Common Items	6
012	*DI-E-1118(MOD)(QC) Drawings, Engrg, and Associated Lists	4,130
012	*DI-E-1118(MOD) (ENGR)	Drawings, Engrg, and Associated Lists	1,348
034	DI-L-1407(MOD)	Preservation and Packaging Data	307
045	DI-R-1711(MOD)	Quality Engrg Acc Insp Req & Eq	79
046	DI-R-1712(MOD)	Qual Engrg Supp QA Provisions	766
049	DI-R-1717	Qual Engrg Calibration Prog Data	22
050	DR-R-1722(MOD)	Qual Insp Pamphlet	330
		GRAND TOTAL DATA COST	\$7,441
		76/77 DATA COST	1,488
		FY77 DATA COST	5,953

* Started during FSD Phase; continued during PEP Program.

E3-PEP

SUMMARY OF DIRECT LABOR MANHOURS FOR ENGRG DATA ITEMS .

Data Item No.	Totals
DI-E-1107	2
DI-E-1118(MOD)	1372

Totals

Totals

1

NAL STREET

DI-E-1103A		165
DI-E-1104		1676
DI-E-1106		28
DI-E-1107		10
DI-E-1115A(MOD)		96
DI-E-1116		73
DI-E-1117		5
DI-E-1118(MOD)	•	5487
DI-E-1407(MOD)		1076

Note: Totals are included in Direct Labor in Engineering Section

9,990

E4-PEP

SUMMARY OF QUALITY CONTROL DIRECT LABOR FOR DATA ITEMS (MANHOURS)

Data Item	<u>GS-12</u>	<u>GS-11</u>	<u>GS-9</u>	GS-5
DI-E-1104	390	-	-	22
DI-E-1118(MOD)	-	14000	-	-
DI-R-1711(MOD)	60	355	-	60
DI-R-1712(MOD)	-	1914	348	348
DI-R-1717	340	165	-	75
DI-R-1722(MOD)		<u> </u>	<u>6620</u>	<u>380</u>
Totals	790	16,434	6,968	885

NOTE: Totals are included in Direct Labor in Quality Control Section. Grand Total manhours - 25,077 + 1,760 (GS-13 Supervisor) = 26,837

E5-PEP

182

INDUSTRIAL FACILITIES SECTION (LOW COST AREA)

The estimate is based on the assumption that the contractor has a suitable plant site available for production of the components.

The design and layout of the plant equipment is based on the manufacturing process. Utilization of equipment is on the basis of 80% of the total machine time available. For the conventional machines a 1-8-5 shift is proposed through the first six months and 2-8-5 for the remainder of the program. For the N/C equipment a 1-8-5 shift is proposed through the first 6 months and 3-8-5 shift for the remainder of the program.

The cost of the plans and layouts for this phase is estimated as follows, and will be accomplished during 76/77 and FY77.

Design and layout including electrical, plumbing, sheet metal, air, etc. for space allocation to machining, assembly, bench work and storage of tools and equipment is estimated to require 225 hours for the entire layout of 37,912 square feet.

Preparation of specifications for the procurement of new equipment and bills of materials required for installation of machines, air lines, etc. is estimated to require 520 hours.

Rates used are based on 4.16 per hour rate for design and layout work was escalated by 350% for overhead to 18.72 per hour. Therefore the 745 hour total computes to 13,946.40.

Area required for production approximates 37,912 square feet to be allocated as follows:

Production area, machining	26,584
Assembly, deburring and bench area	1,244
Tool and gage maintenance	1,000
Receiving	800
Packaging and shipping	1,000
Bonded storage	500

The second s

G-1 PEP

Tool storage	900
Final inspection	2,000
Administration	1,500
Metrology lat	384
Tool Room	2,000
Total Area Requircd	37,912

It is assumed that chrome plating and surface finishing will be vendor purchased.

	TOTAL	76/77	<u>FY77</u>
Labor Cost	3,099.20	619.84	2,479.36
Overhead Cost	10,847.20	2,169.44	8,677.76
Total Cost	13,946.40	2,789.28	11,157.12

NUMBER II-B

BASIC ESTIMATED COST PACKAGE ENGINEERING DEVELOPMENT XM234 CONTRACTED 5Y HIGH COST AREA IN 6.0MM

and the second second and the second of the second second second second second second second second second seco

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22) HIGH COST AREA CONTRACT

1. PREPARING INSTALLATION

SARRI-LS-C

I. SY	XM234 High Cost Area Contract (PEP Included)system(s) supported by THIS PROCUREMENTS. WORK BREAKDOWN STRUCTURE LEVELSquad Automatic Weapon System4							6. ESTIMATE PREPARED AS OF 30 November 197
	RESEARCH AND DEVELOPMENT				Τ	COST	•	REFERENCE
		7	• •	•		10		11 .
	co	ST CATEGORIES	HOURS	RATE	E	TIMATE		SCHEDULE
		ENGINEERING			11,0	571,617		
· · ·	:- 1	DIRECT LABOR	204,376.5		1			
1	2	MATERIAL						
	3	OVERHEAD		110%				
- I	4	OTHER						
	•	TOOLING			4	42,861		
	<u>)</u>	DIRECT LABOR						
	2	MATERIAL			· · · · ·			
	3	OVERHEAD					·····	
	4	OTHER			щ			
<u>c</u>	:	PROTOTYPE PRODU				420, 420		
D	<u>.</u>	SYSTEN TEST AND E	VALUATION			158,631		
£ .	:	DATA			+	56,957		
F L	•	TOTAL SYSTEMS MAN	NAGEMENT		.+	553,574		
G	•	CONSTRUCTION				-0-		
нį	•	TRAINING	PEP		· • . ·-	94,002		
•	•	OTHER (Specily)				586,831		
-+-	:	TOTAL COST LESS (15.	781,893		•
ĸ	.	G AND A	24.6%		17.	204,239		
L	•	PROFIT OR FEE	10.1%			2047235		
M	•		10.10		7	931,867		
N '	•	TOTAL PRICE			11	///////////////////////////////////////	·	

TYPED NAME AND TITLE	SIGNATURE	EXTENSION	DATE
. PREPARING OFFICIAL ROY F. SCHWEGLER Mechanical Engineer		4255	30 Nov 74
6. REVIEWING OFFICIAL			
C. APPROVING OFFICIAL			

AMC FORM 10110-E

was sulfined word their owned to return a difficu

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22) IN-HOUSE SUPPORT

1. PREPARING INSTALLATION

5	UPP	SARRI-LS-C CIES ON SERVICES T In-House Sup		High Cos		include Contra		391	NA
. 5	YST	EMIS SUPPORTED BY			8. V		AKDOWN		STIMATE PREPARE
		Squad Automa	tic Weapon S	System		4			November 19
		RESEARCH AND	DEVELOPMENT		COST			REFEI	RENCE
		7	T • T	•	10			1	1
-	со	ST CATEGORIES	HOURS	RATE	ESTIMA	TE		SCHE	DULE
		ENGINEERING			873,	167			
-		DIRECT LABOR	51,426	-					
	2	MATERIAL							
	3	OVERHEAD		85%					
-	4	OTHER							
	•	TOOLING							
	i	DIRECT LABOR	-	-					
Ì	2	MATERIAL							
	3	OVERHEAD		-					
	4	OTHER							
<u>c</u>	:	PROTOTYPE PRODUCT	TION						
5	:	SYSTEM TEST AND EV	ALUATION *		138,	738			
		DATA							
FI		TOTAL SYSTEMS MANA	GEMENT						
۶Į	•	CONSTRUCTION							
•]	•	TRAINING							
1	•	1	PEP		520	73			
1	•	TOTAL COST LESS (G			1,532,	278			
ĸ	<u> </u>	the same supported to the same state of the same	NA		ļ				
⊾ _4			NA						
M	2		NA						
N	ARK		NA						
		*DT/OT-II of	6 months d	uration					
					ATURE		EXTEN	1910N	DATE
RO	Y.	F. SCHWEGLER anical Engine	er				425	5	30 Nov 74
		EWING OFFICIAL	· · · · · · · · · · · · · · · · · · ·				+		
	TE VI	LANG OFFICIAL							
			I						

Malalas and a land a land a strand strain the strain of
Sugar Man prairie to see

AMC # ORM 10110-8

1

State State

hallows a

543478-0

The subscription of the second state of the se

6.0MM XM234 HIGH COST AREA ENG. DEV RESEARCH & DEVELOPMENT

	<u>FY75</u>	<u>FY76</u>	76/77	<u>FY77</u>	<u>FY78</u>	TOTAL
1.1 Contract 1.11 Dev Eng	221 750	(51.005	124 452	<i>(</i>) () () ()	•	
(Val/Ed) 1.12 PEP 1.13 Tooling	271,759 -0- -0-	651,025 -0- 442,861	134,453 186,080 -0-	614,380 1,400,751 -0-	-0- -0- -0-	1,671,617 1,586,831 442,861
1.14 Mfg Proto *1.15 Other	0 -0- 143,652	-0- 323,467	305,807 151,949	611,613 544,096	-0- -0-	917,420 1,163,164
FY Cost (Less G & A)	415,411	1,417,353	778,289	3,170,840	-0-	5,781,893
G & A(24.6%)						
FY Cost	517,602	1,766,022	969,748	3,950,867	-0-	7,204,239
Profit(10.1%)						
FY Total Price	<u>569,880</u>	1,944,390	1,067,693	4,349,904	-0-	7,931,867
l.2 In-House l.21 Dev Eng	161,229	361,986	72,655	277,497	-0-	873,367
1.22 PEP 1.23 Tooling	110,860	17 9 ,774 -0-	44,054	185,485	-0-	520,173 -0-
1.24 Mfg **1.25 Other	-0-	-0-	-0-	-0- 138,738	-0- -0-	-0-
In-Hou s e Cost	272,089	541,760	116,709	601,720		1,532,278
Total Prog (R & D)	841,969	2,486,150	1,184,402	4,951,624		9,464.145
*Other/						
Contract Syst.Test &						
Evaluation Data	33,424 23,732	82,652 33,225	100,051 -0-	242,504 -0-	-0- -0-	458,631 56,957
Total Syst Mg.	86,496	207,590	51,898	207,590	-0-	553,574
Training TOTAL	-0- 143,652	<u>-0-</u> <u>323,467</u>	<u>-0-</u> 151,949	94,002	<u>-0-</u>	$\frac{94,002}{1,163,164}$
**DUP (ARMCOM)	\$23 123		onthe -TT=6	months		

**DT/OT (ARMCOM) \$23,123/Mo,-I=4 months,-II=6 months

R&D

Carter and an and an all and a fair and the second of the second of the second of the second s

	on S	pread Sheet	(XM234)		
Other	FY75	FY76	<u>76/77</u>	<u>FY77</u>	<u>Total</u>
System Test & Eval	33,424	82,652	100,051	242,504	458,631
Data	23,732	33,225	0	0	56,957
Total Syst Mgmt	86,496	207,590	51,898	207,590	553,574
Training	0	0	0	94,002	94,002
Total	143,652	323,467	151,949	544,096	1,163,164

Break Down of "Other" Expenses Shown on Spread Sheet (XM234)

あった

という あたいない とうない ないない ないない

ADIANS - ANIMALININ

Sugar Diverse and and and

189 ₂

CONTRACTOR MAN HOUR SUMMARY

The lot

ACTIVITY	<u>75</u>	76	76/77	<u>77</u>	TOTAL
A-2 Development Engineering * PEP Material B-2 Tooling ** Other D.C.	13,746 -0- -0- -0- 4,800	32,979 -0- -0- 9,473 10,883	6,760 7,276.1 -0- -0- 3,520	28,760 63,939.4 -0- -0- 20,240	82,245 73,215.5 -0- 9,473 39,443
TOTAL HOURS	18,546	53,335	17,556.1	112,939.4	204,376.5
MAN YEARS (1800 Hours)	10.3	29.63	9.75	62.74	113.54
** O.D.C. D-3 Syst Test & Evaluation	1,600	3,203	1,600	9,353	15,756
E-3 Data		(INCLUDI	ED IN DEV.	ENG.)	
F-2 Total System Management	3,200	7,680	1,920	7,680	20,480
E-4 Training				3,207	3,207
TOTAL O.D.C.	4,800	10,883	3,520	20,240	39,443
*PEP A-3 PEP/E-4 PEP Dev Eng			7,701	30,802	38,503
C-2 PEP Qual Cont.				26,837	26,837
G-l Indust. Facil.			149	596	745
ODC-2			1,426.1	5,704.4	7,130.5
TOTAL PED			9,276.1	63,939.4	73,215. 5

Addition of the second march of the second of the difference

bally march

Sand Section of

RAT IONALE XM-234 IN-HOUSE FSD-ENGINEER ING

RATIONALE: The XM-234 is judged to have 6 areas requiring major redeisgn, specifically:

- (1) Upper Receiver
- (2) Lower Receiver
- (3) Gas System
- (4) Bolt/Operating Group
- (5) Firing Mechanism
- (6) Magazine

CALLA TARNAN AND AND AND AN INCOME

The major FSD-Engineering effort to redesign these areas will be conducted in 5 months of FY75 and 12 months of FY76.

The fiscal transition period of 3 months, 76/77 and 12 months of FY77 will be used to finalize detail design, testing, data ecquisition, data processing, data evaluation, and evaluation of proposed production related modifications in conjunction with the concurrent PEP effort.

Two basic problems appear to exist:

(1) If the Upper Receiver and Lower Receiver are reinforced to insure structural integrity the weight limit may be exceeded.

(2) If the locking lug areas are modified to eliminate excessive wear or potential failure an extensive redesign and testing of the operating mechanism may be required.

1-H/1

XM-234 IN-HOUSE FSD-ENGINEERING

The In-House FSD Engineering Team Effort is summarized as follows:

		FY	75	FY	76	70	5-77	FY7	7
	Grade	Hrs	\$	llrs	\$	Hrs	\$	Hrs	<u>ş</u>
Project Eng	14	750	9,435	1800	22,644	450	5,661	900	11,322
Mech Eng	13	7 50	8,048	1800	19,314	300	3,219	1200	12,876
Mech Eng	12	1500	13,635	3600	32,724	900	8,181	1800	16,362
Mech Tech	12	75 0	6,818	1800	16,362	300	2,727	1200	10,908
Q.A. Tech	11	750	5,722	1800	13,734	300	2,289	1200	9,156
Mech Tech	9	75 0	4,748	1800	11,394	450	2,849	1200	7,596
Draftsman	7	75 0	3,893	1800	9,342	300	1,557	1200	6,228
Draftsman	5	750	3,143	1800	7,542	300	1,257	1200	5,028
Math Analyst	12	563	5,118	1350	12,272	300	2,727	1200	10,908
RAM Eng	12	563	5,118	1350	12,272	300	2,727	1200	10,908
(~ Eng	12	750	6,818	1200	10,908	225	2,046	1200	10,908
Q.A. Tech	12	750	6,818	1200	10,908	225	2,046	1200	10,908
Model Maker		500	3,815	1200	9,156	-0-	-0-	-0-	-0-
Direct Labor	FY75	9876	83,129						
	FY76			22500	188,572				
	76/ 77					4350	37,286		
	FY77							14700	123,108
Total Direct Overhead (85% Total Overhea	6) FY75 FY76 76/77 FY77	FSD) 5 \$70, 160, 31, <u>104,</u> \$367,	286 693 <u>642</u>	hou rs	\$432,09	95			

1-H/2

(ALL CONTENDERS) FSD-ENGINEERING MATERIAL

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY75	5 x \$100	\$ 500
FY76	12 x \$100	1200
76/77	3 x \$100	300
FY77	12 x \$100	1200
TOTAL		\$3200

Other direct charges are covered in either FSD or PEP.

1-H/3

W . Witch W. Swi

a mathed at an in the second state of the second state of the second state of the second state of the second st

FSD - ENGINEERING - OTHER DIRECT COSTS

Rationale: Other Direct Costs are assumed to consist of Computer expense at \$600 per month and Travel Expense.

Δ.	Computer Expense	
	FY75 5 x \$600	\$ 3,000
	FY76 12 x \$600	7,200
_	76/77 3 x \$600	1,800
	FY77 12 x \$600	7,200
	TOTAL	\$19,200
Β.	Travel Expense	
	FY75	3,940
	FY76	4,728
	76/77	1,576
	FY77	41,347
	TOTAL	51,591
с.	Total O.D.C./FY	
	FY75	6,940
	FY76	11,928
	76/77	3,376
	FY77	48,547
D.	Total O.D.C.	70,791

FSD - ENGINEERING - SUMMARY OF COSTS

FY75	\$161,229
FY76	361,986
76/77	72,655
FY77	277,497
TOTAL	\$873,367

1-H/4

XM-234 IN-HOUSE TRAVEL COSTS (HIGH COST AREA)

Estimate of Travel Costs:

「「「「「「「「「」」」」

記行時には「時間」という

LAND BUILD BUILD BUILD

in the a detrict I will a Will a the and a set war in a

Kill Lottelle Tie

4

	<u>FY75</u>	<u>FY76</u>	76/77	<u>FY77</u>	
Reviews at West Coast 3 days x 2 men x \$35/day Car rental 2 days -\$60/trip Air fare \$259 x 2 men		6 1260 360 3108	120	360	
Support of APG Test (RDAT-DT-II) l man x \$35/day Car rental @ \$30/day Air fare \$141/28 trips				275 9625 8250 3948	days
Support Test Fort Benning (OT-II l man x \$35/day Car Rental @ \$30/day Air fare \$172/18 trips	:)			280 6300 5400 3096	days
Total/FY	\$3940	\$4728	\$1576	\$41347	

Total ED Travel \$51,591

XM234 ENGINEERING SECTION

FULL SCALE DEVELOPMENT

1. Introduction:

a. The Engineering Section is divided onto four (4) parts;

(1) Engineering Direct Labor.

(2) Engineering Material.

(3) Engineering Overhead.

(4) Other Direct Charges to Engineering.

b. Each Engineering part consists of description of the item included and the rationale for including and evaluating each item.

c. The costs accrued in each part were developed among the weapon elements according to the percentage of peculiar parts of the weapon system which make up the weapon element. Thus for the XM234:

Weapon Element	Peculiar Parts	%Distribution
Receiver & Operating Group	115	64
Barrel Assembly	17	9
Rear Sight	10	5
Magazine	7	4
Bipod	21	12
Sling	3	2
Maintenance Tools	7	4
TOTAL	180	100

2. Rationale for Estimating Engineering Direct Labor Cost (FSDWEDL):

a. Total Engineering Direct Labor hours is the sum of two inputs:

(1) Engineering Direct Labor hours to accomplish the Engineering Tasks involved in finalizing the weapon design.

(2) Engineering Direct Labor hours to prepare the information required for Data Items.

A-1

b. The value for each Direct Labor hour is an average hourly rate applied to all man hours expended in the Engineering effort and was determined for each contractor in coordination with AMSWE-PPX in the following manner:

(1) Estimate the total Direct Labor hours required for each Government GS grade.

(2) Multiply these totals by the respective step 5 hourly rate and add to get a total equivalent Government direct labor cost.

(3) Divide the total equivalent Givernment direct labor cost by the sum of the direct labor hours, regardless of grade, to obtain an average Government engineering hourly rate.

(4) Compare the average Government engineering hourly rate with the Step 5 hourly rates in the GS pay scale to determine the average grade level of skill employed.

(5) Compare the average grade level of skill with available information on the contractor's pay scale to estimate the average contractor's engineering hourly rate.

c. The average contractor's engineering hourly rate for the Contractor is computed to be \$9.22 per hour.

d. Engineering Direct Labor Hours and Costs for the Contractor by Fiscal Year are estimated to be:

FISCAL YEAR	D. L. HOURS	D. L. COSTS
75	13,746	126,738
76	32,979	304,065
76/77	6,760	62,327
77	28,760	265,167
Total	82,245	\$758,297

A-2

3. Rationale for Estimating Engineering Material Costs (FSDWEMAT):

a. Engineering Materials are considered to consist of miscellaneous material used in performing the engineering effort for Full Scale Development. Layout paper, drafting supplies, bond paper, vellums, computer cards, and computer paper are typical major cost items in this category.

b. Engineering Material Costs are estimated to be:

FY75	275
FY76	660
76/77	160
FY77	660
Total	1,755

4. Rationale for Estimating Engineering Overhead (FSDWEOH):

a. Based on historical data and information available in the Contract Pricing Division, AMSWE-PPX, the Engineering Overhead Rate for the Contractor is estimated to be 110% of Engineering Direct Labor Cost.

b. Summary of Overhead costs is as follows:

Total Overhead 1	FY75	\$139,412
Total Overhead 1	FY76	334,472
Total Overhead	76/77	68,560
Total Overhead I	FY77	291,684
Total Overhead		\$834,128

A-3

5. Rationale for Estimating Other Direct Charges to Engineering (FSDWEOT):

a. This category includes the cost of travel and charges for computer time during Full Scale Development.

(1) The estimated computer costs are for programming and exercising a dynamic model of the weapon, a heat transfer and stress analysis model of the barrel, and analysis of Maintainability and Reliability as follows:

FY75	2,970
FY76	7,100
76/77	1,830
FY77	7,100

Total Computer Cost 19,000

(2) The estimate of travel costs is as follows:

FY75	2,364
FY76	4,728
76/77	1,576
FY77	49,769

Supporting computations may be found under "Estimate of Travel Costs".

b. Other Direct Charges to Engineering are summarized as follows:

	FY75	FY76	76/77	<u>FY77</u>	TOTAL
Computer Time	2,970	7,100	1,830	7,100	19,000
Travel Costs	2,364	4,728	1,576	49,769	58,437
Total by FY	5,334	11,828	3,406	56,869	77,437

TOTAL O.D.C.

A-4

d. Estimate of Travel Costs:

	FY75	FY76	76/77	FY77	
Informal reviews at Rock Island	3	6	2	6	
3 days x 2 men x \$35/trip Car Rental 2 days/\$60 trip Air Fare \$259 x 2 men	630 180 1554	360	120	360	
Support of APG Test (RDAT-DI	C-II)			275	days
l man x \$35/day Car Rental @ \$30/day Air Fare \$355/28 days				9625 8250 9940	
Support Test Fort Benning (C	OT-II)			180	days
l man x \$35/day Car Rental x \$30/day Air Fare \$307/18 days				6300 5400 5526	
TOTAL FY	\$2364	\$4728	\$1576	\$49769	
TOTAL TRAVEL \$58,437					

6. Total Engineering Cost

DUCTION ON AND AND AND

FY75	271,759
FY76	651,025
76/77	134,453
FY77	614,380
TOTAL ENG.	\$1,671,617

A-5

ashed and in structure of south 1 2 more Ma

200

•

HIGH COST AREA SUMMARY OF FSDW TOOLING COSTS ESTIMATED IN 1975 DOLLARS

FSDWTL -

The cost model symbol gives reference to the cost of tooling, gages and manufacturing aids required to produce FSD prototype weapons, supporting equipment, and repair parts. All costs occur in FY76.

and and the provide second
HIGH COST AREA FSD - TOOLING COST (LESS GSA) XM234 (180 UNIQUE PARTS - 1097 OPERATIONS)

Tooling for 104 Prototype Guns Consists of:

			Hours	Amount	
Α.	Purchase Tooling (Vendor Price)			
	1095 x \$112.48			\$123,391	
Β.	Purchase Gages (Vendor Price)				
	1097 x \$21.54			\$ 23,630	
C.	Purchase Expendable Tooling (Vendor Price)				
	1097 x \$40.00			\$ 44,758	
D.	Manufacture - Jigs & Fixtures				
	D.L. Rate \$9.22/hr, O.H. Rate	110%	3813	\$ 73,827	
Ε.	Manufacture - Gages				
	D.L. Rate \$9.22/hr, O.H. Rate	110%	261	\$ 5,054	
	Subtotal			\$270,660	
F.	Manufacture - Processing		2469	\$ 47,805	
	D.L. Rate \$9.22/hr, O.H. Rate	110%			
G.	Tool & Gage Design			\$ 40,599	
	(15% of Item A thru E above)				
Η.	Estimating of Tools		1646	\$ 31,870	
	D.L. Rate \$9.22/hr, O.H. Rate	110%			
Ι.	Purchasing Effort (on A-E abov	e)	1284	\$ 24,861	
	D.L. Rate \$9.22/hr, O.H. Rate	110%			
J.	Tool & Gage Inspection			\$ 27,066	
	(10% of Items A thru E above)				
	Total Tooling Cost		9473 Hrs	\$442,861	(FY76)
	Unit Cost (104 weapons)	B-2		\$ 4,259	

XM234 FSD TOOLING MANUFACTURING PROCESSING

Planning for manufacturing processes is estimated at 2 hours per machine operation. There are 907 machine operations giving:

 $\frac{1097}{2194}$ hrs

An additional .25 hours is estimated for methods and standard work per operation giving:

1097 <u>.25</u> 275

Total

2194	hrs
275	hrs
2469	hrs

TOOL DESIGN

It is estimated from M16 G.M. Hydromatic that 20% design to mfg. From G.E. (M61) Approx. 34%.

It is estimated that 30% is fair and reasonable. In prototype most detailed design would not be made - use 15%.

ESTIMATING OF TOOLS

907 Operations with 3 tools per operation - 1 cutter 1 fixture 1 gage

> 1097 <u>3</u> 3291 tools

It is estimated that .50 hr will be necessary for each tool.

3291 <u>.5</u> 1646 hrs

B-3

Construction and the second
XM234

TOOL & GAGE INSPECTION

It is estimated that 10% of the purchase price will be used for initial inspection of tools and gages, based upon ARMCOM QA experience.

PURCHASING

Total procurement actions For items purchased finished Total operations - 1097 It is assumed that each operation will require: 1 cutter 1 fixture 1 gage Therefore $3 \times 1097 = 3291$ items will be procured. 3 Items over \$3000 1094 Items less than \$3000 Use same standards for purchasing as manufacturing 1094 (.5176 hrs) (150%) = 850 hours 78 hours 3(17.223 hrs)(50%) =928 hours For Items manufactured - Manufacturing hours - 4074 Relationship to mfg to purchased - 38.3% Procurement hours for manufactured items - (928) (38.3%) = 356 hours Total procurement effort - Mfg 356 hours 928 hours Purchased 1284 hours

B-4

and a second
PROTOTYPE COSTS

XM234

Based on experience in manufacturing components for the XM235 at the Naval Air Rework Facility (NARF), Pensacola, Florida and assuming that the manufacturing cost is approximately related to the number of unique components in the weapon the following costs are calculated:

RDAT Weapons	<u>180</u> 155	x 4	>	< \$1	0,0	00	46,452
DT/OT-II Weap	ons 1 T	<u>80</u> 55	x	100	x	\$7,500	870,968
Total Prototype Weapon Cost					917,420		

The prototype manufacturing effort continues over a period of three months in the 76/77 period and six months in the FY77 period. The prototype cost is assumed to be distributed proportionately.

76/77 3/9 x 917,420 = 305,807FY77 6/9 x 917,420 = 611,613

C-1

SYSTEM TEST AND EVALUATION SECTION

FULL SCALE DEVELOPMENT

FSDWTE

1. Introduction

a. The figures below represent an estimate of the contractor's cost to conduct System Test and Evaluation.

b. For computational purposes, the Total System Test and Evaluation activity was divided into three parts as follows:

Part I - Acceptance Testing of the Prototype Weapons

Part II - Research and Development Acceptance Test (RDAT)

Part III - Preliminary Testing

c. The following were not included as part of this estimate:

(1) Weapons, spare barrels, and spare parts. These are included in the Prototype Cost, as other Direct Costs.

(2) Ammunition (MUCOM Item)

(3) Range utilization/rental costs, if required. This item was not included due to lack of supporting information as to where and under what arrangement the contractor will conduct testing.

(4) Shipping/transportation costs of materiel/personnel to various test sites, if required. It is assumed that testing would be within close proximity of the contractor's plant.

d. The same direct labor (time) and materials estimate was used for all three contractors. This is considered a reasonable assumption, since

D - 1

the test requirements are the same. Thus, differences in the cost estimates are the result of the various contractors' equivalent hourly rates and overhead figures. Contractor hourly rates and overhead were obtained from audited historical data.

2.	Summary of Costs	TOTAL
	Part I - Acceptance Testing	\$105,768
	Part II - RDAT	\$2 16,127
	Part III - Preliminary Testing	\$136 , 736
	TOTAL - Weapon System Test and	

Evaluation Cost (FSDWTE)

\$458,631

D - 2

3. Breakdown by Parts

Part I - Acceptance Testing	FY75	FY76	76/77	FY77	TOTAL
Direct Labor (2950 hrs)*	-0-	-0-	-0-	27,199	27,199
Materials	-0-	-0-	-0-	48,650	48,650
Overhead	-0-	-0-	-0-	29,919	29,919
Total				105,768	105,768

Part II - RDAT

Direct Labor (6403 hrs)	-0-	-0-	-0-	59,036	59,036
Materials	-0-	-0-	79,391	12,760	92,151
Overhead	-0-	-0-	-0-	64,940	64,940
Total			79,391	136,736	216,127

**Part III - Prelim. Tstg.

Direct Labor (6403 hrs)	9,840	39,358	9,838	-0-	59,036
Material	12,760	-0-	-0-	-0-	12,760
Overhead	10,824	43,294	10,822	-0-	64,940
Total	33,424	82,652	20,660	-0-	136,736

* Direct Labor Rate = \$9.22/hr

0verhead = 110%

** Preliminary Testing Period - May 1975 through Oct 1976

D - 3

DATA SECTION

FULL SCALE DEVELOPMENT

1. Introduction:

a. This section summarizes the costs for the FSD Data Items. The section contains a List of FSD Data Items and their costs. These costs make up the totals which are entered under DATA in the FSD Cost Model. The costs for the Functional Direct Labor hours are accounted for in the respective Direct Labor sections for Engineering and Training.

b. The Data Items for the Technical Data Package (TDP) are accounted for in the PEP Program and are so noted on the list of the Data Costs for each Data Item. The TDP Data Items which are started in FSD and continued in PEP are also noted in the list for cross reference and continuity.

c. The section also contains a Data Related Cost Summary for information on the total cost related to data items.

E-1

2. DATA RELATED COST SUMMARY

a. Direct Labor plus Overhead to prepare FSD Dat 1 Items is carried . under the following categories and totals as follows:

Category

Engineering hours	29,800
Training hours	3,207
Engineering Cost	576,928
Training Cost	62,088
Total \$/FY	639,016
b. Data Cost	56,957
a + b	695,973

c. Total Data Related Cost - FSD = \$695,973 (P-F)

NOTE: Engineering and Training Hourly Rate = \$9.22 + 110% Overhead = \$9.22 + \$10.14 = \$19.36/hour

d. Data Cost by Fiscal Year FY75 5/17 x 56,957 = \$16,752 FY76 12/17 x 56,957 = \$40,205

E-2

3. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE ENGINEERING

DATA ITEMS

List of Engineering Data Item Numbers

BŁ	DI	B#	DI#
01	DI-A-1014A (MOD)	32	DI-H-1329A
02	DI-E-1100 (MOD)	37	DI-M-1501 (MOD)
03	DI-E-1101A	38	DI-M-1502
04	DI-E-1103A	39	DI-M-1502
05	DI-E-1104	40	DI-M-1505
06	DI-E-1105	41	DI-M-1510
08	DI-E-1107	42	DI-P-1600
10	DI-E-1116	44	DI-R-1710 (MOD)
11	DI-E-1117	51	DI-R-1730 (MOD)
12	DI-E-1118 (MOD)	52	DI-R-1731 (MOD)
13	DI-E-1119 (MOD)	53	DI-R-1733 (MOD)
14	DI-E-1128	54	DI-R-1734 (MOD)
15	DI-E-11XX (MOD)	55	DI-R-1735 (MOD)
16	DI-E-XXX1	56	DI-R-1740 (MOD)
17	DI-F-6000	57	DI-R-1741 (MOD)
18	DI-F-60001	58	DI-R-1750 (NOD)
18A	DI-F-XXX1	59	DI-S-1800 (MOD)
19	DI-F-6004	60	DI-S-1804A
25	DI-H-1312	61	DI-S-1812
26	DI-H-1314	62	DI-S-1818 (MOD)
27	DI-H-1315	63	DI-S-1819 (MOD)
29	DI-H-1322A (MOD)	64	DI-S-18XX (MOD)
30	DI-H-1326A	65	DI-T-1906 (MOD)
31	DI-H-1327A (MOD)	66	DI-T-XXX1 (NEW)
	•	67	DI-V-1950 (MOD)

Direct Labor Hours = 29,800

at Jacked Academic and Britter

NOTE: These direct labor hours are included under Engineering.

many the internet way the second water and the second with the for the second of the second of the second of the

4. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE TRAINING

DATA ITEMS

List of Training Data Items

8#	DI
20	DI-H-1300 (MOD)
21	DI-H-1302
22	DI-H-1304
23	DI-H-1308
24	DI-H-1310
Direct La	bor hours = 3,207

NOTE: These direct labor hours are included under Training.

E-4

SUMMARY OF COSTS - DATA ITEM CALL ITEMS - FSD

能管理品

Cardenia and a state of the state of

<u>B No.</u>	Data Item No.	Data Item Title		
01	DI-A-1014A(MOD)	PERT		557
02	DI-E-1100(MOD)	Corfiguration Management Plan		246
03	DI-E-1101A	Configuration Stat Acct & Engr Record		507
04	DI-E-1103A	Engineer Release Record	FSD/PEP	1620
05	DI-E-1104	Specifications	FSO/PEP	91
06	DI-E-1105	Characteristics & Description Book		168
07	DI-E-1106	Specs, Standards, Appl. List	PEP	0
08	EI-E-1107	Drawing Custodianship List	FSD/PEP	30
09	EI-E-1115A(MOD)	Technical Data Package	PEP	0
10	DI-E-1116	Stdz Comp & Select Control	FSO/PEP	58
4	9I-E-1117	Stdz Report of Common Items	PEP	0
12	DI-E-1118(MOD)	Drawings, Engr & Assoc Lists	FSD/PEP	645
13	DI-E-1119(MOD)	Environmental Criteria Report		3172
14	DI-E-1128	Electromagnetic Interference Control Plan		84
15	(X)DI-E-11XX(MOD)	Interface Control Doc. for VRFWS		311
16	DI-E-XXX1	Dynamic Mathematical Nodel		288
17	DI-F-6000	Cost performance report		353
18	DI-F-6001(MOD)	Procurement Info Functional Cost- Hour Report		5
18 A	DI-F-XXX1	Model for Eval of Design-To Unit Production Cest		29
19	D I-F-6004	Contract Funds Status Report		22
20	EI-H-1300(MOD)	Personnel & Training Requirements		150

E-5

Brits.

SUMMARY OF COSTS - DATA CALL ITEMS - FSD (Continued)

B No.	Data Item No.	Data Item Title	
21	DI-H-1320	New Equipment Training Plan	0
22	DI-H-1304	New Equipment Training Courses	1350
23	DI-H-1308	Training Course Reports	0
2.4	DI-H-1310	Graphic Aids	31444
25	DI-H-1312	Human Factors Engr Plan	53
26	DI-H-1314	Human Factors Engr Progress Rpt	179
27	DI-H-1315	Human Factors Engr Final Report	59
28	DI-H-1321A	Explosive Hazard Class. Data	See Amino
29	DI-H-1322A(MOD)	Safety Statement	77
$\tilde{\mathbf{r}}$	DI-H-1326A	Safety Anal. & Hazard Eval Rpts	212
31	DI-H-1327A(MOD)	Surface Danger Area Data	68
32	DI-H-1329A	Accident/Incident Report	20
33	DI-H-1330(MOD)	Facilities Safety Data	0
34	DI-L-1407(MOD)	Preservation & Packaging Data	PE P
3 5	DI-L-1410	Ammunition Data Cards	Ammo
36	DI-M-1500(MOD)	Firing Table Manuścript	Amero
37	DI-M-1501(MOD)	Validation Plan for Equip. Publications	, 1
38	DI-M-1502(MOD)	Equipment Publications	1176
39	DI-M-1502(MOD)	Equipment Publications	Included in 8038
40	DI-M-1505(MOD)	Equip. Pub. Progress/Cost Reports	38
41	DI-M-1510	Maintenance Allocation Chart	11
42	DI-P-1600	Value Engr Data Report	135
3	DI-P-1602	Value Engr Plan	No Cost Plan is prepared and paid in Contractor's Proposal.

E-6

214

for

à

ų

SUMMARY OF COSTS - DATA CALL ITEMS - FSD (Continued)

B No.	Data Item No.	Data Item Title	
44	DI-R-1710(MOD)	Quality Program Plan	128
45	DI-R-1711(MOD)	Qual Engrg Acc Insp Req & Equip List	PEP
46	DI-R-1712(MOD)	Quality Engrg Supp QA Provision	PEP
47			PEP
48			PEP
49	DI-R-1717	Qual Engr Calibration Program Data	PEP
50	DI-R-1722(MOD)	Qual Insp Pamphlet	PEP
51	DI-R-1730(MOD)	Reliability Program Plan	17
52	DI-R-1731(MOD)	Reliability Reports	67
53	DI-R-1733(MOD)	Reliability Qualified Items List	3
FA	DI-R-1734(MOD)	Rel Fail Modes Effects & Crit Anal Rpts	21
55	DI-R-1735(MOD)	Rel Failed Item Analysis Report	114
56	DI-R-1740(MOD)	Maintainability Program Plan	17
57	DI-R-1741(MOD)	Maintainability Reports	20
58	DI-R-1750(MOD)	Assessment Program Plan	7
59	DI-S-1800(MOD)	Technical Reports	1179
60	DI-S-1804A	Corrosion Prevention & Matl Deterioration Rots and/or Studies	49
61	DI-S-1812	Maintenance Engr Des Discrepancy Report	34
62	DI-5-1818(MOD)	Maintenance Engr Analysis	380
63	DI-S-1819(MOD)	Contractor Recommended Support Plan	31
64	¢X)DI-S-18XX(MOD)	Support Model Data	6
65	DI-T-1906(MOD)	Test & Demonstration Reports	1105
66	DI-T-XXX1(New)	RåD Acceptance Test Plan	25
-	DI-V-1950(MOD)	Provisioning Requirements for US Army Eq.	581
68	DI-V-1951(MOD)	Federal Item Identification Data	No Contractor Performance Regd
Total co	nverted to FY75 Doll	ars \$48,268 x 1.18 = \$56,957	TOTAL \$48,268
			215

E-7

Total Systems Management Section Full Scale Development

1. Introduction:

The overall systems management team to be employed by the contractor is considered to be a staff type operation that would be responsible for the contractor's overall program and execution.

Personnel on the management team are not included in the functional areas (i.e., engineering, manufacturing, testing, etc.). Top or executive management, administrative and clerical personnel are included in overhead and/or GSA. Since each of the functional areas would have their own supervision and management the rationale is to keep the Systems Management to a small highly capable team headed by a Project Manager.

2. Systems Management Team:

The team would be a full time effort for four (4) men headed by a Project Manager. It would consist of:

1 - Project Manager

1 - Senior Staff Systems Engineer for engineering activities

1 - Senior Staff Engineer for manufacturing and acceptance.

1 - Program Manager for plans and programs.

This team would be responsible for both the Full Scale Development and PEP Programs which are in the same time frame. Therefore, the costs are scheduled only in the FSD portion of the estimate.

F-1

3. The following is the estimated average Government rate:

Title	Grade	FY75 D.L. Rate
Project Manager	GS-15	\$15.40
Senior Engineer, Engr.	GS-14	13.21
Senior Engineer, Mfg.	GS-13	11.27
Program Manager	GS-13	11.27
		\$51.15

\$51.15/4 = \$12.79 hr average Government rate.

4. Based on the equivalent Government rate and discussions with AMSWE-PPX the equivalent Contractor hourly rate is estimated to be \$12.87/hr and overhead at 110% totaling \$27.03/hr D.L.&O.H.

5. Costs by Fiscal Period:

這一點。各定面的現象或為時間而受強強。」。48. a 49. a

FY75 (5 months, 160 hrs/month)	
5 x 160 x 4 x \$27.03 =	86,496
FY76 (12 months, 160 hrs/month)	
12 x 160 x 4 x \$27.03 =	207,590
76/77 (3 months, 160 hrs/month)	
3 x 160 x 4 x \$27.03 =	51,898
FY77 (12 months, 160 hrs/month)	
12 x 160 x 4 x \$27.03 =	207,590
Total	553.574

F-2

IN-HOUSE TASKS

PEP RELATED

The major areas of In-House Direction and Support effort required during the PEP period are:

1. Producibility Engineering and Planning Studies.

2. Product Engineering Studies including Tolerance/Dimension Studies.

3. Engineering effort to prepare the Technical Data Package Data Call Items.

4. Engineering effort to enhance Reliability and Maintainability Engineering activities.

Configuration Management will be monitored in detail through acceptance testing.

Starting with RDT, Configuration Management will revert entirely to the Government as an In-House Task requiring effort as follows:

1. Prepare a Configuration Plan.

2. Update the Configuration Plan as required.

3. Review Engineering Change Proposals (ECPs):

a. Failure Related.

b. Production Related.

Other specific In-House Task areas are:

Review/monitor and direct Contractor and In-House conducted
 Producibility Engineering and Planning studies as follows:

a. Review each part/drawing.

b. Review Contractor Draft Process Sheets.

1-H/1 PEP

- c. Review unique processing operations.
- d. Review current and proposed processing capabilities.
- e. Review difficult/uneconomical manufactured items and recommended actions.
- f. Review Contractor PEP reports.

2. Review, monitor and direct Contractor and In-House conducted Production Engineering and Tolerance/Dimension Studies as follows:

- a. Review components/drawings.
- b. Maintain conformity to Military Standards as specification as applicable.
- c. Review Contractor and In-House conducted redesign efforts.
- d. Review and prepare reports.
- e. Analyze available data and identify/approve areas for in-house or by contractor.
- f. Conduct and/or monitor tolerance/dimension studies.
- g. Review revisions and related reports.
- h. Maintain liaison with contractor project related supervision personnel.

3. Maintain cognizance of current and proposed manufacturing processes and procedures.

1-H/2 PEP

(ALL CONTENDERS) IN-HOUSE PEP-ENGINEERING

The In-House PEP Engineering team effort is summarized as follows:

		F	¥75		¥76		76/77		FY77
Title	Grade	Hrs	\$	Hrs	\$	Hrs	\$	Hrs	\$
Project Eng	14	750	9,435	900	11,324	225	2,831	900	11,324
Mech Eng	13	750	8,048	750	8,048	450	4,829	1800	19,316
Mech Eng	12	750	6,818	600	5,454	150	1,364	600	5,454
Mech Tech	11	375	2,861	600	4,578	150	1,1.45	600	4,578
Mech Tech	9	375	2,374	600	3,798	150	95 0	600	3,798
Draftsman	7	750	3,893	600	3,114	150	779	600	3,114
Draftsman	5	750	3,143	1800	7,542	450	629	1800	7,542
Math Analyst	12	375	3,409	600	5,454	150	1,364	600	5,454
AM Eng	12	750	6,818	1800	16,362	225	2,046	900	8,181
F 7	Y75 Y76 6/77 Y77	5,625	46,7 9 9	8250	65,674	2100	15,937	8400	68,761
Tot a l Direct	Labor	(PEP)	24,375 Ma	an Hours	\$197,171				·
Overhead (85%) FY75 \$39,779									
	Y76		55,823						
	6/77		13,547						
	'Y77		58,447		Į.				
Total Overhead (PEP) \$167,596									

1-H/3 PEP

.(

(ALL CONTENDERS) IN-HOUSE PEP SUMMARY

ŧ

4

.

is also we we we have a life but the main of a damate to the second

		FY75	FY76	76/77	<u>FY77</u>	TOTAL
Α.	Engineering					
	Direct Labor	46,799	65,674	15,937	68,761	197,171
	Material(\$75/Mo)	375	900	225	900	2,400
	Overhead	39,779	55,823	13,547	58,447	167,596
	Other D.C. (In- cluaed in FSD)			-	_	
	Total A	86,953	122,397	29,709	128,108	\$367,167
в.	Configuration Con	trol Board	1			
	Direct Labor	12,720	30,528	7,633	30,528	81,409
	Material(\$75/Mo)	375	900	225	900	2,400
	Overhead (85%)	10,812	25,949	6,487	25,949	69,197
	Other D.C. (In- cluded in FSD)		_			
	Total B	23,907	57,377	14,345	57,377	\$153,006
	A plus B	110,860	179,774	44,054	185,485	
TO	TAL IN-HOUSE PEP C	OST	4			\$520,173

PEP ENGINEERING24,375 Hrs.C.C. Board7,680 Hrs.TOTAL MAN HOURS32,055 Hrs.

1-H/4 PEP

A STATE AND A STATE AND A STATE AND A STATE AND A STATE AND A STATE AND A STATE AND A STATE AND A STATE AND A S

221

and an and the second sec

(ALL CONTENDERS) IN-HOUSE CONFIGURATION CONTROL BOARD

Control of Configuration Management will be assumed by the Government.

A Configuration Control Board (CCB) will be established and will exercise its authority throughout the FSD period and potentially continue in the same manner but at somewhat diminished levels of effort through the Limited Production period and the Full Scale Production period.

During the FSD period from 1 February 1975 to 1 October 1977 (32 months) the CCB will utilize of the following people to the extent indicated:

Title	Frade	Hours	\$DL	\$0verhead
40% Configuration Mgr 40% Engineer 20% Procurement	14 13	1920 1920	24,154 20,602	20,531 17,511
Specialist	13	960	10,301	8,756
20% W.A. Engineer (Gages & SQAPS)	13	960	10,301	8,756
20% Maintenance Specialist	12	960	8,726	7,417
20% Supply Specialist	11	960	7,325	6,226
	TOTAL	7,680	\$81,409	\$69,197
These expenses occur as	follows:	FY75	12,720	10,812
		FY76	30,528	25,949
		76/77	7,633	6,487
		FY77	30,528	25,949

and the second second and the second
f

SAW WEAPON XM-234 (HIGH COST AREA) PRODUCIBILITY ENGINEERING & PLANNING SEP/OCT 74

VIEW ()

S. 5. 1849

1

	ST CATEGORIES D ELEMENTS					
DE	VELOPMENT-PEP	PEP TOTAL	FY75	<u>FY76</u>	76/77	<u>F¥77</u>
Α.	Engineering Direct Labor Material Overhead Other D.C.	886,979 354,998 150 390,498 141,333	-0-	-0-	150,113	736,866
в.	Tooling(Software)157,968	-0-	-0-	31,594	126,374
C.	Quality Control	520,018	-0-	-0-	-0-	520,018
D.	System Test & Evaluation	-0-	-0-	-0-	-0-	-0-
E.	Data	7,441	-0-	-0-	1,488	5,953
F.	Total Systems Management	-0-	-0-	-0-	-0-	-0-
G.	Industrial Facilities	14,425	-0-	-0-	2,885	11,540
н.	Training	-0-	-0-	-0-	-0-	-0-
I.	Miscellaneous	-0-	-0-	-0-	-0-	-0-
TO	TAL COST 1	,586,831			186,080	1,400,751

PEP

CONTRACTOR DEVELOPMENT ENG PEP

Rationale:

The Contractor PEP effort is estimated to address the following areas:

a. Producibility Engineering and Planning Studies.

b. Product Engineering and Tolerance Studies.

Tasks are identified in each area, required manhours are estimated for each task and the total estimated manhours determined. These manhours are multiplied by appropriate labor and overhead rates to obtain total values for Direct Labor and Overhead, \$150 is estimated for Materials and tuese values of Direct Labor, Overhead, and Material cost are added to Other Direct Costs which are defined in a separate section.

A-1 PEP

CONTRACTOR DEVELOPMENT ENG PEP

A. Producibility Engineering and Planning Studies:

TASK

MANHOURS

1.	Review Part Drawings	2058
2.	Prepare Draft Process Sheets	5143
3.	Determine Unique Operations	1.76
4.	Conduct Process Capabilities Study	2788
5.	Determine Difficult Items and Make	
	Recommendations	1394
6.	Prepare Reports	41
7.	Maintain Supervision	4752
	TOTAL "A"	16352 hours

B. Product Engineering and Tolerance Studies:

1.	Review Drawings	461	
2.	Review Mil. Standards & Specs.	216	
3.	Select and Conduct Redesign	2979	
4.	Prepare Reports	40	
5.	Review Data/Identify Areas for Study	481	
6.	Conduct Tolerance/Dimension Study	2675	
7.	Determine Revisions and Prepare Report	556	
8.	Maintain Supervision	4752	
	TOTAL "B"	12161	hours

TOTAL MANHOURS (A & B)

ť

addition States

28,513

SAW-XM-234 (HIGH COST AREA) CONTRACTOR DEVELOPMENT ENG PEP

Total ManHours (A&B) Data Item ManHours Total Manhours	28,513 hrs 9,990 hrs 38,503		
Direct Labor Rate Direct Labor Cost Overhead Rate 110% Overhead Cost	\$9.22/hr \$354,997.66 \$390,497.43		
Engineering Cost Summary Direct Labor Material Overhead O.D.C. Total Engineering	\$354,998 150 390,498 141,333 \$886,979	76/77 \$71,000 30 78,100 983 \$150,113	FY77 \$283,998 120 312,398 140,350 \$736,866

A-3 PEP

Second Charles & Second and Second Second Second Second

an a start a second start a start

Con Contraction of the office of the

OTHER DIRECT COSTS CONTRACTOR PRODUCIBILITY ENGINEERING & PLANNING (PEP)

RATIONALE: Other Direct Costs are assumed to consist of three (3) categories:

a. Manufacturing Processing Engineering

b. Travel

1

林市市市市市

c. Reproduction Costs

- (1) PEP Studies
- (2) Product Engineering and Tolerance Studies

ODC/-1 PEP

XM-234 (HIGH COST AREA) OTHER DIRECT COSTS CONTRACTOR PEP

A. Manufacturing Process Engineering is the Engineering effort to prepare and process routing sheets and other documentation defining in detail the manufacturing processes to be used for each component.

Estimated manufact Estimated Eng Hrs Direct Labor Rate Overhead		1097 6.5 hrs \$9.22/hr 110%
Required Manhrs Direct Labor Overhead Total M.P.E.	1097 x 6.5 7130.5 x \$9.22 \$65,743 x 1.10	7130.5 \$65,743.21 72,317.53 \$138,060.74

B. O.D.C. Travel Estimated travel consists of 2 trips to RIA by 1 man in FY77 at 2 x \$449 = \$898 plus 2 trips by 2 men at \$847 per trip (1 trip in FY76/77 and 1 trip in FY77.

	<u>76/77</u>	FY77	TOTAL
l man trip		\$898	
2 man trip	\$847	\$847	
Total Travel	\$847	\$1745	\$2592

ODC/-2 PEP

XM-234 (HIGH COST AREA) OTHER DIRECT COSTS CONTRACTOR PEP

C. Reproduction:

The second strategies in most of the other a second as second the second and have been

TT - 7

1) Estimated for Producibility Engineering & Planning Studies:

	76/77	FY77	TOTAL
\$165.00 x (1.24)	\$40.92	\$163.68	\$204.60
2) Estimated for Product	t Engineering	and Tclerance	Studies:
\$369.00 x (1.24)	\$95.11	\$360.45	\$475.56
Total Reproduction Cost	\$136.03	\$544.13	\$680.16
O.D.C. Summary			
Total M.P.E.	-0-	\$138,060.74	\$138,060.74

Total M.P.E.	-0-	\$ 138,060. /4	\$138,060.74
Total Travel	\$847.00	1,745.00	2,592.00
Total Reproduction	136.03	544.13	680.16
Total O.D.C.	\$983.03	\$140,349.87	\$141,332.90

ODC/-3 PEP

Alexa Herman B.S.

TOOLING SECTION (SOFTWARE) XM-234 (HIGH COST AREA)

Costs are incurred during design of special purpose production equipment and tooling to achieve quantity production. Based on past experience it is estimated that 35% of the initial tooling cost is used for design.

All design costs are shown against the weapon.

On the basis of past estimates for automatic weapons an average tooling cost of \$400 per operation is applied to cover the cost of Purchased Tooling, Purchased Gages, Expendable Tooling, Jigs and Fixtures, and Gages.

The corresponding Design Cost is thus estimated at .35 x \$400= \$144 per operation.

No. C	perations	x \$144	76/77	FY77
XM-23	4 1097	\$157,968	\$31,594	\$126,374

Recard Hickory & all with Course For a Art Bat. Batharde & s. A.

and an bital ad apple with further an anital to write as si band de adaptitation from a second

OUALITY CONTROL SECTION

The estimates contained herein for Quality Control are for the Quality Documentation that is part of the Technical Data Package. In addition, estimated hours for Quality Control Engineering Supervisor are included at the rate of 160 hours per month for 11 months. The man hours estimated for the preparation of Quality Control Documentation are based on similar work performed by ARMCOM personnel.

Rationale is derived from a similar study performed on proposed Bushmaster weapons. The following Data Items are involved:

DI-E-1104*

DI-E-1118 (Mod)*

DI-R-1711 (Mod)

DI-R-1712 (Mod)

DI-R-1717

DI-R-1722 (Mod)

* In addition to Quality Control, there are man hours for these Data Items in the Engineering Section.

During the PEP Program, it is estimated all Q.C. software efforts will be accomplished in FY77.

C-1 PEP

SUMMARY OF MAN HOURS

CS-13	Supervisor	1,760
GS-12	Engineer	790
G S-11	Specialist Gage Designer/Checker	16,434
GS-09	Tech Writer, Illustrator	6,968
GS-05	Document Control Clerk	885
		26,837

SUMMARY OF COSTS

Direct Labor Hours	26,837
Hourly Rate	9,22
Total D. L. Cost	247,437
Overhead (110%)	272,181
Material	400
Total Q. C. Cost	520,018

C-2 PEP

DATA SECTION

PEPND

1. This section includes the rationale and a summary of direct labor manhours and costs for material and reproduction for each Data Call Item considered a part of the total Technical Data Package (TDP).

2. The summary of direct labor man hours for Engineering Data Items is incorporated in the Engineering Section under Data Items. The summary of direct labor man hours for Quality Control Data Items is incorporated in the Quality Control Section under Data Items. Data Call Items DI-E-1104 and DI-E-1118(MOD), which require both Engineering and Quality Control documentation, have separate summaries and rationale contained in this section.

3. The material costs for preparation of the Data Items include the costs of standard forms, such as drawings, supplementary quality assurance provisions, and packaging data sheets. These costs are summarized and shown in their respective functional areas.

4. A summary of Data Costs for all TDP related Data Items is included in this section and entered under Data in the Cost Model.

DATA SECTION

5. DATA RELATED COST SUMMARY

St. Inton

PF

a. Cost of Direct Labor plus Overhead to prepare data items is as follows:

	Category	
	Engineering Direct Labor (Manhours)	9,990
	Quality Control Direct Labor (Manhours)	26,837
	Engineering Cost*	193,426
	Quality Control Cost*	519,618
	Total Direct Labor & Overhead	713,044
b.	Data Cost	7,441

c. Total Related Data Cost - PEP (a + b) 720,486

*Hourly rate = \$9.22 + 110% Overhead = 19.36/hour

E2 PEP

SUMMARY OF DATA COSTS-PEP PROGRAM

B. No.	Data Item No.	Data Item Title	
0004	*DI-E-1103A	Engrg Release Record	\$ 203
0005	*DI-E-1104(QC)	Specifications	39
0005	*DI-E-1104(ENGR)	Specifications	93
0007	DI-E-1106	Specs, Stds, Application List	44
0008	*DI-E-1107	Drawing Custodianship List	68
0009	DI-E-1115A(MOD)	Technical Data Package	
010	*DI-E-1116	Standardization, Components, and Selection Control	6
011	DI-E-1117	Standardization-Report of Common Items	6
012	*DI-E-1118(MOD)(QC) Drawings, Engrg, and Associated Lists	4,130
012	*DI-E-1118(MOD) (ENGR)	Drawings, Engrg, and Associated Lists	1,348
034	DI-L-1407(MOD)	Preservation and Packaging Data	307
045	DI-R-1711(MOD)	Quality Engrg Acc Insp Req & Eq	79
046	DI-R-1712(MOD)	Qual Engrg Supp QA Provisions	766
049	DI-R-1717	Qual Engrg Calibration Prog Data	22
050	DR-R-1722(MOD)	Qual Insp Pamphlet	330
		GRAND TOTAL DATA COST	\$7,441
		76/77 DATA COST	1,488
		FY77 DATA COST	5,953

* Started during FSD Phase; continued during PEP Program.

E3 PEP

SUMMARY OF DIRECT LABOR MANHOURS FOR ENGRG DATA ITEMS

Data Item No.	Totals
DI-E-1107	2
DI-E-1118(MOD)	1372
Totals	
DI-E-1103A	165
DI-E-1104	1676
DI-E-1106	28
DI-E-1107	10
DI-E-1115A(MOD)	96
0I-E-1116	73
DI-E-1117	5
DI-E-1118(MOD)	5487
DI-E-1407(MOD)	1075
Totals	9 ,99 0

San Baller State Sugar

Hote: Totals are included in Direct Labor in Engineering Section

E4 PEP

We have a martine of the state of the state of the

SUMMARY OF QUALITY CONTROL DIRECT LABOR FOR DATA ITEMS (MANHOURS)

Data Item	<u>GS-12</u>	<u>GS-11</u>	<u>65-9</u>	GS-5
DI-E-1104	39 0	-	-	22
DI-E-1118(MOD)	-	14000	-	-
DI-R-1711(MOD)	60	355	-	60
DI-R-1712(MOD)	-	1914	348	348
DI-R-1717	340	165	· • 3	75
DI-R-1722(MOD)	-	-	6620	380
Totals	7 9 0	16,434	6,968	885

NOTE: Totals are included in Direct Labor in Quality Control Section. Grand Total manhours - 25,077 + 1,760 (GS-13 Supervisor) = 26,837

E5 PEP

INDUSTRIAL FICILITIES SECTION

The estimate is based on the assumption that the contractor has a suitable plant site available for production of the components.

The design and layout of the plant equipment is based on the manufacturing process. Utilization of equipment is on the basis of 80% of the total machine time available. For the conventional machines a 1-8-5 shift is proposed through the first six months and 2-8-5 for the remainder of the program. For the N/C equipment a 1-8-5 shift is proposed through the first 6 months and a 3-8-5 shift for the remainder of the program.

The cost of the plans and layouts for this phase is estimated as follows, and will be accomplished during 76/77 and FY77.

Design and layout including electrical, plumbing, sheet metal, air, etc. for space allocation to machining, assembly, bench work and storage of tools and equipment is estimated to require 225 hours for the entire layout of 37,912 square feet.

Preparation of specifications for the procurement of new equipment and bills of materials required for installation of machines, air lines, etc. is estimated to require 520 hours.

Rates used are based on 9.22 per hour rate for design and layout work was escalated by 110% for overhead to 19.36 per hour. Therefore the 745 hour total computes to 14,424.69.

Area required for production approximates 37,912 square feet to be allocated as follows:

Production area, machining	26,584
Assembly, deburring and bench area	1,244

G-1 PEP

Tool and gage maintenance	1,000
Receiving	800
Packaging and shipping	1,000
Bonded storage	500
Tool storage	900
Final inspection	2,000
Administration	1,500
Metrology lab	384
Tool room	2,000
Total Area Required	37,912

It is assumed that chrome plating and surface finishing will be vendor purchased.

	Total	FY- 77	<u>76/77</u>
Labor Cost	6868.90	5,495.12	1373.78
Overhead Cost	7555,79	6,044,63	1511,16
Total Cost	14,424.69	11,539.75	2884.94

G-2 PEP

NUMBER II-C

States of the states of the states of the states of the states of the states of the states of the states of the

BASIC ESTIMATED COST PACKAGE ENGINEERING DEVELOPMENT XM235 CONTRACTED IN A LOW COST AREA IN 6.00MM

and substant for an in the set of all

Land & Later Stringer Str.

Stable 2 de Martin State

Carron Million and

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22) LOW COST AREA CONTRACT

1. PREPARING INSTALLATION

		LIES OR SERVICES				8. <u>q</u>	UANTITY	
		5 Low Cost A					NA	
5	YST	EM(S) SUPPORTED E Squad Automa	atic Weapon (S. WORK BREA STRUCTUR 4	ELEVEL /	November 197	
			DEVELOPMENT		COST	REFE	RENCE	
• •	· · · •		•	•	10			
-	со	ST CATEGORIES	HOURS	RATE	ESTIMATE	SCHI	EDULE	
iſ		ENGINEERING			1,489,292			
	1	DIRECT LABOR	177,109.5					
_	2	MATERIAL						
	2	OVERHEAD		350%	<u></u>			
	4	OTHER			1			
L.,	•	TOOLING			383,853	···		
-	. !	DIRECT LABOR		-	/		·····	
1	1	MATERIAL			¥			
	3	OVERHEAD	-		···· · · · · · · · · · · · · · · · · ·			
- 1	4	OTHER			790,000			
-		PROTOTYPE PRODUC			448,465			
2		SYSTEM TEST AND EV	VALUATION		56,957		**************************************	
	. : .	DATA			-0-			
1	•••••	TOTAL SYSTEMS MAN	IAGEMENT		-0-	<u></u>		
	•	CONSTRUCTION			90,886			
1	•	TRAINING	PEP		1,505,288			
		OTHER (Specify) TOTAL COST LESS (G			4,764,741			
+		G AND A	5%		1 41/041/44			
+		TOTAL COST			5,002,978			
	•	PROFIT OR FEE	9.3	8				
1		TOTAL PRICE			5,468,255			
		ED NAME AND TITLE	E	SIGN	ATURE	EXTENSION	DATE	
P	REP	ARING OFFICIAL F. SCHWEGLE	R					
		hanical Engi				4255	30 Nov 74	
		EWING OFFICIAL					+	
	- E V I	ILWING UPPICIAL						
	PPI	NOVING OFFICIAL						

Black and Brid Becker Mine Chine 199

added the states

INDEPENDENT GOVERNMENT COST ESTIMATE .. RESEARCH AND DEVELOPMENT

(ANCR 715-22) IN-HOUSE SUPPORT

1. PREPARING INSTALLATION

	SARRI-LS-C					
2. SUP	PLIES OR SERVICES	TO BE PROCURED		(000 In		S. QUANTITY
	IOUSE SUPPORT	VM235 Low C	ogt Aroa	•	cluded)	NA
	TEM(S) SUPPORTED B			S. WORK B		8. ESTIMATE PREPARED
4. 575	TEM(S) SUPPORTED B	THIS PROCUREM			URE LEVEL	AS OF
	Squad Automa	tic Weapon	System	4		30 November 197
	RESEARCH AND DEVELOPMENT			COST		REFERENCE
the feature of a	7	•	•	10		11
с	OST CATEGORIES	HOURS	RATE	ESTIMATE		SCHEDULE
	ENGINEERING			871,353		
	DIRECT LABOR	51,426	-			
2	MATERIAL					
3	OVERHEAD		85%			
4	OTHER					
3 .	TOOLING					
)	DIRECT LABOR		_			
12	MATERIAL					
3	OVERHEAD					
	OTHER					
<u> </u>	PROTOTYPE PRODUC					
<u>0</u> .	SYSTEM TEST AND EV	ALUATION *		138,738		
£ :	PATA					
F	TOTAL SYSTEMS MAN	AGEMENT				
G -	CONSTRUCTION			<u>↓</u>		
H -	TRAINING	DED		E20 172		
	OTHER (Specify)	PEP		520,173 1,530,264		
	TOTAL COST LESS (G	NA		1,330,204		
K -	G AND A TOTAL COST	NA				
M	PROFIT OR FEE	NA		<u> </u>		
	TOTAL PRICE	NA		<u>├</u>		
REMARK	and the strength of the second se			<u></u>	· · · · ·	
	*DT/OT-II of	6 months du	uration			

will all the mind

AMC FORM 10110-2

6.0MM XM-235 (LOW COST AREA) ENG. DEV. (ED) RESEARCH & DEVELOPMENT

	FY75	<u>FY76</u>	76/77	FY77	<u>FY78</u>	TOTAL
1.14 Mfg.Proto *1.15 Other	227,123 -0- -0- -0- 49,492	544,062 -0- 383,853 -0- 120,116	129,902 200,501 -0- 263,333 99,365	588,205 1,304,787 -0- 526,667 <u>327,335</u>	-0- -0- -0- -0- -0-	1,489,292 1,505,288 383,853 790,000 596,308
FY Cost (Less G & A)	276,615	1,048,031	693,101	2,746,994	-0-	4,764,741
G & A (5%) FY-Cost Profit (9.3%)	290,446	1,100,433	727,756	2,884,344	-0-	5,002,978
FY-Total Price	317,457	1,202,773	795,437	3,152,588	-0-	5,468,255
1.2 In-House 1.21 Dev Eng 1.22 PEP 1.23 Tooling 1.24 Mfg. **1.25 Other	160,699 110,860 -0- -0- -0-	361,350 179,774 -0- -0- -0-	72,443 44,054 -0- -0- -0-	276,861 185,485 -0- -0- 138,738	-0- -0- -0- -0- -0-	871,353 520,173 -0- -0- 138,738
In-House Cost	271,559	541,124	116,497	601,084	-0-	1,530,264
Total Prog R & D		1,743,897	911,934	3,753,672	-0-	6,998,519
*Other/Contract Syst. Test & Evaluation Data Total Syst Mgt Training TOTAL	32,740 16,752	79,911 40,205 -0- -0- 120,116	99,365 -0- -0- -0- 99,365	236,449 -0- -0- 90,886 327,335	-0- -0- -0- -0- -0-	448,465 56,957 -0- <u>90,886</u> 596,308

**DT.OT (ARMCOM) \$23,123/MO,-I=4 months, -II=6 months

R&D

the second to be the second of the second second second second

BREAK DOWN OF "OTHER" EXPENSES SHOWN ON SPREAD SHEET (XM-235, LOW COST AREA)

	FY75	FY76	76/77	FY77	TOTAL
OTHER					
System Test & Evaluation	32,740	79,911	99,365	236,449	448,465
Data	23,732	33,225	-0-	-0-	56,957
Total Systems Management	-0-	-0-	-0-	-0-	-0-
Training	-0-		-0-	90,886	90,886
	56,472	113,136	99,365	327,335	596,308

R&D

.

1

「「「

ع 244

XM-235 (LOW COST AREA) CONTRACTOR MAN HOURS SUMMARY

ACTIVITY	FY75	<u>FY76</u>	76/77	<u>FY77</u>	TOTAL
A-2 Development Eng *PEP Material B-2 Tooling ** Other D.C.	11,850 -0- -0- -0- 1,067	28,430 -0- -0- 8,328 4,269	6,760 9,107.1 -0- -0- 1,067	28,760 63,263.4 -0- -0- 14,208	72,370.5 -0- 8,328
TOTAL HOURS	12,917	41,027	16,934.1	106,231.4	177,109.5
MAN YEAR (1800 HRS)	7.18	22.79	9.41	59.02	98.39
<pre>** O.D.C. D-3 Syst Test & Evaluation E-3 Data F-2 Total Syst Mgmt. E-4 Training</pre>	1,067 -0- -0-	4,269 (INCLUDED I -0- -0-	1,067 N DEV. ENG.) -0- -0-	9,353 -0- _4,855	15,756 -0- _4,855
TOTAL O.D.C.	1,067	4,269	1,067	14,208	20,611
*PEP A-3 PEP Dev.Eng. C-2 PEP Quality Control G-1 Indust. Facil. ODC-2 O.D.C.	-0- -0- -0- -0-	-0- -0- -0- -0-	7,701 -0- 149 1,257.1	30,802 26,837 596 5,028.4	38,503 26,837 745 6,285.5
TOTAL PEP	-0-	-0-	9,107.1	63,263.4	72,370.5

XM-235 CONTRACTOR MAN HOURS

The Street in and the allow allow and the second street with a street in the the second in the street was

1.

XM-235 IN-HOUSE MAN HOUR SUMMARY

ACTIVITY	<u>FY75</u>	<u>FY76</u>	76/77	FY77	FY78	TOTAL
FSD Engineering	9,867	22,500	4,350	14,700	-0-	51,426
PEP Engineering	5,625	8,250	2,100	8,400	-0-	24,375
Config. Control Board	1,200	2,880	720	2,880	-0-	7,680
TOTAL	16,701	33,630	7,170	25,980	-0-	83,481

XM-235 IN-HOUSE MAN HOURS

and the second
RATIONALE XM-235 IN-HOUSE FSD-ENGINEERING

RATIONALE: The XM-235 is judged to have 3 areas requiring major redesign, specifically:

(1) Magazine

(2) Bolt Assembly

(3) Feed Mechanism

The major FSD-Engineering effort to redesign these areas will be conducted in 5 months of FY75 and 12 months of FY76.

The fiscal transition period of 3 months, 76/77, and 12 months of FY77 will see finalization of design, testing, data acquisition, processing, and evaluation, and evaluation of proposed production related modifications in conjunction with the concurrent PEP effort.

One basic problem appears to exist in that the contractor must familiarize his personnel with an unknown weapon concept.

Second Ballin and Andrew Martin Provention

XM-235 IN-HOUSE FSD-ENGINEERING

The In-House FSD-Engineering Team Effort is summarized as follows:

	Grade		FY75 S		276 S	Uma	76/77 \$		2477
Project Eng	14	Hrs 750	9,435	Hrs 1800	22,644	Hrs 450	, 5,661	Hrs 900	\$ 11,322
Mech Eng	13	750	8,048	1800	19,314	300	3,219	1200	12,876
Mech Eng	12	1500	13,635	3600	32,724	900	8,181	1800	16,362
Mech Eng Tech	12	750	6,818	1800	16,362	300	2,727	1200	10,908
Q.A. Tech	11	750	5,722	1800	13,734	300	2,289	1200	9,156
Mech Eng Tech	9	750	4,748	1800	11,394	450	2,849	1200	7,596
Draftsman	7	750	3, 8 93	1800	9,342	300	1,557	1200	6,228
Draftsman	5	750	3,143	1800	7,542	300	1,257	120 0	5,028
Math Analyst	12	563	5,118	1350	12,272	300	2,727	1200	10,908
M Eng	12	563	5,118	1350	12,272	300	2,727	1200	10,908
Q.A. Eng	12	750	6 ,8 18	1200	10,908	225	2,046	1200	10,908
Q.A. Tech	12	750	6,818	1200	10,908	225	2,046	1200	10,908
Model Maker		500	3,815	1200	9,156	-0-	-0-	-0-	-0-
Direct Labor	FY75	9876	83,129						
	FY76			22500	188,572				
	76/77	7				4350	37,286		
	FY77							14700	123,108
Total Direct L Overhead (SD)	51,426 Ma	n hours	\$432,0	95			
	FY75		\$ 70,66						
	FY76 76/77	7	160,28 31,69						
	FY77		104,64						
Total Overhead	(FSD)		\$367,28	1					

1-H/2

1.00

7 248 :

(ALL CONTENDERS) FSD-ENGINEERING MATERIAL

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY75	5	x	\$100	\$ 500
FY76	12	x	\$100	1200
76/77	3	x	\$100	300
FY77	12	x	\$100	1200
TOTAL				\$3200

Other direct charges are covered in either FSD or PEP.

1-H/3

FSD - ENGINEERING - OTHER DIRECT COSTS

Rationale: Other Direct Costs are assumed to consist of Computer expense at \$600 per month and Travel Expense.

A. Computer Expense

FY75 FY	5 x \$600	\$3,000
FY76	12 x \$600	7,200
76/77	1 x \$600	1,800
F ¥77	12 x \$600	7.200
Total		\$19,200

B. Travel Expense

FY75	3,410
FY76	4,092
76/77	1,364
F Y77	40,711
Total	49,577

C. Total O.D.C./FY

D.

F Y75	6,410
FY76	11,292
76/77	3,164
FY77	47.911
Total O.D.C.	68,777

FSD-IN-HOUSE ENGINEERING-SUMMARY OF COSTS

P Y75	\$160,699
F Y76	361,350
76/77	72,443
FY77	276,861
Total	\$871,353

1-8/4

XM235 IN-HOUSE TRAVEL COSTS (LOW COST AREA)

.

Estimate of Travel Costs:

	<u>FY75</u>	<u>FY76</u>	76/77	<u>FY77</u>
Reviews at East Coast 3 days x 2 men x \$35/day Car rental 2 days - \$60/trip Air fare \$206 x 2 men	5 1050 300 2060	6 1260 360 2472	2 420 120 824	6 1260 360 2472
Support of APG Test (RDAT-DT-II) l Man x \$35/day Car rental @ \$30/day Air fare \$141/28 trips				275 days 9,625 8,250 3,948
Support Test Fort Benning (CT-II) l Man x \$35/day Car rental @ \$30/day Air fare \$141/18 trips)			180 days 6,300 5,400 3,096
Total/FY	3,410	4,092	1,364	40,711
Total ED Travel	\$49,577			

1-H/5

XM235 ENGINEERING SECTION FULL SCALE DEVELOPMENT

1. Introduction:

a. The Engineering Section is divided into four (4) parts:

(1) Engineering Direct Labor.

(2) Engineering Material.

(3) Engineering Overhead.

(4) Other Direct Charges to Engineering.

b. Each Engineering part consists of description of the items included and the rationale for including and evaluating each item.

c. The costs accrued in each part were developed among the weapon elements according to the percentage of peculiar parts of the weapon system which make up the weapon element. Thus for the XM235:

Weapon Element	Peculiar Parts	% Distribution
Receiver & Operating Group	95	61
Sarrel Assembly	5	3
Rear Sight	12	8
Magazine	8	5
Bipod	23	15
Sling	4	3
Maintenance Tools	8	5
Total	155	100

2. Rationale for Estimating Engineering Direct Labor Cost (FSDWEDL):

a. Total Engineering Direct Labor hours is the sum of two inputs.

(1) Engineering Direct Labor hours to accomplish the Engineering Tasks involved in finalizing the weapon design.

(2) Engineering Direct Labor hours to prepare the information required for Data Items.

A-1

252 '

b. The value for each Direct Labor hour is an average hourly rate applied to all man hours expended in the Engineering effort and was determined for each contractor in coordination with AMSWE-PPX in the following manner:

(1) Estimate the total Direct Labor hours required for each GovernmentGS grade.

(2) Multiply these totals by the respective step 5 hourly rate and add to get a total equivalent Government direct labor cost.

(3) Divide the total equivalent Government direct labor cost by the sum of the direct labor hours, regardless of grade, to obtain an average Government engineering hourly rate.

(4) Compare the average Government engineering hourly rate with the Step 5 hourly rates in the GS pay scale to determine the average grade level of skill employed.

(5) Compare the average grade level of skill with available information on the contractor's pay scale to estimate the average contractor's engineering hourly rate.

c. The average contractor's engineering hourly rate for the Contractor is computed to be \$4.16 per hour.

d. Engineering Direct Labor Hours and Costs for the Contractor by Fiscal Year are estimated to be:

Fiscal Year	D. L. Hours	D. L. Costs
75	11,850	49,236
76	28,430	118,269
76/77	6,760	28,122
77	28,760	119,641
Total	75,800	\$315,328

A-2

3. Rationale for Estimating Engineering Mate: ial Cosis (FSDWEMAT):

a. Engineering Materials are considered to consist of miscellaneous material used in performing the engineering effort for Full Scale Development. Layout paper, drafting supplies, bond paper, vellums, computer cards, and computer paper are typical major cost items in this category.

b. Engineering Material Costs are estimated to be:

FY75	275
FY76	660
FY76/77	160
FY77	660
Total	1.755

.

4. Rationale for Estimating Engineering Overhead (FSDWEOH):

a. Based on historical data and information available in the Contract Pricing Division, AMSWE-PPX, the Engineering Overhead Rate for the Contractor is estimated to be 350% of Engineering Direct Labor Cost.

b. Summary of Overhead costs is as follows:

Total	Overhead	FY75	172,536
Total	Overhead	FY76	413,941
Total	Overhead	76/77	98,426
Total	Overhead	FY77	418,745
Total	Overhead		1,103,648

A-3

5. Rationale for Estimating other Direct Charges to Engineering (FSDWEOT):

a. This category includes the cost of travel and charges for computer time during Full Scale Development.

(1) The estimated computer costs are for programming and exercising a dynamic model of the weapon, a heat transfer and stress analysis model of the barrel, and analysis of Maintainability and Reliability as follows:

FY75		2	,970		
FY76		7	,100		
76/77		1	.83 0		
FY77		7	,100		
Total	Computer C	ost 19	,000		
(2)	The estimate	e of travel	costs	ts as	follows:
I	FY75	2,046.00)		
1	FY76	4,092.00	ŧ.		
7	76/77	1,364.00)		

.

Supporting computations may be found under "Estimate of Travel Costs".

b. Other Direct Charges to Engineering are summarized as follows:

	<u>FY75</u>	FY76	76/77	FY77
Computer Time	2,970	7,100	1,830	7,100
Travel Costs	2,046	4,092	1,364	42,059
Total by FY	5,016	11,192	3,194	49,159
FY75	5,016			
FY 76	11,192			
76/77	3,194			
FY77	49,159			
Total O.D.C.	\$68,501			

A-4

Estimate of Travel Costs:

6.

	FY75	FY76	<u>76/77</u>	FY77	
Informal Reviews at Rock Island	3	6	2	6	
3 days x 2 men x \$35/day	630	1,260	420	1,260	
Car Rental 2 days - \$60/trip	180	360	120	360	
Air Fare \$206 x 2 men	1,236	2,472	824	2,472	
Support of APG Test (RDAT-DT II)				275 days	
1 Man x \$35/day				\$9,625	
Car Rental @ \$30/day				\$8,250	
Air Fare \$139/28 days				\$3,892	
Support Test Fort Benning (OT II)				180 days	
1 Man x \$35/day				\$6,300	
Car Rental x \$30/day				\$5,400	
Air Fare \$250/18 days				\$4,500	
TOTAL TRAVEL	\$2,046	\$4,092	\$1,364	\$42,059	

7. Total Development Engineering

FY75	\$227,123
FY76	544,062
7 6/77	129,902
FY77	588,205
TOTAL	\$1,489,292

the will be the think

and the second second second second second second

(LOW COST AREA) SUMMARY OF FSDW TOOLING COSTS ESTIMATED IN 1975 DOLLARS

FSDWTL -

「あるまただ」がおいていたので、「「「ない」」というない。

A CAR BERGER

The cost model symbol gives reference to the cost of tooling, gages and manufacturing aids required to produce FSD prototype weapons, supporting equipment, and repair parts. All costs occur in FY76.

B-1

(LOW COST AREA) FSD - TOOLING COST (LESS GSA) XM235 (155 UNIQUE PARTS, 967 OPERATIONS)

Tooling for 104 Prototype Guns consists of:

		Hours	Amount
Α.	Purchase Tooling (Vendor Price)		
	967 x \$112.48		\$108,768
Β.	Purchase Gages (Vendor Price)		
	967 x \$21.54		\$ 20,829
C.	Purchase Expendable Tooling (Vendor Price)		
	967 x \$40.80		\$ 39,454
D.	Manufacture - Jigs & Fixtures		
	D.L. Rate \$4.16/hr, O.H. Rate 350%	3361	\$ 62,918
Ε.	Manufacture - Gages		
	D.L. Rate \$4.16/hr, O.H. Rate 350%	230	\$ 4,306
	Subtotal		\$236,275
F.	Manufacture - Processing	2176	\$ 40,566
	D.L. Rate \$4.16 hr, O.H. Rate 350%		
G.	Tool & Gage Design		\$ 35,441
	(15% of Item A thru E above)		
Η.	Estimating of Tools	1452	\$ 27,182
	D.L. Rate \$4.16/hr, O.H. Rate 350%		
Ι.	Purchasing Effort (on A-E above)	1109	\$ 20,761
	D.L. Rate \$4.16/hr, O.H. Rate 350%		
J.	Tool & Gage Inspection		\$ 23,628
	(10% of Items A thru E above)		
	Total Tooling Cost		\$383,853 (FY76)
	Unit Cost (104 Weapons)		\$ 3,691
	B-2		

XM235 FSD FOOLING MANUFACTURING PROCESSING

Planning for manufacturing processes is estimated at 2 hours per machine operation. There are 907 machine operations giving:

967 <u>2</u> 1934 hours

An additional .25 hour is estimated for methods and standards work per operation giving:

967 <u>.25</u> 242 hours

Total

1934 hours 242 hours 2176 hours

TOOL DESIGN

It is estimated from M16 G.M. Hydromatic that 20% design to mfg. From G.E. (M61) approx. 34%.

It is estimated that 30% is fair and reasonable. In prototype most detailed design would not be made - use 15%.

ESTIMATING OF TOOLS

907 Operations with 3 tools per operation - 1 cutter 1 fixture 1 gage

967 32901 tools

It is estimated that .50 hr will be necessary for each tool.

2901 <u>.5</u> 1452 hours

B-3

XM235 TOOL & GAGE INSPECTION

It is estimated that 10% of the purchase price will be used for initial inspection of tools and gages, based upon ARMCOM QA experience.

PURCHASING

Total procurement actions For items purchased finished Total operations - 967 It is assumed that each operation will require: 1 cutter 1 fixture 1 gage Therefore 3 x 967 = 2901 items will be procured. 2 Items over \$3000 965 Items less than \$3000 Use same standards for purchasing as manufacturing. (965) (.5176 hrs) (150%) = 750 hours (2) (17.223 hrs) (150%) = 52 hours 802 hours For Items manufactured - Manufacturing hours - 3591 Relationship to mfg to purchased - 38.3% Procurement hours for manufactured items - (802) (38.3%) = 307 hours Total procurement effort - Mfg 307 hours 802 hours Purchased 1109 hours

5

PROTOTYPE COSTS

XM235

Based on experience in manufacturing components for 18 Validation Phase weapons at the Naval Air Rework Facility (NARF), Pensacola, Florida, the four weapons required for RDAT are estimated to cost \$10,000 each. The 100 weapons for DT-II/OT-II are estimated to cost \$7,500 each.

Manufacturing elapsed time is estimated at 7 months from 1 July 1976 for four RDAT weapons and 9 months from 1 July 1976 for the remaining 100 weapons. The reporting periods are three months in the 76/77 period and six months in FY77 period.

The prototype manufacturing effort continues over a three month period in 76/77 and a six months period in FY77. The cost is assumed to be distributed in proportion to the time of effort.

RDAT W	eapons		4 x	\$10,000	\$ 40,000
DT/OT	II Wea	pons	s 100	x \$7,500	750,000
Total	Protot	уре	Weapons	Cost	\$790,000
76/77	3/9	x	790, 000	=	\$263,333
FY77	6/9	x	790,000	3	\$526,667

C-1

SYSTEM TEST AND EVALUATION SECTION

FULL SCALE DEVELOPMENT

FSDWTE

1. Introduction

a. The figures below represent an estimate of the contractor's cost to conduct System Test and Evaluation.

b. For computational purposes, the Total System Test and Evaluation activity was divided into three parts as follows:

Part I - Acceptance Testing of the Prototype Weapons

Part II - Research and Development Acceptance Test (RDAT)

Part III - Preliminary Testing

c. The following were not included as part of this estimate:

(1) Weapons, spare barrels, and spare parts. These are included in the Prototype Cost, as other Direct Costs.

(2) Amnunition (MUCOM Item)

(3) Range utilization/rental costs, if required. This item was not included due to lack of supporting information as to where and under what arrangement the contractor will conduct testing.

(4) Shipping/transportation costs of materiel/personnel to various test sites, if required. It is assumed that testing would be within close proximity of the contractor's plant.

d. The same direct labor (time) and materials estimate was used for all three contractors. This is considered a reasonable assumption, since

D - 1

the test requirements are the same. Thus, differences in the cost estimates are the result of the various contractors' equivalent hourly rates and overhead figures. Contractor hourly rates and overhead were obtained from audited historical data.

2.	Summary of Costs	TOTAL
	Part I - Acceptance Testing	\$103,874
	Part II - RDAT	\$212,016
	Part III - Preliminary Testing	\$132,625

TOTAL - Weapon System Test and	
Evaluation Cost (FSDWTE)	\$448,515

D-2

3. Breakdown by Parts

Part I - Acceptance Testing	FY75	FY76	76/77	FY77	TOTAL
Direct Labor (2950 hrs)	-0-	-0-	-0-	12,272	12,272
Materials	-0-	-0-	-0-	48,650	48,650
Overhead	-0-	-0-	-0-	42,952	42,952
Total				103,874	103,874

Part II - RDAT

Direct Labor (6403 hrs)	-0-	-0-	-0-	26,637	26,637
Materials Ove	-0-	-0-	79,391	12,760	92,151
Overhead	-0-	-0-	-0-	93,228	93,228
Total	-0-	-0-	79,391	132,625	212,016

**Part III - Prelim. Tstg.

Direct Labor (6403 hrs)	4,440	17,758	4,439	-0-	26,637
Material	12,760	-0-	-0-	-0-	12,760
Overhead	15,540	62,153	15,535	-0-	93,228
Total	32,740	79,911	19,974	-0-	132,625

- * Direct Labor Rate = \$4.16/hr
 - 0verhead = 350%

****** Preliminary Testing Period - May 1975 through Oct 1976

D - 3

Total Systems Management Section

The overall systems management team to be employed by the Contractor is considered to be a staff function that is responsible for the Contractor's overall program and execution.

Contractorspersonnel on the management team are not included in the functional areas (i.e., engineering, manufacturing, testing, etc.). Instead because of the relatively small size of the company management team personnel are included in overhead and/or GSA. Thus there is no entry under cost of Total Systems Management.

These conclusions were determined from discussions with AMSWE-PPX.

F-1

DATA SECTION

FULL SCALE DEVELOPMENT

1. Introduction:

a. This section summarizes the costs for the FSD Data Items. The section contains a List of FSD Data Items and their costs. These costs make up the totals which are entered under DATA in the FSD Cost Model. The costs for the Functional Direct Labor hours are accounted for in the respective Direct Labor sections for Engineering and Training.

b. The Data Items for the Technical Data Package (TDP) are accounted for in the PEP Program and are so noted on the list of the Data Costs for each Data Item. The TDP Data Items which are started in FSD and continued in PEP are also noted in the list for cross reference and continuity.

c. The section also contains a Data Related Cost Summary for information on the total cost related to data items.

Tokani Balins P. S. C. Satisfic States

2. DATA RELATED COST SUMMARY

a. Direct Labor plus Overhead to prepare FSD Data Items is carried under the following categories and totals as follows:

Category

1

ć

(

Engineering hours	29,800
Training hours	3,207
Engineering Cost	557 ,856
Training Cost	60,035
Total \$/FY	617,891
b. Data Cost	56,957
a + b	674,848

- c. Total Data Related Cost FSD = \$674,848 (MM)
- NOTE: Engineering and Training Hourly Rate = \$4.16 + 350% Overhead = \$4.16 + \$14.56 = \$18.72/hour
 - c. Data Cost by Fiscal Year:
 - FY75 5/17 x 26,957 =\$16,752
 - FY76 12/17 x 56,957 =\$40,205

E-2

3. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE ENGINEERING

DATA ITEMS

List of Engineerir 🦾 👘 Item Numbers

<u>B#</u>	DI#	B#	<u>DI#</u>
B# 01 02 03 04 05 06 08 10 11 12 13 14 15 16 17 18 18 19 25 26 27 29 30	DI# DI-A-16.44 (MOD) DI-E-1100 (MOD) DI-E-1101A DI-E-1103A DI-E-1105 DI-E-1107 DI-E-1107 DI-E-1116 DI-E-1117 DI-E-1118 (MOD) DI-E-1128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI-E-128 DI	32 37 38 39 40 41 42 44 5: 52 53 54 55 56 57 58 59 60 61 62 63 64 65	DI -H-1329A DI -M-1501 (MOD) DI-M-1502 DI-M-1505 DI-M-1505 DI-M-1510 DI-P-1600 DI-R-1710 (MOD) DI-R-1730 (MOD) DI-R-1731 (MOD) DI-R-1733 (MOD) DI-R-1734 (MOD) DI-R-1735 (MOD) DI-R-1740 (MOD) DI-R-1740 (MOD) DI-R-1750 (MOD) DI-R-1750 (MOD) DI-S-1804A DI-S-1812 DI-S-1818 (MOD) DI-S-1819 (MOD) DI-S-1873 (MOD) DI-S-1804 (MOD) DI-S-1819 (MOD) DI-S-1819 (MOD) DI-S-1873 (MOD) DI-S-1874 (MOD)
31	DI-H-1327A (MOD)	66 67	DI-T-XXX1 (NEW) DI-V-1950 (MOD)

Direct Labor Hours = 29,800

NOTE: These direct labor hours are included under Engineering.

E-3

4. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE TRAINING DATA ITEMS

List of Training Data Items

ŧ

(

<u>B#</u>	DI#
20	DI-H-1300 (MOD)
21	DI-H-1302
22	DI-H-1304
23	DI-H-1308
24	DI-H-1310
Direct	Labor hours = 3,207

NOTE: These direct labor hours are included under Training.

E-4

SUMMARY OF COSTS - DATA ITEM CALL ITEMS - FSD

	<u>B No.</u>	Data Item No.	Data Item Title			
	01	DI-A-1014A(MOD)	PERT		557	
	02	DI-E-1100(MOD)	Configuration Management Plan		246	
	03	DI-E-1101A	Configuration Stat Acct & Engr Record		507	
	04	DI-E-1103A	Engineer Release Record	FSD/PEP	1620	
	05	DI-E-1104	Specifications	FSD/PEP	91	
	06	DI-E-1105	Characteristics & Description Book		168	
	07	DI-E-1106	Specs, Standards, Appl. List	PEP	0	
	08	EI-E-1107	Drawing Custodianship List	FSD/PEP	30	
	09	EI-E-1115A(MOD)	Technical Data Package	PEP	0	
	10	DI-E-1116	Stdz Comp & Select Control	FSD/PEP	58	
;	I	DI-E-1117	Stdz Report of Common Items	PEP	0	
	12	DI-E-1118(MOD)	Drawings, Engr & Assoc Lists	FSD/PEP	645	
	13	DI-E-1119(MOD)	Environmental Criteria Report		3172	
	14	DI-E-1128	Electromagnetic Interference Control Plan		84	
	15	(X)DI-E-11XX(MOD)	Interface Control Doc. for VRFWS		311	
	16	DI-E-XXX1	Dynamic Mathematical Model		288	
	17	DI-F-6000	Cost performance report		353	
	18	DI-F-6001(MOD)	Procurement Info Functional Cost- Hour Report		5	
	18A	DI-F-XXX1	Model for Eval of Design-To Unit Production Cost		29	
	19	DI-F-6004	Contract Funds Status Report		22	
	20	EI-H-1300(MOD)	Personnel & Training Requirements		150	

E-5

and the second the line of the second

1

water is bout the day is

270 ²8

SUMMARY OF COSTS - DATA CALL ITEMS - FSD (Continued)

(

Part Contest

	<u>B No.</u>	Data Item No.	Data Item Title	
*	21	DI-H-1320	New Equipment Training Plan	0
	22	DI-H-1304	New Equipment Training Courses	1350
٠	23	DI-H-1308	Training Course Reports	0
	24	DI-H-1310	Graphic Aids	31444
	25	DI-H-1312	Human Factors Engr Plan	53
	26	DI-H-1314	Human Factors Engr Progress Rpt	179
	27	DI-H-1315	Human Factors Engr Final Report	59 .
	28	DI-H-1321A	Explosive Hazard Class. Data	See Ammo
	29	DI-H-1322A(MOD)	Safety Statement	77
ī	зÛ	DI-H-1326A	Safety Anal. & Hazard Eval Rpts	212
ſ	51	DI-H-1327A(MOD)	Surface Danger Area Data	68
	32	DI-H-1329A	Accident/Incident Report	20
	33	DI-H-1330(MOD)	Facilities Safety Data	0
	- 34	DI-L-1407(MOD)	Preservation & Packaging Data	PEP
	35	DI-L-1410	Ammunition Data Cards	Алто
	36	DI-M-1500(MOD)	Firing Table Manuscript	Ammo
	37	DI-M-1501(MOD)	Validation Plan for Equip. Publication	s 1
	38	DI-M-1502(MOD)	Equipment Publications	1176
	39	DI-M-1502(MOD)	Equipment Publications	Included in B038
	40	DI-M-1505(MOD)	Equip. Pub. Progress/Cost Reports	38
	41	DI-M-1510	Maintenance Allocation Chart	11
	42	DI-P-1600	Value Engr Data Report	135
(3	DI-P-1602	Value Engr Plan	No Cost Plan is prepared and paid for in Contractor's Proposal.

E-6

The man have been and the

٠

(SUMM	MARY OF COSTS - DATA CALL ITEMS - FSD (Continued)	
<u>B No.</u>	Data Item No.	Data Item Title	
44	DI-R-1710(MOD)	Quality Program Plan	128
45	DI-R-1711(MOD)	Qual Engrg Acc Insp Req & Equip List	PEP
46	DI-R-1712(MOD)	Quality Engrg Supp QA Provision	PEP
47			PEP
48			PEP
49	DI-R-1717	Qual Engr Calibration Program Data	PEP
50	DI-R-1722(MOD)	Qual Insp Pamphlet	PEP
51	DI-R-1730(MOD)	Reliability Program Plan	17
52	DI-R-1731(MOD)	Reliability Reports	67
53	DI-R-1733(MOD)	Reliability Qualified Items List	3
54	DI-R-1734(MOD)	Rel Fail Modes Effects & Crit Anal Rpts	21
i Lu	DI-R-1735(MOD)	Rel Failed Item Analysis Report	114
56	DI-R-1740(MOD)	Maintainability Program Plan	17
57	DI-R-1741(MOD)	Maintainability Reports	20
<u>.</u> 58	DI-R-1750(MOD)	Assessment Program Plan	7
59	DI-S-1800(MOD)	Technical Reports	1179
60	DI-S-1804A	Corrosion Prevention & Matl Deterioration	49
61	DI-S-1812	Rpts and/or Studies Maintenance Engr Des Discrepancy Report	34
62	DI-S-1818(MOD)	Maintenance Engr Analysis	380
63	DI-S-1819(MOD)	Contractor Recommended Support Plan	31
64	(X)DI-S-18XX(MOD)	Support Model Data	. 6
65	DI-T-1906(MOD)	Test & Demonstration Reports	1105
66	DI-T-XXX1 (New)	R&D Acceptance Test Plan	25
<u>!</u>	DI-V-1950(MOD)	Provisioning Requirements for US Army Eq.	581
68	DI-V-1951(MOD)	Federal Item Identification Data	No Contractor
Total co	nverted to FY75 Doll	lars \$48,268 x 1.18 = $\frac{56,957}{5.7}$	Performance Reqd TOTAL \$48,268 272 30

(Th)

a a second and the second and the wide him hill and a second to be and the second and the second and the second

IN-HOUSE TASKS

PEP RELATED

The major areas of In-House Direction and Support effort required during the PEP period are:

1. Producibility Engineering and Planning Studies.

2. Product Engineering Studies including Tolerance/Dimension Studies.

3. Engineering effort to prepare the Technical Data Package Data Call Items.

4. Engineering effort to enhance Reliability and Maintainability . Engineering activities.

Configuration Management will be monitored in detail through acceptance testing.

Starting with RDT, Configuration Management will revert entirely to the Government as an In-House Task requiring effort as follows:

1. Prepare a Configuration Plan.

ŧ

2. Update the Configuration Plan as required.

3. Review Engineering Change Proposals (ECPs):

a. Failure Related.

b. Production Related.

Other specific In-House Task areas are:

Review/monitor and direct Contractor and In-House conducted
 Producibility Engineering and Planning studies as follows:

a. Review each part/drawing.

b. Review Contractor Draft Process Sheets.

1-H/1 PEP

- c. Review unique processing operations.
- d. Review current and proposed processing capabilities.
- e. Review difficult/uneconomical manufactured items and recommended actions.
- f. Review Contractor PEP reports.

2. Review, monitor and direct Contractor and In-House conducted Production Engineering and Tolerance/Dimension Studies as follows:

- a. Review components/drawings.
- b. Maintain conformity to Military Standards as specification as applicable.
- c. Review Contractor and In-House conducted redesign efforts.
- d. Review and prepare reports.

and the second secon

- e. Analyze available data and identify/approve areas for in-house or by contractor.
- f. Conduct and/or monitor tolerance/dimension studies.
- g. Review revisions and related reports.
- h. Maintain liaison with contractor project related supervision personnel.

3. Maintain cognizance of current and proposed manufacturing processes and procedures.

1-H/2 PEP

(ALL CONTENDERS) IN-HOUSE PEP-ENGINEERING

The In-House PEP Engineering team effort is summarized as follows:

1

ž

ĺ

		F	'Y75	1	'Y76		76/77		FY77
Title	Grade	Hrs	\$	Hrs	\$	Hrs	\$	Hrs	\$
Project Eng	14	750	9,435	900	11,324	225	2,831	900	11,324
Mech Eng	13	750	8,048	750	8,048	450	4,829	1800	19,316
Mech Eng	12	750	6,818	600	5,454	150	1,364	600	5,454
Mech Tech	11	375	2,861	600	4,578	150	1,145	600	4,578
Mech Tech	9	375	2,374	600	3,798	150	950	600	3,798
Draftsman	7	750	3,893	600	3,114	150	779	600	3,114
Draftsman	5	750	3,143	1800	7,542	450	629	1800	7,542
Math Analyst	12	375	3,409	600	5,454	150	1,364	600	5,454
AM Eng	12	750	6,818	1800	16,362	225	2,046	900	8,181
1	FY75 FY76 76/77 FY77	5,625	46,7 9 9	8250	65,674	2100	15,937	8400	66,761
Total Direct	Labor	(PEP)	24,375 M	an Hours	\$197 ,17 1				
Overhead (85%)									
	FY75 FY76		\$39,779						
	76/77		55,823 13,547						
	FY77		58,447						
Total Overhead (PEP) \$167,596									

1-H/3 PEP

:

;

L

(ALL CONTENDERS) IN-HOUSE PEP SUMMARY

٠

4

		<u>FY75</u>	<u>FY76</u>	76/77	FY77	TOTAL
Α.	Engineering					
	Direct Labor	46,799	65,674	15,937	68,761	197,171
	Material(\$75/Mo)	375	900	225	900	2,400
	Overhead	39,779	55,823	13,547	58,447	167,596
	Other D.C. (In- cluded in FSD)			_	-	
	Total A	86,953	122.397	29,709	128,108	\$367,167
в.	Configuration Con	trol Board	l			
	Direct Labor	12,720	30,528	7,633	30,528	81,409
	Material(\$75/Mo)	375	900	225	900	2,400
	Overhead (85%)	10,812	25,949	6,487	25,949	69,197
	Other D.C. (In- cluded in FSD)				-	-
·	Total B	23,907	57,377	14,345	57,377	\$153,006
	A plus B	110,860	179,774	44,054	185,485	
то	TAL IN-HOUSE PEP C	COST				\$520,173
		PEP ENGI	NEERING	24,375 Hrs.		
		C.C. Boa	rd	7,680 Hrs.		

TOTAL MAN HOURS 32,055 Hrs.

276 *34*

5

1-H/4 PEP

(ALL CONTENDERS) IN-HOUSE CONFIGURATION CONTROL BOARD

Control of Configuration Management will be assumed by the Government.

A Configuration Control Board (CCB) will be established and will exercise its authority throughout the FSD period and potentially continue in the same manner but at somewhat diminished levels of effort through the Limited Production period and the Full Scale Production period.

During the FSD period from 1 February 1975 to 1 October 1977 (32 months) the CCB will utilize of the following people to the extent indicated:

Title	rade	Hours	<u>\$DL</u>	\$0verhead
40% Configuration Mgr 40% Engineer 20% Procurement	14 13	1920 1920	24,154 20,602	20,531 17,511
Specialist 20% W.A. Engineer	13	960	10,301	8,756
(Gages & SQAPS) 20% Maintenance	13	960	10,301	8,756
Specialist	12	960	8,726	7,417
20% Supply Specialist	11	960	7,325	6,226
	TOTAL	7,680	\$81,409	\$69,197
These expenses occur as	follows	: FY75	12,720	10,812
		FY76	30,528	25,949
		76/77	7,633	6,487
		FY77	30,528	25,949

1

1-H/5 PEP

SAW WEAPON XM-235 (LOW COST AREA) PRODUCIBILITY ENGINEERING & PLANNING SEP/OCT 74

COST CATEGORIES AND ELEMENTS						
DEVELOPMENT-PEP	PEP TOTAL	FY75	FY76	76/77	TOTAL	
A. Engineering Direct Labor Material Overhead Other O.C.	841,864 160,173 150 560,604 120,937	-0-	-0-	168,373	673,491	
B. Tooling(Software)	139,248	-0-	-0-	27,850	111,398	
C. Quality Control	502 ,788	-0-	-0-	-0-	502,788	
D. System Test & Evaluation	-0-	-0-	-0-	-0-	-0-	
E. Data	7,441	-0-	-0-	1,488	5,953	
F. Total Systems Mgt	0-	-0-	-0-	-0-	-0-	
G. Industrial Facilities	13,947	-0-	-0-	2,790	11,157	
H. Training	-0-	-0-	-0-	-0-	-0-	
I. Miscellaneous	-0-	-0-	-0-	-0-	-0-	
TOTAL COST	1,505,288	-0-	-0-	200,501	1,304,787	

PEP

36 278

ACTIVATION AND CONSIGNATION

Rationale:

The Contractor PEP effort is estimated to address the following areas:

a. Producibility Engineering and Planning Studies.

b. Product Engineering and Tolerance Studies.

Tasks are identified in each area, required manhours are estimated for each task and the total estimated manhours determined. These manhours are multiplied by appropriate labor and overhead rates to obtain total values for Direct Labor and Overhead, \$150 is estimated for Materials and these values of Direct Labor, Overhead, and Material cost are added to Other Direct Costs which are defined in a separate section.

The total thus obtained is distributed 1/5 in FY76/77 and 4/5 in FY77.

A-1 PEP

CONTRACTOR DEVELOPMENT ENG PEP

A. Producibility Engineering and Planning Studies:

	TASK	MANHOURS	
1.	Review Part Drawings	2058	
2.	Prepare Draft Process Sheets	5143	
3.	Determine Unique Operations	176	
4.	Conduct Process Capabilities Study	2788	
5.	Determine Difficult Items and Make		
	Recommendations	1394	
6.	Prepare Reports	41	
7.	Maintain Supervision	4752	
	TOTAL "A"	16352 hou:	rs

B. Product Engineering and Tolerance Studies:

1.		461	
2.	Review Mil. Standards & Specs.	216	
3.	Select and Conduct Redesign	2979	
4.	Prepare Reports	40	
5.	Review Data/Identify Areas for Study	481	
6.	Conduct Tolerance/Dimension Study	2676	
7.	Determine Revisions and Prepare Report	556	
8.	Maintain Supervision	4752	
	TOTAL "B"	12161	hours

TOTAL MANHOURS (A & B)

28,513

A-2 PEP

280 **38**

SAW-XM-235 (LOW COST AREA) CONTRACTOR DEVELOPMENT ENG PEP

Total ManHours (A&B) Data Item ManHours Total ManHours	\$ 28,513 hrs 9,990 hrs 38,503
Direct Labor Rate Direct Labor Cost Overhead Rate 350% Overhead Cost	\$4.16/hr \$160,172.48 \$560,603.68
Engineering Cost Summary	
Direct Labor Material Overhead O.D.C. Total Engineering	\$160,173 150 560,604 <u>120,937</u> \$841,864
FY-76/77 \$841,864 x 1/5	\$168,373
FY-77 \$841,864 x 4/5	\$673,491

A-3 PEP

K

OTHER DIRECT COSTS CONTRACTOR PRODUCIBILITY ENGINEERING & PLANNING (PEP)

RATIONALE: Other Direct Costs are assumed to consist of three (3) categories:

- a. Manufacturing Processing Engineering
- b. Travel
- c. Reproduction Costs
 - (1) PEP Studies
 - (2) Product Engineering and Tolerance Studies

ODC/-1 PEP

XM-235 (LOW COST AREA) OTHER DIRECT COSTS CONTRACTOR PEP

A. Manufacturing Process Engineering is the Engineering effort to prepare and process routing sheets and other documentation defining in detail the manufacturing processes to be used for each component.

Estimated manufacturi Estimated Eng Hrs per Direct Labor Rate Overhead		967 6.5 hrs \$4.16/hr 350%
Required ManHrs. Direct Labor Overhead Total M.P.E.	967x6.5 6285.5 x \$4.16 \$27,136 x 3.50	6285.5 \$26,147.68 91,516.83 \$117,664.56

B. O.D.C. Travel

1

Estimated travel consists of 2 trips to RIA by 1 man in FY77 at 2 x \$449 = \$898, plus 2 trips by 2 men at \$847 per trip (1 trip in FY76/77 and 1 trip in FY77.

	76/77	FY77	TOTAL
l man trip		\$895	
2 man trip	\$847	\$847	
Total Travel	\$847	\$1745	\$2592

ODC/-2 PEP

XM-235 (LOW COST AREA) OTHER DIRECT COSTS CONTRACTOR PEP

C. Reproduction

3

and the second

1) Estimated for Producibility Engineering & Planning Studies:

		76/77		<u>FY77</u>	TOTAL
	\$165.00 X (1.24)	\$40.92		\$163.68	\$204.60
2)	Estimated for Product	Engineering	and	Tolerance	Studies:
	\$369.90 X (1.24)	\$136.03		\$544.13	\$680.16

O.D.C. SUMMARY

1

		76/77	<u>FY77</u>	TOTAL
				7
Total	M.P.E.			\$117,664.56
Total	Travel			2,592.00
Total	Reproduction			680.16
Total	0.D.C.			\$120,936.72

ODC/-3 PEP

Tooling Section (Software)

Costs are incurred during design of special purpose production equipment and tooling to achieve quantity production. Based on past experience it is estimated that 35% of the initial tooling cost is used for design.

All design costs are shown against the weapon.

On the basis of past estimates for automatic weapons an average tooling cost of \$400 per operation is applied to cover the cost of Purchased Tooling, Purchased Gages, Expendable Tooling, Jigs and Fixtures, and Gages.

The corresponding Design Cost is thus estimated at .35 x \$400 = \$144 per operation.

No. Ope	eration	ns x \$144	76/77	<u>FY77</u>
XM235	967	\$139,248	\$27,850	\$111,398

QUALITY CONTROL SECTION

The estimates contained herein for Ouality Control are for the Quality Documentation that is part of the Technical Data Package. In addition, estimated hours for Ouality Control Engineering Supervisor are included at the rate of 160 hours per month for 11 months. The man hours estimated for the preparation of Ouality Control Documentation are based on similar work performed by ARMCOM personnel.

Rationale is derived from a similar study performed on proposed Bushmaster weapons. The following Data Items are involved:

DI-E-1104*

「「「「「「「」」

DI-E-1118 (Mod)*

DI-R-1711 (Mod)

DI-R-1712 (Mod)

DI-R-1722 (Mod)

* In addition to Quality Control, there are man hours for these Data Items in the Engineering Section.

During the PEP Program, it is estimated all Q. C. software efforts will be accomplished in FY77.

C-1 PEP

SUMMARY OF MAN HOURS

GS-13	Supervisor	1,760
GS-12	Engineer	790
GS-11	Specialist Gage Designer/Checker	16,434
GS-09	Tech Writer, Illustrator	6,968
GS-05	Document Control Clerk	885
		26.837

SUMMARY OF COSTS (LOW COST AREA)

Direct Labor Costs	26,837
Hourly Rate	4.16
Total D.L. Cost	111,642
Overhead (350%)	390,747
Material	400
Total Q.C. Cost	502,789

1

ł

C-2 PEP

DATA SECTION *

PEPWD

1. This section includes the rationale and a summary of direct labor manhours and costs for material and reproduction for each Data Call Item considered a part of the total Technical Data Package (TDP).

2. The summary of direct labor man hours for Engineering Data Items is incorporated in the Engineering Section under Data Items. The summary of direct labor man hours for Quality Control Data Items is incorporated in the Quality Control Section under Data Items. Data Call Items DI-E-1104 and DI-E-1118(MOD), which require both Engineering and Quality Control documentation, have separate summaries and rationale contained in this section.

3. The material costs for preparation of the Data Items include the costs of standard forms, such as drawings, supplementary quality assurance provisions, and packaging data sheets. These costs are summarized and shown in their respective functional areas.

4. A summary of Data Costs for all TDP related Data Items is included in this section and entered under Data in the Cost Model.

*Data Section Meets Requirements of the Following:

- 1. AR700-51
- 2. DOD Instruction DODO-5010,12
- 3. TD-3 Listing of DOD Data Items

E1-PEP

DATA SECTION

- 5. DATA RELATED COST SUMMARY
 - a. Cost of Direct Labor plus Overhead to prepare data items is as follows: <u>Category</u>

Engineering Direct Labor (Manhours)	9,990
Quality Control Direct Labor (Manhours)	26,837
Engineering Cost*	187,013
Quality Control Cost*	502,389
Total Direct Labor & Overhead	689,402

- b. Data Cost 7,441
- c. Total Related Data Cost PEP (a + b) 696,843

* Hourly rate = \$4.16 + 350% overhead = 18.72/hour

E2-PEP

,

SUMMARY OF DATA COSTS-PEP PROGRAM

THE .

<u>B. No.</u>	<u>Data Item No.</u>	<u>Data Item Title</u>	
0004	*DI-E-1103A	Engrg Release Record	\$ 203
0005	*DI-E-1104(QC)	Specifications	39
0005	*DI-E-1104(ENGR)	Specifications	93
0007	DI-E-1106	Specs, Stds, Application List	44
0008	*DI-E-1107	Drawing Custodianship List	68
0009	DI-E-1115A(MOD)	Technical Data Package	
010	*DI-E-1116	Standardization, Components, and Selection Control	6
011	DI-E-1117	Standardization-Report of Common Items	6
012	*DI-E-1118(MOD)(QC) Drawings, Engrg, and Associated Lists	4,130
012	*DI-E-1118(MOD) (ENGR)	Drawings, Engrg, and Associated Lists	1,348
034	DI-L-1407(MOD)	Preservation and Packaging Data	307
045	DI-R-1711(MOD)	Quality Engrg Acc Insp Req & Eq	79
046	DI-R-1712(MOD)	Qual Engrg Supp QA Provisions	766
049	DI-R-1717	Qual Engrg Calibration Prog Data	22
050	DR-R-1722(MOD)	Qual Insp Pamphlet	330
		GRAND TOTAL DATA COST	\$7,441
		76/77 DATA COST	1,488
		FY77 DATA COST	5,953

* Started during FSD Phase; continued during PEP Program.

E3-PEP

SUMMARY OF DIRECT LABOR MANHOURS FOR ENGRE DATA ITEMS

Data Item No.	Totals
DI-E-1107	2
DI-E-1118(MOD)	1372
Totals	
DI-E-1103A	165
DI-E-1104	1676
DI-E-1106	28
DI-E-1107	10
DI-E-1115A(MOD)	96
DI-E-1116	73
DI-E-1117	5
DI-E-1118(MOD)	5487
DI-E-1407(MOD)	<u>1076</u>
Totals	9,990

.

Note: Totals are included in Direct Labor in Engineering Section

E4-PEP

SUMMARY OF QUALITY	CONTROL DI	RECT LABOR FOR	DATA ITEMS	(MANHOURS)
<u>Data Item</u>	<u>GS-12</u>	<u>GS-11</u>	<u>GS-9</u>	GS-5
DI-E-1104	390	-	-	22
DI-E-1118(MOD)	-	14000	-	-
DI-R-1711(MOD)	60	355	-	60
DI-R-1712(MOD)	-	1914	348	348
DI-R-1717	340	165	-	75
DI-R-1722(MOD)	<u>-</u>	-	6620	<u>380</u>
Totals	790	16,434	6,968	885

NOTE: Totals are included in Direct Labor in Quality Control Section. Grand Total manhours - 25,077 + 1,760 (GS-13 Supervisor) = 26,837

INDUSTRIAL FACILITIES SECTION (LOW COST AREA)

教授

The estimate is based on the assumption that the contractor has a suitable plant site available for production of the components.

The design and layout of the plant equipment is based on the manufacturing process. Utilization of equipment is on the basis of 80% of the total machine time available. For the conventional machines a 1-2-5 shift is proposed through the first six months and 2-8-5 for the remainder of the program. For the N/C equipment a 1-8-5 shift is proposed through the first 6 months and 3-8-5 shift for the remainder of the program.

The cost of the plans and layouts for this phase is estimated as follows, and will be accomplished during 76/77 and FY77.

Design and layout including electrical, plumbing, sheet metal, air, etc. for space allocation to machining, assembly, bench work and storage of tools and equipment is estimated to require 225 hours for the entire layout of 37,912 square feet.

Preparation of specifications for the procurement of new equipment and bills of materials required for installation of machines, air lines, etc. is estimated to require 520 hours.

Rates used are based on 4.16 per hour rate for design and layout work was escalated by 350% for overhead to 18.72 per hour. Therefore the 745 hour total computes to 13,946.40.

Area required for production approximates 37,912 square feet to be allocated as follows:

Production area, machining	26, 584
Assembly, deburring and bench area	1,244
Tool and gage maintenance	1,000
Receiving	800
Packaging and shipping	1,000
Bonded storage	500

G-1 PEP

Tool storage	900
Final inspection	2,000
Administration	1,500
Metrology lab	384
Tool Room	2,000
Total Area Required	37,912

開リローの

ç

It is assumed that chrome plating and surface finishing will be vendor purchased.

	TOTAL	76/77	FY77
Labor Cost	3,099.20	619.84	2,479.36
Overhead Cost	10,847.20	2,169.44	8,677.76
Total Cost	13,946.40	2,789.28	11,157.12

NUMBER II-D

BASIC ESTIMATED COST PACKAGE ENGINEERING DEVELOPMENT XM235 CONTRACTED IN HIGH COST AREA IN 6.0MM INDEPENDENT GOVERNMENT COST ESTIMATE -- RESEARCH AND DEVELOPMENT (AMCR 7/5-22) HIGH COST AREA CONTRACT

1. PREPARING INSTALLATION

	SARRI-LS-C						
2. SUPPLIES OR SERVICES TO BE PROCURED 3. QUANTITY							
ХМ23	5 High Cost A		NA				
	TEM(S) SUPPORTED			B. WORK BRE	AKDOWN 6. 1 E LEVEL	STIMATE PREPARED	
	Squad Automa	atic Weapon	System	4	30	November 1974	
	RESEARCH AND DEVELOPMENT			COST	REFE	RENCE	
. 🗆 🛸	a para da serie de la companya de la		9	10			
	7		RATE	ESTIMATE			
- co	ST CATEGORIES	HOURS	HATE	1 1			
	ENGINEERING	195,941.5		1,546,832			
- L	DIRECT LABOR	195,941.5		·····			
	MATERIAL		110%	+			
- 3	OTHER		<u>+ + 0 0</u>				
	TOOLING		*********************	389,944			
<u>0</u> -	DIRECT LABOR		<u></u>				
2	MATERIAL						
3	OVERHEAD		-				
4	OTHER						
<u>c</u> :	PROTOTYPE PRODUC	TION		790,000			
D.	SYSTEM TEST AND EV	ALUATION		458,631			
€ -	DATA			56,957			
F -	TOTAL SYSTEMS MAN	AGEMENT		553,574			
G .	CONSTRUCTION		a la casa a	-0-			
н	TRAINING			94,002			
	OTHER (Specity)	PEP	- 1i	1,551,750			
	TOTAL COST LESS (G	24.68		5,441,690			
_K	G AND A	24.06		6,780,345			
L .	PROFIT OR FEE	9.1%		1011013421			
	TOTAL PRICE	9.10		7,397,357			
FIMARK				· • • • • • • • • • • • • • • • • • • •			
12.				·	T	1	
	ED NAME AND TITLE		SIGN	ATURE	EXTENSION	DATE	
. PREP	ARING OFFICIAL						
	F. SCHWEGLER				4055	20 11-1 74	
	anical Engine	.er			4255	30 Nov 74	
S. REV	IEWING OFFICIAL						
C. APP	ROVING OFFICIAL						

AMC FORM 10110-2

INDEPENDENT GOVERNMENT COST ESTIMATE -- RESEARCH AND DEVELOPMENT

(AMCR 715-22) IN-HOUSE SUPPORT

I. PREPARING IN TALLATION

	SARRI-LS-C					
2. SUPPL	IES OR SERVICES T	D BE PROCURED	2000 NDT			S. QUANTITY
	INCLUDED)	KM235 HIGH	COST ARE	A CONTRACTOR		NA
4 SYSTE	M(S) SUPPORTED BY	THIS PROCUREN	AENT	S. WORK BRE	NE LEVEL	6. ESTIMATE PREPARED AS OF
	Squad Automa	tic Weapon	System	4		30 November 1974
				+ ¹ 1		
	RESEARCH AND	DEVELOPMENT		COST	1	REFERENCE
		1 .	9	10		11
	Si S i IS			+		
COS	TCATEGORIES	HOURS	RATE	ESTIMATE		SCHEDULE
	ENGINEERING			862,637		
	DIRECT LABOR	50,788	-			
2	MATERIAL					
2	OVERHEAD		85%			
	OTHER			.		
	TOOLING		·····	4		
	DIRECT LABOR		-	╉──────╂━╸		
2	MATERIAL		-	•		
3	OVERHEAD					
	OTHER PROTOTYPE PRODUCT	L		•		
	SYSTEM TEST AND EVA			138,738		
	DATA					
- T - T	KRIC TOTAL SYSTEMS MANA	GEMENT		tt		
• • • • • • • • •	CONSTRUCTION			tt		
_ 1 1	TRAINING					
		PEP		520,173		
	TOTAL COST LESS (G			1,521,548		
κ.	G AND A	NA				
.L	TOTAL COST	NA				
+	PROFIT OR FEE	NA				
N -	TOTAL PRICE	NA				
	* DT/OT-II of	f 6 months	duration	l		
				EXTENS	ION DATE	
ROY F. SCHWEGLER						
Mechan	ical Engineer	r			4255	30 Nov 74
6. REVIE	WING OFFICIAL					
. APPR	DVING OFFICIAL					

AMC FORM 1011g-R

.

6.0MM XM-235 HIGH COST AREA ENG. DEV. RESEARCH & DEVELOPMENT

	<u>FY75</u>	<u>FY76</u>	76/77	<u>FY77</u>	FY78	TOTAL
<pre>1.1 Contract 1.11 Dev Eng (Val/Ed) 1.12 PEP 1.13 Tooling 1.14 Mfg Proto *1.15 Other</pre>	235,049 -0- -0- -0- 136,672	562,950 -0- 389,944 -0- <u>330,447</u>			- 0 - - 0 - - 0 - - 0 - - 0 -	1,546,832 1,551,750 389,944 790,000 1,163,164
FY Cost (Less G & A)	371,721	1,283,341	732,071	3,054,557	-0-	5,441,690
G & A (24.6%)						
FY Cost	453,164	1,599,043	912,160	3,805,978	-0-	6,780,345
Profit (9.1%)						
FY-Total Price	505,312	1,744,556	995,167	4,152,322	-0-	7,397,357
1.2 In-House 1.21 Dev Eng 1.22 PEP 1.23 Tooling 1.24 Mfg **1.25 Other	158,067 110,860	354,418 179,774	72,655 44,054	277,497 185,485 138,738	- 0 - - 0 - - 0 - - 0 - - 0 -	862,637 520,173 <u>138,738</u>
In-House Cost	268,927	534,192	116,709	601,720	-0-	1,521,548
Total Prog R & D	77 4, 239	2,278,748	1,111,876	4,752,042		8,918,905
*Other/ Contract Syst.Test & Evaluation Data Total Syst. Mg Training	33,424 16,752 86,496 -0- 136,672	82,652 40.205 207,590 -0- 330,447	100,051 -0- 51,898 -0- 151,949	242,504 -0- 207,590 94,002 544,096	-0- -0- -0- -0-	458,631 56,957 553,574 94,002 1,163,164
				· · · · ·		

**DT/OT (ARMCOM) \$23,123/Mo,-I=4 months,-II=6 months

1

4

٠

2

¢

1

Breakdown of "Other" Expenses Shown On Spread Sheet (XM235, High Cost Area)

Other	FY75	FY 76	76/77	FY77	Total
System Test & Eval	33,424	82,652	100,051	242,504	458,631
Data	16,752	40,205	0	U	56,957
Total Systems Mgmt	86,496	207,590	51,898	207,590	553,574
Training	0	0	0	94,002	94,002
	136,672	330,447	151,949	544,096	1,163,164

ODC

XM-235 (HIGH COST AREA) CONTRACTOR MAN HOURS SUMMARY

1

ACTIVITY	<u>FY7</u> 5	<u>FY76</u>	76/77	<u>FY77</u>	TOTAL
A-2 Development Eng * PEP Material B-2 Tooling **Other D.C.	11,850 -0- -0- -0- 4,267	28,430 -0- -0- 8,328 11,949	9,107.1 -0- -0-	28,760 63,263.4 -0- -0- 20,240	72,370.5 -0- 8,328
Total Hours	16,117	48,707	18,854.1	112,263.4	195,941.5 0
Man Years (1800 Hrs)	8.95	27.06	10.47	62.37	108.86
<pre>**0.D.C. D-3 System Test & Evaluation E-3 Data F-2 Total Syst Mgmt. E-4 Training Total O.D.C.</pre>	1,067 3,200 -0- 4,267	(INCLUDED 7,680 <u>-0-</u>	1,067 IN DEV. EN 1,920 -0- 2,987	G.) 7,680 3,207	15,756 20,480 <u>3,207</u> 39,443
*PEP A-3PEP E-4 PEP Dev. Eng. C-2PEP Quality Control G-1 Indust. Facil. O.D.C2 O.D.C.	- 0- - 0- - 0- - 0-	- 0 - - 0 - - 0 - - 0 -	7,701 -0- 149 1,257.1	30,802 26,837 596 5,028.4	38,503 26,837 745 6,285.5
Total PEP	-0-	-0-	9,107.1	63,263.4	72,370.5

r

300

RATIONALE XM-235 IN-HOUSE FSD-ENGINEERING

RATIONALE: The XM-235 is judged to have 3 areas requiring major redesign, specifically:

(1) Magazine

(2) Bolt Assembly

(3) Feed Mechanism

The major FSD-Engineering effort to redesign these areas will be conducted in 5 months of FY75 and 12 months of FY76.

The fiscal transition period of 3 months, 76/77, and 12 months of FY77 will see finalization of design, testing, data acquisition, processing, and evaluation, and evaluation of proposed production related modifications in conjunction with the concurrent PEP effort.

One basic problem appears to exist in that the contractor must familiarize his personnel with an unknown weapon concept.

XM235 IN-HOUSE FSD-ENGINEERING

The In-House FSD-Engineering Team Effort is summarized as follows:

			Y75	FY			6/77		77
	Grade	Hrs	\$	Hrs	\$	Hrs	\$	Hrs	\$
Project Eng	14	750	9,435	1800	22,644	450	5,661	900	11,322
Mech Eng	13	750	8,048	1800	19,314	300	3,219	1200	12,876
Mech Eng	12	1500	13,635	3600	32,724	900	8,181	1800	16,362
Mech Eng Tech	12	750	6,818	1800	16,362	300	2,727	1200	10,908
QA Tech	11	750	5,722	1800	13,734	300	2,289	1200	9,156
Mech Eng Tech	9	7 50	4,748	1800	11,394	450	2 ,8 49	1200	7,596
Draftsman	7	750	3,893	1800	9,342	300	1,557	1200	6,228
Draftsman	5	7 50	3,143	1800	7,542	300	1,259	1200	5,028
Math Analyst	12	375	3,409	900	8,181	300	2,727	1200	10,908
RAM Eng	12	536	5,118	1350	12,272	300	2,727	1200	10,908
QA Eng	12	750	6,818	1200	10,908	225	2,046	1200	10,908
QA Tech	12	750	6,818	1200	10,908	225	2,046	1200	10,908
Model Maker		500	3,815	1200	9,156	0	0	0	0
7	Y75 Y76 76/77 Y77	9,688	81,420	22,050	184,481 4	,350	37,286	14,700	123,108
Total Direct L Overhead (85		(FSD)	50,788	Man Hou	rs \$426	,295			
FY7 FY7 FY7 FY7 FY7 FY7 FY7	75 76 /77	31	,207 ,808 ,693 ,642						

Total Overhead (FSD) \$362,351

1

T.M.

I-H/2

(ALL CONTENDERS) FSD-ENGINEERING MATERIAL

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY75	5 x 100	\$ 500
FY 76	12 x \$1 00	1,200
76/77	3 x \$100	300
FY77	12 x \$100	1,200
Total		\$3,200

Other direct charges are covered in either FSD or PEP.

FSD - ENGINEERING - OTHER DIRECT COSTS

Rationale: Other Direct Costs are assumed to consist of Computer expense at \$600 per month and Travel Expense.

A. Computer Expense

FY75	5 x \$600	\$ 3,000
FY 76	12 x \$600	7,200
76/77	3 x \$600	1,800
FY77	12 x \$600	7,200
Total		\$19,200

B. Travel Expense

FY75	3,940
FY76	4,728
76/77	1,576
FY77	41,347
Total	51,591

C. Total O.D.C./FY

υ.

FY75	6,940
FY76	11,928
76/77	3,376
FY77	48,547
Total O.D.C.	70,791

FSD - IN HOUSE ENGINEERING - SUMMARY OF COSTS

FY75	\$158,067
FY76	354,418
76/77	72,655
FY77	277,497
Total	\$862,637

XM235 IN-HOUSE TRAVEL COSTS HIGH COST AREA

Estimate of Travel Costs:

	FY75	<u>FY76</u>	76/77	FY77	
Reviews at West Coast 3 days x 2 men x \$35/day Car rental 2 days - \$60/trip Air Fare \$259 x 2 men	5 1050 300 2590	6 1260 360 3108	2 420 120 1036	6 1260 360 3108	
Support of APG Test (RDAT-DT-II) 1 Man x \$35/day Car rental @ \$30/day Air Fare \$141/28 trips				275 c 9,625 8,250 3,948	lays
Support Test Fort Benning (OT-II 1 Man x \$35/day Car rental @ \$30/day Air fare \$172/18 trips) -			180 c 6,300 5,400 3,096	lays
Total/FY	\$3,940	\$4,728	\$1,576	\$41,347	
Total ED Travel	\$51,591				

1-H/5

XM235 ENGINEERING SECTION FULL SCALE DEVELOPMENT

1. Introduction:

- a. The Engineering Section is divided into four (4) parts:
- (1) Engineering Direct Labor.
- (2) Engineering Material.
- (3) Engineering Overhead.
- (4) Other Direct Charges to Engineering.

b. Each Engineering part consists of description of the items included and the rationale for including and evaluating each item.

c. The costs accrued in each part were developed among the weapon elements according to the percentage of peculiar parts of the weapon system which make up the weapon element. Thus for the XM235:

Weapon Element	Peculiar Parts	% Distribution
Receiver & Operating Group	95	61
Barrel Assembly	5	3
Rear Sight	12	8
Magazine	8	5
Bipod	23	15
Sling	4	3
Maintenance Tools	8	5
Total	155	100

2. Rationale for Estimating Engineering Direct Labor Cost (FSDWEDL):

a. Total Engineering Direct Labor hours is the sum of two inputs.

(1) Engineering Direct Labor hours to accomplish the Engineering Tasks involved in finalizing the weapon design.

(2) Engineering Direct Labor hours to prepare the information required for Data Items.

b. The value for each Direct Labor hour is an average hourly rate applied to all man hours expended in the Engineering effort and was determined for each contractor in coordination with AMSWE-PPX in the following manner:

(1) Estimate the total Direct Labor hours required for each Government GS grade.

(2) Multiply these totals by the respective step 5 hourly rate and add to get a total equivalent Government direct labor cost.

(3) Divide the total equivalent Government direct labor cost by the sum of the direct labor hours, regardless of grade, to obtain an average Government engineering hourly rate.

(4) Compare the average Government engineering hourly rate with the Step 5 hourly rates in the GS pay scale to determine the average grade level of skill employed.

(5) Compare the average grade level of skill with available information on the contractor's pay scale to estimate the average contractors engineering hourly rate.

c. The average contractor's engineering hourly rate for the Contractor is computed to be 9.22 per hour.

d. Engineering Direct Labor Hours and Costs for the Contractor by Fiscal Year are estimated to be:

Fiscal Year	D. L. Hours	D. L. Costs
75	11,850	\$109,257
76	28,430	262,125
76/77	6,760	62,327
77	28,760	265,167
Total	75,800	\$698,876

A-2

3. Rationale for Estimating Engineering Material Costs (FSDWEMAT):

a. Engineering Materials are considered to consist of miscellaneous material used in performing the engineering effort for Full Scale Development. Layout paper, drafting supplies, bond paper, vellums, computer cards, and computer paper are typical major cost items in this category.

b. Engineering Material Costs are estimated to be:

FY75	275
FY76	660
FY76/77	160
FY77	660
Total	1,755

4. Rationale for Estimating Engineering Overhead (FSDWEOH):

a. Based on historical data and information available in the Contract Pricing Division, AMSWE-PPX, the Engineering Overhead Rate for the Contractor is estimated to be 110% of Engineering Direct Labor Cost.

b. Summary of Overhead costs is as follows:

Total	0 verhe ad	FY75	\$120,183
Total	Overhead	FY76	288,337
Total	Overhead	FY76/77	68,560
To ta I	0verhead	FY77	291,684
Total	Overhead		768,764

A-3

5. Rationale for Estimating Other Direct Charges to Engineering (FSDWEOT):

a. This category includes the cost of travel and charges for computer time during Full Scale Development.

(1) The estimated computer costs are for programming and exercising a dynamic model of the weapon, a heat transfer and stress analysis model of the barrel, and analysis of Maintainability and Reliability as follows:

FY 75	2,970
FY76	7,100
76/77	1,830
FY77	7,100

Total Computer Cost 19,000

(2) The estimate of travel costs is as follows:

FY75	2,364.00
FY76	4,728.00
76/77	1,576.00
FY7a/	49,769.00

Supporting computations may be found under "Estimate of Travel Costs".

b. Other Direct Charges to Engineering are summarized as follows:

			FY75	FY76	76/77	<u>FY77</u>
(Computer Time		2,970	7,100	1,830	49,100
1	[ravel Costs		2,364	4,728	1,576	49,769
	Total by FY		5,334	11,828	3,406	56,869
	FY 75	5,234				
	FY76	11.828			·	

76/77	3,406
FY77	56,869

Total ODC \$77,437

.

.

6. Estimate of Travel Costs:

FY77

TOTAL

1

1

		FY75	FY76	76/77	<u>FY77</u>	
In	Informal reviews at Rock Island		6	2	6	
	3 days x 2 men x \$35/day	630	1,260	420	1,260	
	Car Rental 2 days - \$60/t	r1p 180	360	120	360	
	Air Fare \$259 x 2 men	1,554	3,108	1,036	3,108	
Su	pport of APG Test \RDAT-DT	11)			275	days
	1 Man x \$35/day				\$9,265	
	Car Rental @ \$30/day				\$8,250	
	Air Fare \$355/28 days				\$9,940	
Su	pport Test Fort Benning (OT	-II)			180	days
	1 Man x \$35/day				\$6,300	
	Car Rental x \$30/day				\$5,400	
	Air Fare \$307/18 days				\$5,526	
то	TAL TRAVEL	\$2,364	\$4,728	\$1,576	\$49,769	
7.	Total Development Engine	eering				
	FY75 \$235,	049				
	FY76 562,9	950				
J.	76/77 134,4	453				

614,380

\$1,546,832

HIGH COST AREA SUMMARY OF FSDW TOOLING COSTS ESTIMATED IN 1975 DOLLARS

FSDWTL -

1. S.

.

.

5

The cost model symbol gives reference to the cost of tooling, gages and manufacturing aids required to produce FSD prototype weapons, supporting equipment, and repair parts. All costs occur in FY76. HIGH COST AREA FSD - TOOLING COST (LESS GSA) XM235 (155 UNIQUE PARTS, 967 OPERATIONS)

Tooling for 104 Prototype Guns consists of:

		Hours	Amount
Α.	Purchase Tooling (Vendor Price)		\$108,768
	967 x \$112.48		
Β.	Purchase Gages (Vendor Price)		\$ 20,829
	967 x \$21.54		
C.	Purchase Expendable Tooling (Vendor Price)		\$ 39,454
	967 x \$40.80		
D.	Manufacture - Jigs & Fixtures		
	D.L. Rate \$9.22/hr, O.H. Rate 110%	3361	\$ 65,076
Ε.	Manufacture - Gages		
	D.L. Rate \$9.22/hr. O.H. Rate 110%	230	\$ 4,453
	Subtotal		\$238,5 80
F.	Manufacture - Processing	2176	\$ 42,132
	D.L. Rate \$9.22/hr, O.H. Rate 110%		
G.	Tool & Gage Design		\$ 35,787
	(15% of A thru E above)		
Н.	Estimating of Tools	1452	\$ 28,114
	D.L. Rate \$9.22/hr, O.H. Rate 110%		
I.	Purchasing Effort (or A-E above)	1109	\$ 21,473
	D.L. Rate \$9.22/hr, O.H. Rate 110%		
J.	Tool & Gage Inspection		\$ 23,858
	(10% of Items A thru E above)		
	Total Tooling Cost	8328	\$389,944 (FY76)
	Unit Cost (104 weapons) B-2		\$ 3,750

XM235 FSD TOOLING MANUFACTURING PROCESSING

Planning for manufacturing processes is estimated at 2 hours per machine operation. There are 907 machine operations giving:

> 967 <u>2</u> 1934 hours

An additional .25 hour is estimated for methods and standards work per operation giving:

967 .25 242 hours

Total

۰.

1934 hours 242 hours 2176 hours

TOOL DESIGN

It is estimated from M16 G.M. Hydromatic that 20% design to mfg. From G.E. (M61) approx. 34%.

It is estimated that 30% is fair and reasonable. In prototype most detailed design would not be made - use 15%.

ESTIMATING OF TOOLS

907 Operations with 3 tools per operation - 1 cutter 1 fixture 1 gage

967 <u>3</u> 2901 tools

It is estimated that .50 hr will be necessary for each tool.

2901 .5 1452 hours

B-3

XM2 35 TOOL & GAGE INSPECTION

It is estimated that 10% of the purchase price will be used for initial inspection of tools and gages, based upon ARMCOM QA experience.

PURCHASING

Total procurement actions For items purchased finished Total operations - 967 It is assumed that each operation will require: 1 cutter 1 fixture 1 gage Therefore 3 x 967 = 2901 items will be procured. 2 Items over \$3000 965 Items less than \$3000 Use same standards for purchasing as manufacturing. (965) (.5176 hrs) (150%) = 750 hours (2) (17.223 hrs) (150%) = 52 hours 802 hours For Items manufactured - Manufacturing hours - 3591 Relationship to mfg to purchased - 38.3% Procurement hours for manufactured items - (802) (38.3%) = 307 hours 307 hours Total procurement effort - Mfg Purchased 802 hours 1109 hours

B-4

PROTOTYPE COSTS

10

XM235

Based on experience in manufacturing components for 18 Validation Phase weapons at the Naval Air Rework Facility (NARF), Pensacola, Florida, the four weapons required for RDAT are estimated to cost \$10,000 each. The 100 weapons for DT-II/OT-II are estimated to cost \$7,500 each.

Manufacturing elapsed time is estimated at 7 months from 1 July 1976 for four RDAT weapons and 9 months from 1 July 1976 for the remaining 100 weapons. The reporting periods are three months in the 76/77 period and six months in FY77 period.

The prototype manufacturing effort continues over a three month period in 76/77 and a six months period in FY77. The cost is assumed to be distributed in proportion to the time of effort.

RDAT Weap	ons	4 x	\$10,000	\$ 40,000
DT/OT II	Weapons	100	x \$7,500	750,000
Total Pro	totype W	eapons	Cost	\$790,000
76/77 3	/9 x 7	no 000	-	\$263,333
10/11 3/	/ X /		-	\$203,333
FY77 6,	/9 x 7	90,000	•	\$526,667

C-1

SYSTEM TEST AND EVALUATION SECTION

FULL SCALE DEVELOPMENT

FSDWTE

1. Introduction

a. The figures below represent an estimate of the contractor's cost to conduct System Test and Evaluation.

b. For computational purposes, the Total System Test and Evaluation activity was divided into three parts as follows:

Part I - Acceptance Testing of the Prototype Weapons

Part II - Research and Development Acceptance Test (RDAT)

Part III - Preliminary Testing

c. The following were not included as part of this estimate:

(1) Weapons, spare barrels, and spare parts. These are included in the Prototype Cost, as other Direct Costs.

(2) Ammunition (MUCOM Item)

(3) Range utilization/rental costs, if required. This item was not included due to lack of supporting information as to where and under what arrangement the contractor will conduct testing.

(4) Shipping/transportation costs of materiel/personnel to various test sites, if required. It is assumed that testing would be within close proximity of the contractor's plant.

d. The same direct labor (time) and materials estimate was used for all three contractors. This is considered a reasonable assumption, since

D - 1

the test requirements are the same. Thus, differences in the cost estimates are the result of the various contractors' equivalent hourly rates and overhead figures. Contractor hourly rates and overhead were obtained from audited historical data.

2.	Summary of Costs	TOTAL
	Part I - Acceptance Testing	\$105,768
	Part II - RDAT	\$216,127
	Part III - Preliminary Testing	\$136,736

TOTAL - Weapon System Test and , Evaluation Cost (FSDWTE) \$458,631

D - 2

1

3. Breakdown by Parts

Part I - Acceptance Testing	FY75	FY76	76/77	FY77	TOTAL
Direct Labor (2950 hrs)*	-0-	-0-	-0-	27,199	27,199
Materials	-0-	-0-	-0-	48,650	48,650
Overhead	-0-	-0-	-0-	29,919	29,919
Total				105,768	105,758

Part II - RDAT

Direct Labor (6403 hrs)	-0-	-0-	-0-	59,036	59,036
Materials	-0-	-0-	79,391	12,760	92 ,1 51
Overhea d	-0-	-0-	-0-	64,940	64,940
Total			79,391	136,736	216,127

**Part III - Prelim. Tstg.

Lirect Labor (6403 hrs)	9,840	39,358	9,838	-0-	59,036
Materiaï	12,760	-0-	-0-	-0-	12,760
Overhead	10,824	43,294	10,822	-0-	64,940
Tota	33,424	82,652	20,660	-0-	136,736

* Direct Labor Rate = \$9.22/hr

0verhead = 110%

1

** Preliminary Testing Period - May 1975 through Oct 1977

D - 3

318

X

DATA SECTION

FULL SCALE DEVELOPMENT

1. Introduction:

1

a. This section summarizes the costs for the FSD Data Items. The section contains a List of FSD Data Items and their costs. These costs make up the totals which are entered under DATA in the FSD Cost Model. The costs for the Functional Direct Labor hours are accounted for in the respective Direct Labor sections for Engineering and Training.

b. The Data Items for the Technical Data Package (TDP) are accounted for in the PEP Program and are so noted on the list of the Data Costs for each Data Item. The TDP Data Items which are started in FSD and continued in PEP are also noted in the list for cross reference and continuity.

c. The section also contains a Data Related Cost Summary for information on the total cost related to data items.

2. DATA RELATED COST SUMMARY

a. Direct Labor plus Overhead to prepare FSD Data Items is carried under the following categories and totals as follows:

Category

Engineering hours	29,800
Training hours	3,207
Engineering Cost	576,928
Training Cost	62,088
Total \$/FY	639,016
b. Data Cost	56,957
a + b	6 95, 973

- c. Total Data Related Cost FSD = \$695,973 (P-F)
- NOTE: Engineering and Training Hourly Rate = \$9.22 + 110% Overhead = \$9.22 + \$10.14 = \$19.36/hour

d. Data Cost by Fiscal Year
FY75 5/17 x 56,957 = \$16,752
FY76 12/17 x 56,957 = \$40,205

E-2

3. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE ENGINEERING

DATA ITEMS

ł

(

List of Engineering Data Item Numbers

<u>B#</u>	<u>DI#</u>	<u>B#</u>	DI#
01	DI-A-1014A (MOD)	32	DI-H-1329A
02	DI-E-1100 (MOD)	37	DI-M-1501 (MOD)
03	DI-E-1101A	38	DI-M-1502
04	DI-E-1103A	39	DI-M-1502
05	DI-E-1104	40	DI-M-1505
06	DI-E-1105	41	DI-M -1510
08	DI-E -1107	42	DI-P-1600
10	DI -E-1116	44	DI-R-1710 (MOD)
11	DI-E-1117	51	DI-R-1730 (MOD)
12	DI-E-1118 (MOD)	52	DI-R-1731 (MOD)
13	DI-E-1119 (MOD)	53	DI-R-1733 (MOD)
14	DI-E-1128	54	DI-R-1734 (MOD)
15	DI-E-11XX (MOD)	55	DI-R-1735 (MOD)
16	DI-E-XXX1	56	DI-R-1740 (MOD)
17	DI-F-6000	57	DI-R-1741 (MOD)
18	DI-F-60001	58	DI-R-1750 (MOD)
18A	DI-F-XXX1	59	DI-S-1800 (MCD)
19	DI- F-6004	60	DI-S-1804A
25	DI-H-1312	61	DI-S-1812
26	DI-H-1314	62	DI-S-1818 (MOD)
27	DI-H-1315	63	DI-S-1819 (MOD)
29	DI-H-1322A (MOD)	64	DI-S-18XX (MOD)
30	DI-H-1326A	65	DI-T-1906 (MOD)
31	DI-H-1327A (MOD)	66	DI-T-XXX1 (NEW)
		67	DI-V-1950 (MOD)

Direct Labor Hours = 29,800

NOTE: These direct labor hours are included under Engineering.

E--3

4. SUMMARY OF FSD DATA ITEM LISTING AND DIRECT LABOR TO PRODUCE TRAINING

DATA ITEMS

E.S.

List of Training Data Items

<u>B#</u>	DI#
20	DI-H-1300 (MOD)
21	DI-H-1302
22	DI-H-1304
23	DI-H-1308
24	DI-H-1310
<u>.</u>	Labor hours $= 2.207$

Direct Labor hours = 3,207

NOTE: These direct labor hours are included under Training.

SUMMARY OF COSTS - DATA ITEM CALL ITEMS - FSD

4

R

5

ł

1

<u>B</u> No	. Data Item No.	Data Item Title		
01	DI-A-1014A(MOD)	PERT		557
02	DI-E-1100(MOD)	Configuration Management Plan		246
03	DI-E-1101A	Configuration Stat Acct & Engr Record		507
04	DI-E-1103A	Engineer Release Record	FSD/PEP	1620
05	DI-E-1104	Specifications	FSD/PEP	91
06	DI-E-1105	Characteristics & Description Book		168
07	DI-E-1106	Specs, Standards, Appl. List	PEP	0
08	EI-E-1107	Drawing Custodianship List	FSD/PEP	30
09	EI-E-1115A(MOD)	Technical Data Package	PEP	0
10	D1-E-1116	Stdz Comp & Select Control	FSD/PEP	58
(₁	DI-E-1117	Stdz Report of Common Items	PEP	0
12	DI-E-1118(MOD)	Drawings, Engr & Assoc Lists	FSD/PEP	645
13	DI-E-1119(MOD)	Environmental Criteria Report		3172
. 14	DI-E-1128	Electromagnetic Interference Control Plan		84
15	(X)DI-E-11XX(MOD)	Interface Control Doc. for VRFWS		311
16	DI-E-XXX1	Dynamic Mathematical Model		288
17	DI-F-6000	Cost performance report		353
18	DI-F-6001(MOD)	Procurement Info Functional Cost- Hour Report		5
18A	DI-F-XXX1	Model for Eval of Design-To Unit Production Cost		29
19	DI-F-6004	Contract Funds Status Report		22
20	EI-H-1300(MOD)	Personnel & Training Requirements		150
(

SUMMARY OF COSTS - DATA CALL ITEMS - FSD (Continued)

<u>B No.</u>	Data Item No.	Data Item Title	
21	DI-H-1320	New Equipment Training Plan	0
22	DI-H-1304	New Equipment Training Courses	1350
23	DI-H-1308	Training Course Reports	0
24	DI-H-1310	Graphic Aids	31444
25	DI-H-1312	Human Factors Engr Plan	53
26	DI-H-1314	Human Factors Engr Progress Rpt	179
27	DI-H-1315	Human Factors Engr Final Report	59
28	DI-H-1321A	Explosive Hazard Class. Data	See Ammo
29	DI-H-1322A(MOD)	Safety Statement	77
JU	DI-H-1326A	Safety Anal. & Hazard Eval Rpts	212
	DI-H-1327A(MOD)	Surface Danger Area Data	68
32	DI-H-1329A	Accident/Incident Report	20
33	DI-H-1330(MOD)	Facilities Safety Data	0
34	DI-L-1407(MOD)	Preservation & Packaging Data	PEP
35	DI-L-1410	Ammunition Data Cards	Ammo
36	DI-M-1500(MOD)	Firing Table Manuscript	Amno
37	DI-M-1501(MOD)	Validation Plan for Equip. Publication	s 1
38	DI-M-1502(MOD)	Equipment Publications	1176
39	DI-M-1502(MOD)	Equipment Publications	Included in B038
40	DI-M-1505(MOD)	Equip. Pub. Progress/Cost Reports	38
41	DI-M-1510	Maintenance Allocation Chart	11
42	DI-P-1600	Value Engr Data Report	135
(3	DI-P-1602	Value Engr Plan	No Cost Plan is prepared and paid for in Contractor's Proposal.

E-6

1

£

(SUMM	ARY OF COSTS - DATA CALL ITEMS - FSD (Continued)	
B No.	Data Item No.	Data Item Title	
44	DI-R-1710(MOD)	Quality Program Plan	128
45	DI-R-1711(MOD)	Qual Engrg Acc Insp Req & Equip List	PEP
46	DI-R-1712(MOD)	Quality Engrg Supp QA Provision	PEP
47			PEP
48			PEP
49	DI-R-1717	Qual Engr Calibration Program Data	PEP
50	DI-R-1722(MOD)	Qual Insp Pamphlet	PEP
51	DI-R-1730(MOD)	Reliability Program Plan	17
52	DI-R-1731(MOD)	Reliability Reports	67
53	DI-R-1733(MOD)	Reliability Qualified Items List	3
54	DI-R-1734(MOD)	Rel Fail Modes Effects & Crit Anal Rpts	21
(DI-R-1735(MOD)	Rel Failed Item Analysis Report	114
56	DI-R-1740(MOD)	Maintainability Program Plan	17
57	DI-R-1741(MOD)	Maintainability Reports	20
<u>.</u> 58	DI-R-1750(MOD)	Assessment Program Plan	7
59	DI-S-1800(MOD)	Technical Reports	1179
60	DI-S-1804A	Corrosion Prevention & Matl Deterioration	49
61	DI-S-1812	Rpts and/or Studies Maintenance Engr Des Discrepancy Report	34
62	DI-S-1818(MOD)	Maintenance Engr Analysis	380
63	DI-S-1819(MOD)	Contractor Recommended Support Plan	31
64	(X)DI-S-18XX(MOD)	Support Model Data	6
65	DI-T-1906(MOD)	Test & Demonstration Reports	1105
66	DI-T-XXX1(New)	R&D Acceptance Test Plan	25
(DI-V-1950(MOD)	Provisioning Requirements for US Army Eq.	581
68	DI-V-1951(MOD)	Federal Item Identification Data	No Contractor
Total co	nverted to FY75 Doll	ars \$48,268 x 1.18 = <u>\$56,957</u>	Performance Reqd TOTAL \$48,268 32

ł

Total Systems Management Section Full Scale Development

1. Introduction:

The overall systems management team to be employed by the contractor is considered to be a staff type operation that would be responsible for the contractor's overall program and execution.

Personnel on the management team are not included in the functional areas (i.e., engineering, manufacturing, testing, etc.). Top or executive management, administrative and clerical personnel are included in overhead and/or GSA. Since each of the functional areas would have their own supervision and management the rationale is to keep the Systems Management to a small highly capable team headed by a Project Manager.

2. Systems Management Team:

The team would be a full time effort for four (4) men headed by a Project Manager. It would consist of:

1 - Project Manager

1 - Senior Staff Systems Engineer for engineering activities

1 - Senior Staff Engineer for manufacturing and acceptance.

1 - Program Manager for plans and programs.

This team would be responsible for both the Full Scale Development and PEP Programs which are in the same time frame. Therefore, the costs are scheduled only in the FSD portion of the estimate.

F-1

3. The following is the estimated average Government rate:

Title	Grade	FY75 D.L. Rate
Project Manager	GS-15	\$15.40
Senior Engineer, Engr.	GS-14	13.21
Senior Engineer, Mfg.	GS-13	11.27
Program Manager	GS-13	11.27
		\$51.15

\$51.15/4 = \$12.79 hr average Government rate.

4. Based on the equivalent Government rate and discussions with AMSWE-PPX the equivalent contractor hourly rate is estimated to be \$12.87/hr and overhead at 110% totaling \$27.03/hr D.L.&O.H.

5. Costs by Fiscal Period:

ĸ

FY75 (5 months, 160 hrs/month)	
5 x 160 x 4 x \$27.03 =	86,496
FY76 (12 months, 160 hrs/month)	
72 x 160 x 4 x \$27.03 =	207,590
76/77 (3 months, 160 hrs/month)	
3 x 160 x 4 x \$27.03 =	51,898
FY77 (12 months, 160 hrs/month)	
12 x 160 x 4 x \$27.03 =	207,590
Total	553,574

F-2

SAW WEAPON XM-235 (HIGH COST AREA) PRODUCIBILITY ENGINEERING & PLANNING SEP/OCT 74

	COST CATEGORIES AND ELEMENTS					
DE	VELOPMENT-PEP	PEP TOTAL	<u>FY75</u>	FY76	76/77	F¥77
л 	Engineering Direct Labor Material Overhead Other O.C.	870,618 354,998 150 390,498 124,972	-0-	-0-	150,113	720,505
В.	Tooling(Software)	139,248	-0-	-0-	27,850	111,398
С.	Quality Control	520,018	-0-	-0-	-0-	520,018
υ.	System Test & Evaluation	-0 -	-0-	-0-	-0-	-0-
Е.	Data	7,441	-0-	-0-	1,488	5,953
F.	Total System Mgmt	-0-	-0-	-0-	-0-	- 0 -
G.	Industrial Facilities	14,425	()	-0-	2,885	11,540
H.	Training	-0-	-0-	-0-	-0-	-0-
I.	Aiscellaneous	-0-	-0-	-0-	-0-	-0-
TO	TAL COST	1,551,750	-0-	-0-	182,336 1	,369,414

PEP

1

ġ

「「「「「「「」」」」

IN-HOUSE TASKS

PEP RELATED

The major areas of In-House Direction and Support effort required during the PEP period are:

1. Producibility Engineering and Planning Studies.

2. Product Engineering Studies including Tolerance/Dimension Studies.

3. Engineering effort to prepare the Technical Data Package Data Call Items.

4. Engineering effort to enhance Reliability and Maintainability Engineering activities.

Configuration Management will be monitored in detail through acceptance testing.

Starting with RDT, Configuration Management will revert entirely to the Government as an In-House Task requiring effort as follows:

1. Prepare a Configuration Plan.

•,•

2. Update the Configuration Plan as required.

3. Review Engineering Change Proposals (ECPs):

a. Failure Related.

b. Production Related.

Other specific In-House Task areas are:

1. Review/monitor and direct Contractor and In-House conducted Producibility Engineering and Planning studies as follows:

a. Review each part/drawing.

b. Review Contractor Draft Process Sheets.

1-H/1 PEP

- c. Review unique processing operations.
- d. Review current and proposed processing capabilities.
- e. Review difficult/uneconomical manufactured items and recommended actions.
- f. Review Contractor PEP reports.

2. Review, monitor and direct Contractor and In-House conducted Froduction Engineering and Tolerance/Dimension Studies as follows:

a. Review components/drawings.

- Maintain conformity to Military Standards as specification as applicable.
- c. Review Contractor and In-House conducted redesign efforts.
- d. Review and prepare reports.
- e. Analyze available data and identify/approve areas for in-house or by contractor.
- f. Conduct and/or monitor tolerance/dimension studies.
- g. Review revisions and related reports.
- h. Maintain liaison with contractor project related supervision personnel.

3. Maintain cognizance of current and proposed manufacturing processes and procedures.

1-H/2 PEP

(ALL CONTENDERS) IN-HOUSE PEP-ENGINEERING

The In-House PEP Engineering team effort is summarized as follows:

ł

۱

(

		F	¥75	F	¥76		76/77		FY77
Title	Grade	Hrs	\$	Hrs	\$	Hrs	\$	Hrs	\$
Project Eng	14	750	9,435	900	11,324	225	2,831	900	11,324
Mech Eng	13	750	8,048	750	8,048	0ز 4	4,829	1800	19,316
Mech Eng	12	750	6,818	600	5,454	150	1,364	600	5,454
Mech Tech	11	375	2,861	600	4,578	150	1,145	600	4,578
Mech Tech	9	375	2,374	600	3,798	150	950	600	3,798
Draftsman	7	750	3,893	600	3,114	150	779	600	3,114
Draftsman	5	750	3,143	1800	7,542	450	629	1800	7,542
Math Analyst	12	375	3,409	600	5,454	150	1,364	600	5,454
NAM Eng	12	750	6,818	1800	16,362	225	2,046	900	8,181
H 7	7¥75 7¥76 76/77 7¥77	5,625	46,799	8250	65,674	2100	15,937	8400	68,761
Total Direct	Labor	(PEP)	24,375 M	an Hours	\$197,171				
F 7	4) 7475 7476 76/77 7477		\$3 9, 779 55,823 13,547 58,447						
Total Overhea) \$	167,596						

ş.

	(ALL CONTENDERS) IN-HOUSE PEP SUMMARY						
		FY75	<u>FY76</u>	76/77	<u>FY77</u>	TOTAL	
Α.	Engineering						
	Direct Labor	46,799	65,674	15,937	68,761	197,171	
	Material(\$75/Mo)	375	900	225	900	2,400	
	Overhead	39,779	55,823	13,547	58,447	167,596	
	Other D.C. (In- cluded in FSD)		-		-		
	Total A	86,953	122,397	29,709	128,108	\$367,167	
Ε.	Configuration Con	trol Boa r d	1				
	Direct Labor	12,720	30,528	7,633	30,528	81,409	
	Material(\$75/Mo)	375	900	225	900	2,400	
	Overhead (85%)	10,812	25,949	6,487	25,949	69,197	
	Other D.C. (In- cluded in FSD)				-	-	
4	Total B	23,907	57,377	14,345	57,377	\$153,006	
	A plus B	110,860	179,774	44,054	185,485		
TOTAL IN-HOUSE PEP COST						\$520,173	
		PEP ENGI	INEERING	24,375 Hrs.			
		C.C. Boa	ırd	7,680 Hrs.			

100

٠

.

TOTAL MAN HOURS 32,055 Hrs.

1-H/4 PEP

332

ŝ

-

(ALL CONTENDERS) IN-HOUSE CONFIGURATION CONTROL BOARD

Control of Configuration Management will be assumed by the Government.

A Configuration Control Board (CCB) will be established and will exercise its authority throughout the FSD period and potentially continue in the same manner but at somewhat diminished levels of effort through the Limited Production period and the Full Scale Production period.

During the FSD period from 1 February 1975 to 1 October 1977 (32 months) the CCB will utilize of the following people to the extent indicated:

<u>Title</u> <u>G</u>	rade	Hours	\$DL	\$0verhead
40% Configuration Mgr 40% Engineer 20% Procurement	14 13	1920 1920	24,154 20,602	20,531 17,511
Specialist	13	960	10,301	8,756
20% W.A. Engineer (Gages & SQAPS) 20% Maintenance	13	960	10,301	8,756
Specialist	12	960	8,726	7,417
20% Supply Specialist	11	960	7,325	6,226
	TOTAL	7,680	\$81,409	\$69,197
These expenses occur as	follows:	FY75	12,720	10,812
		FY76	30,528	25,949
		76/77	7,633	6,487
		FY77	30,528	25,949

CONTRACTOR DEVELOPMENT ENG PEP

Rationale:

The Contractor PEP effort is estimated to address the following areas:

a. Producibility Engineering and Planning Studies.

b. Product Engineering and Tolerance Studies.

Tasks are identified in each area, required manhours are estimated for each task and the total estimated manhours determined. These manhours are multiplied by appropriate labor and overhead rates to obtain total values for Direct Labor and Overhead, \$150 is estimated for Materials and these values of Direct Labor, Overhead, and Material cost are added to Other Direct Costs which are defined in a separate section.

The total thus obtained is distributed 1/5 in FY76/77 and 4/5 in FY77.

CONTRACTOR DEVELOPMENT ENG PEP

A. Producibility Engineering and Planning Studies:

	TASK	MANHOURS
1. 2. 3. 4. 5.	Review Part Drawings Prepare Draft Process Sheets Determine Unique Operations Conduct Process Capabilities Study Determine Difficult Items and Make	2058 5143 176 2788
6.	Recommendations Prepare Reports Maintain Supervision TOTAL "A"	1394 41 <u>4752</u> 16352 hours

B. Product Engineering and Tolerance Studies:

1.	Review Drawings	461	
2.	Review Mil. Standards & Specs.	216	
3.	Select and Conduct Redesign	2979	
	Prepare Reports	40	
5.	Review Data/Identify Areas for Study	481	
6.	Conduct Tolerance/Dimension Study	2676	
	Determine Revisions and Prepare Report		
8.	Maintain Supervision	4752	
	TOTAL "B"	12161	hours

TOTAL MANHOURS (A & B)

(

ī

1

28,513

A-2 PEP

SAW-XM235 (HIGH COST AREA) CONTRACTOR DEVELOPMENT ENG PEP

Total ManHours (A&B) Data Item ManHours Total ManHours	28,513 hrs 9,990 hrs 38,503		
Direct Labor Rate Direct Labor Cost Overhead Rate 110% Overhead Cost	\$9.22/hr \$354,997.66 \$390,497.43		
Engineering Cost Summary Direct Labor	\$354,998	$\frac{76/77}{71,000}$	FY77 283,998
Material Overhead O.D.C. Total Engineering	150 390,498 <u>124,972</u> \$870,618	30 78,100 <u>983</u> \$150,113	120 312,393 123,989 \$720,505

A-3 PEP

1

336

3

ĩ

OTHER DIRECT COSTS CONTRACTOR PRODUCIBILIT. NGINEERING & PLANNING (PEP)

RATIONALE: Other Direct Costs are assumed to consist of three (3) categories:

- a. Manufacturing Processing Engineering
- b. Travel

(

c. Reproduction Costs

(1) CEP Studies

(2) Product Engineering and Tolerance Studies

ODC/-1 PEP

337

:1

XM-235 (HIGH COST ARFA) OTHER DIRECT COSTS CONTRACTOR PEP

A. Manufacturing Process Engineering is the Engineering effort to prepare and process routing sheets and other documentation defining in detail the manufacturing processes to be used for each component.

Estimated manufact Estimated Eng Hrs j Direct Labor Rate Overhead		967 6.5 hrs \$9.22/hr 110%
Required Manhours Direct Labor Overhead Total M.P.E.	967 x 6.5 6285.5 x \$9.22 \$57,952 x 1.10	6285.5 \$57,952.31 \$63,747.54 \$121,699.85

B. O.D.C.Travel Estimated travel consists of 2 trips to RIA by 1 man in FY77 at 2 x \$449 = \$898 plus 2 trips by 2 men at \$847 per trip (1 trip in FY76/77 and 1 trip in FY77

	76/77	<u>FY77</u>	TOTAL
l man trip 2 man trip Total Travel	\$847 \$847	\$898 \$847 \$1745	\$2592

ODC/-2 PEP

1

7

ŧ

XM-235 (HIGH COST AREA) OTHER DIRECT COSTS CONTRACTOR PEP

C. Reproduction:

4

٠

•

listi .

the property for shother what

1

1) Estimated for Producibility Engineering & Planning Studies:

	76/77	FY77	TOTAL			
\$165.00 x (1.24	\$40.92	\$153.68	\$204.60			
2) Estimated for Produ	ct Engineering	and Tolerance	Studies:			
\$369.00 x (1.24) <u>\$ 95.11</u>	\$380.45	\$475.56			
Total Reproduction Cost	\$136.03	\$544.13	\$680.16			
O.D.C. Summary						
Total M.P.E. Total Travel Total Reproduction	-0- 847.00 136.03	121,699.85 1,745.00 544.13	\$121,699.85 2,592.00 680.16			
TOTAL O.D.C.	\$983.03	\$123,988.98	\$124,972.01			

ODC/-3 PEP

Tooling Section (Software)

Costs are incurred during design of special purpose production equipment and tooling to achieve quantity production. Based on past experience it is estimated that 35% of the initial tooling cost is used for design.

All design costs are shown against the weapon.

On the basis of past estimates for automatic weapons an average tooling cost of \$400 per operation is applied to cover the cost of Purchased Tooling, Purchased Gages, Expendable Tooling, Jigs and Fixtures, and Gages.

The corresponding Design Cost is thus estimated at .35 x \$400 = \$144 per operation.

No. Ope	eration	ns x \$144	76/77	FY77
XM235	967	\$139,243	\$2 7, 850	\$111,398

QUALITY CONTROL SECTION

The estimates contained herein for Quality Control are for the Quality Documentation that is part of the Technical Data Package. In addition, estimated hours for Quality Control Engineering Supervisor are included at the rate of 160 hours per month for 11 months. The man hours estimated for the preparation of Quality Control Documentation are based on similar work performed by ARMCOM personnel.

Rationale is derived from a similar study performed on proposed Bushmaster weapons. The following Data Items are involved:

DI-E-1104*

DI-E-1118 (Mod)*

DI-R-1711 (Mod)

DI-R-1712 (Mod)

DI-R-1717

ÿ

DI-R-1722 (Mod)

* In addition to Quality Control, there are man hours for these Data Items in the Engineering Section.

During the PEP Program, it is estimated all Q.C. software efforts will be accomplished in FY77.

SUMMARY OF MAN HOURS

GS-13	Supervisor	1,760	
GS-12	Engineer	790	
GS-11	Specialist Gage Designer/Checker	16,434	~
GS-09	Tech Writer, Illustrator	6,968	
GS-0 5	Document Control Clerk	885	
		26,837	

17

the second second second

SUMMARY OF COSTS

Direct Labor Hours		26,837
Hourly Rate		9,22
Total D. L. Cost		247,437
Overhead (110%)		272,181
Material		400
Total Q. C. Cost	. 4	520,018

.

C-2 PEP

4

A CONTRACTOR

DATA SECTION

PEPWD

This section includes the rationale and a summary of direct labor manhours and costs for material and reproduction for each Data Call Item considered a part of the total Technical Data Package (TDP).
 The summary of direct labor man hours for Engineering Data Items is incorporated in the Engineering Section under Data Items. The summary of direct labor man hours for Quality Control Data Items is incorporated in the Quality Control Section under Data Items. Data Call Items DI-E-1104 and DI-E-1118(MOD), which require both Engineering and Quality Control documentation, have separate summaries and rationale contained in this section.

3. The material costs for preparation of the Data Items include the costs of standard forms, such as drawings, supplementary quality assurance provisions, and packaging data sheets. These costs are summarized and shown in their respective functional areas.

4. A summary of Data Costs for all TDP related Data Items is included in this section and entered under Data in the Cost Model.

El PEP

DATA SECTION

- 5. DATA RELATED COST SUMMARY
 - a. Cost of Direct Labor plus Overhead to prepare data items is as follows:
 <u>Category</u>
 Engineering Direct Labor (Manhours)
 9,990

Quality Control Direct Labor (Manhours)26,837Engineering Cost*193,426Quality Control Cost*519,618Total Direct Labor & Overhead713,044b. Data Cost7,441

c. Total Related Data Cost - PEP (a + b) 720,486

*Hourly rate = \$9.22 + 110% Overhead = 19.36/hour

PF

F

SUMMARY OF DATA COSTS-PEP PROGRAM

8. No.	Data Item No.	Data Item Title	
0004	*DI-E-1103A	Engrg Release Record	\$ 203
0005	*DI-E-1104(QC)	Specifications	39
0005	*DI-E-1104(ENGR)	Specifications	93
0007	DI-E-1106	Specs, Stds, Application List	44
8000	*DI-E-1107	Drawing Custodianship List	68
0009	DI-E-1115A(MOD)	Technical Data Package	
010	*DI-E-1116	Standardization, Components, and Selection Control	6
011	DI-E-1117	Standardization-Report of Common Items	6
012	*DI-E-1118(MOD)(QC) Drawings, Engrg, and Associated Lists	4,130
012	*DI-E-1118(MOD) (ENGR)	Drawings, Engrg, and Associated Lists	1,348
034	DI-L-1407(MOD)	Preservation and Packaging Data	307
045	DI-R-1711(MOD)	Quality Engrg Acc Insp Req & Eq	79
046	DI-R-1712(MOD)	Qual Engrg Supp QA Provisions	766
049	DI-R-1717	Qual Engrg Calibration Prog Data	22
050	DR-R-1722(MOD)	Qual Insp Pamphlet	330
		GRAND TOTAL DATA COST	\$7,441
		76/77 DATA COST	1,488
		FY77 DATA COST	5,953

* Started during FSD Phase; continued during PEP Program.

Ni.

E3 PEP

SUMMARY OF DIRECT LABOR MANHOURS FOR ENGRG DATA ITEMS

Data Item No.	Totals
DI-E-1107	2
DI-E-1118(MOD)	1372
Totals	
DI-E-1103A	165
DI-E-1104	1676
DI-E-1105	28
DI-E-1107	10
DI-E-1115A(MOD)	96
DI-E-1116	73
DI-E-1117	5
DI-E-1118(MOD)	5487
DI-E-1407(MOD)	1076
Totals	9 ,99 0

Note: Totals are included in Direct Labor in Engineering Section

E4 PEP

346

SUMMARY OF QUALITY CONTROL DIRECT LABOR FOR DATA ITEMS (MANHOURS)

Data Item	<u>GS-12</u>	<u>65-11</u>	<u>65-9</u>	QS-5
DI-E-1104	390	-	-	22
DI-E-1118(MOD)	-	14000	-	-
DI-R-1711(MOD)	60	355	-	60
DI-R-1712(MOD)	-	1914	348	348
DI-R-1717	340	165		75
DI-R-1722(MOD)	-	-	6620	380
Totils	790	16,434	6 ,96 8	885

X

1

NOTE: Totals are included in Direct Labor in Quality Control Section. Grand Total manhours - 25,077 + 1,760 (GS-13 Supervisor) = 26,837

E5 PEP

INDUSTRIAL FICILITIES SECTION

The estimate is based on the assumption that the contractor has a suitable plant site available for production of the components.

The design and layout of the plant equipment is based on the manufacturing process. Utilization of equipment is on the basis of 80% of the total machine time available. For the conventional machines a 1-8-5 shift is proposed through the first six months and 2-8-5 for the remainder of the program. For the N/C equipment a 1-8-5 shift is proposed through the first 6 months and a 3-8-5 shift for the remainder of the program.

The cost of the plans and layouts for this phase is estimated as follows, and will be accomplished during 76/77 and FY77.

Design and layout including electrical, plumbing, sheet metal, air, etc. for space allocation to machining, assembly, bench work and storage of tools and equipment is estimated to require 225 hours for the entire layout of 37,912 square feet.

Preparation of specifications for the procurement of new equipment and bills of materials required for installation of machines, air lines, etc. is estimated to require 520 hours.

Rates used are based on 9.22 per hour rate for design and layout work was escalated by 110% for overhead to 19.36 per hour. Therefore the 745 hour total computes to 14,424.69.

Area required for production approximates 37,912 square feet to be allocated as follows:

Production	n area, machining	26,584
Assembly,	deburring and bench area	1,244

G-1 PEP

Tool and gage maintenance	1,000
Receiving	800
Packaging and shipping	1,000
Bonded storage	500
Tool storage	900
Final inspection	2,000
Administration	1,500
Metrology lab	384
Tool room	2,000
Total Area Required	37,912

¢

t

1

It is assumed that chrome plating and surface finishing will be vendor purchased.

	Total	<u>FY-77</u>	76/77
Labor Cost	6868.90	5,495.12	1373.78
Overhead Cost	7555.79	6,044.63	1511.16
Total Cost	14,424.69	11,539.75	2884 .94

NUMBER II-E

BASIC ESTIMATED COST PACKAGE ENGINEERING DEVELOPMENT BEST CONCEPTUAL WEAPON CONTRACTED BY AN AVERAGE US CONTRACTOR IN 6.00MM (OR FABRIQUE NATIONALE CONTENDER CONTRACTED BY AN AVERAGE US CONTRACTOR IN 5.56MM/ 63 GRAIN PROJECTILE)

INDEPENDENT GOVERNMENT COST ESTIMATE-RESEARCH AND DEVELOPMENT

(AMCR 715-22) AVERAGE US CONTRACTOR

1. PREPARING INSTALLATION

7 . 1ª

•

ł

SUPPLIES OR SERVICES TO BE PROCURED					S. QUANTITY		
FN	FN or BC, Average US Contractor (PEP Included)						NA
575	SYSTEM(S) SUPPORTED BY THIS PROCUREMENT STRUCTURE LEVEL			6. ESTIMATE PREPAREI AS OF			
Squ	ad Automatic	-			4	30 November 19	
			COST	COST		REFERENCE	
	- 100 j		9	10	t	1	1
 co	DST CATEGORIES	HOURS	RATE	ESTIMATE		SCHE	DULE
1				1,586,962	+		
	DIRECT LABOR *	190,910.9	6.69	• · · · · · · · · · · · · · · · · · · ·	*		
	MATERIAL						
	a second and the second	-	184%				
3	OVERHEAD			1	†		
	OTHER		***************************************	413,802	†		
	DIRECT LABOR		and the second courses	1	1		
+-	-	- +		1	1		
12	MATERIAL		in the second second	†	+		
3	OVERHEAD	-					·
4	OTHER			852,436	+		
. 1	PROTOTYPE PRODUC			453,561	1		
-	SYSTEM TEST AND EV	ATUATION		56,957			
:	DATA					~	
+-	TOTAL SYSTEMS MAN	AGEMENT		276,787	4		
1.	CONSTRUCTION			-0-			
1.	TRAINING			92,444			
	OTHER (Specily)			1,553,064			
+·-	TOTAL COST LESS (G			5,286,013			
+	G AND A	16%		6,131,775			
- ·	TOTAL COST			0,131,113			
1	the second	.9.28					
<u></u>	TOTAL PRICE			6,695,898			
	surs shown are	total for a	all cost	categorie	S		
	ED NAME AND TITLE	F (SIGN	ATURE	EXTEN	SION	DATE
ROY	PARING OFFICIAL F. SCHWEGLER						20 11 54
	hanical Engin	eel			4.	255	30 Nov 74
APP	ROVING OFFICIAL					<u>-</u>	

AMC FORM 10110-R

INDEPENDENT GOVERNMENT COST ESTIMATE -- RESEARCH AND DEVELOPMENT

(AMCR 715-22) IN-HOUSE SUPPORT

1. PREPARING INSTALLATION

1

SARRI-LS-C

SARRI-LS-C						
2. SUPPLIES OR SERVICES TO BE PROCURED					3. QI	UANTITY
In-House Support FN or BC Avg. US Contractor					1	
(Includes PEP) 4 SYSTEM(S) SUPPORTED BY THIS PROCUREMENT B. WORK BREAKDOWN					1	NA STIMATE PREPARED
			STRUCT	URELEVEL	•	SOF
Squad Automatic Weapon System			4	30	November 1974	
RESEARCH AND D	EVELOPMENT		COST	REFERENCE		RENCE
7	• I	9	10		1	1
COST CATEGORIES	HOURS	RATE	ESTIMATE		SCHE	DULE
			872,392			
A - ENGINEERING	51,542	_				
2 MATERIAL						
3 OVERHEAD		85%				
4 OTHER						
B . TOOLING						
1 DIRECT LABOR		-				
2 MATERIAL						· · · · · · · · · · · · · · · · · · ·
3 OVERHEAD						
4 OTHER		ä				
C PROTOTYPE PRODUCTION			120 730			
D - SYSTEM TEST AND EVALU	ATION		138,738			
				and the second sec		
F - TOTAL SYSTEMS MANAGE				*··· ******		
H - TRAINING						
1 - OTHER (Specify) P.	EP		510,899			
J - TOTAL COST LESS (G ANI			1,522,029			
K - GANDA	NA					
L - TOTAL COST	JA					
M - PROFIT OR FEE	NA					
N - TOTAL PRICE	NA					
*DT/OT-II of 6 mon	ths dura t .	ion				
TYPED NAME AND TITLE		SIGN	ATURE	EXTEN	SION	DATE
. PREPARING OFFICIAL RUY F. SCHWEGLER						
Mechanical Enginee:	r			10	55	30 Nov 74
6. REVIEWING OFFICIAL					55	JU 110V 74
. REVIEWING OFFICIAL						
C. APPROVING OFFICIAL					.0	
AMC FORM 10110-8	<u>I</u>					

.

4

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) ENG. DEV. RESEARCH & DEVELOPMENT

		FY75	FY76	76/77	<u>FY77</u>	FY78	TOTAL
l	<pre>1.1 Contract 1.11 Dev. Eng. (Val./ED) 1.12 PEP 1.13 Tooling 1.14 Mfg. Proto. *1.15 Other</pre>	251,355 -0- -0- -0- _98,317	602,136 -0- 413,802 -0- 220,047	132,178 208,353 -0- 284,145 125,657	1,344,711 -0- 568,291	-0- -0- -0- -0- -0-	1,586,962 1,553,064 413,802 852,436 879,749
	FY-Cost (Less G & A)	349,672	1,235,985	750,333	2,950,023	-0-	5,286,013
	G & A (16%)						
	FY-Cost	405,620	1,433,743	870,386	3,422,027	-0-	6,131,775
	Profit (9.2%)						
	FY-Total Price	422,937	1,565,647	950,461	3,736,853	-0-	6,695,898
	1.2 In-House 1.21 Dev Eng 1.22 PEP 1.23 Tooling 1.24 Mfg. **1.25 Other	163,327 110,860 -0- -0- -0- -0-	367,344 179,774 -0- -0- -0-	69,587 44,054 -0- -0- -0-	272,134 176,211 -0- -0- 138,738	-0- -0- -0- -0- -0-	872,392 510,899 -0- -0- 138,738
	In-House Cost	274,187	547,118	113,641	587,083	-0-	1,522,029
	Total Prog. R & D	717,124	2,112,765	1,064,102	4,323,936		8,217,927
	*Other/Contract Syst. Test & Evaluation Data Total Syst. Mfg. Training	33,082 21,987 43,248 -0-	81,282 34,970 103,795 -0-	99,708 -0- 25,949 -0-	239,489 -0- 103,795 _92,444	-0- -0- -0- -0-	453,561 56,957 276,787 92,444
	Total	98,317	220,047	125,657	435,728	-0-	879,749

**DT/OT (ARMCOM) \$23,123/Mo.,-I=4 months, -II=6 months

1

t

x

353

and make the cardinal definition of the second

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) SUPPORTING CALCULATIONS SHEET 1

392

(

Thoras

33⁵⁰.

	FY75	<u>FY76</u>	76/77	FY77	TOTAL
1.1 Contract 1.11 Dev Eng					
XM233	271,489	650,506	129,903	588,208	1,640,106
X14234	271,759	651,025	134,453	614,380	1,671,617
XM235M	227,123	544,062	129,902	588,205	1,489,292
XM235P	235,049	562,950	134,453	614,380	1,546,832
/4	251,355	602,136	132,178	601,293	1,586,962
1.12 PEP					
XM233	-0-	-0-	213,200	1,355,187	1,568,387
XM234	-0-	-0-	213,363	1,373,468	1,586,831
XM235M	0	-0-	200,501	1,304,787	1,505,288
XM235P	-0-	-0-	206,347	1,345,403	1,551,750
/4	-0-	-0-	208,353	1,344,711	1,553,064
1.13 Tool					
XM233	-0-	479,149	-0-	-0-	479,149
XM234	-0-	402,262	0	-0-	402,262
X11235r1	-0-	383,853	-0-	-0-	383,853
XM235P	-0-	389,944	-0-	-0-	389,944
/4	-0-	413,802	-0-	-0-	413,802
1.14 MFG.				3	
XM233	-0-	-0-	304,108	608,215	912,323
XM234	-0-	-0-	305,807	611,613	917,420
XM235M	-0-	-0-	263,333	526,667	790,000
XM235P	-0-	-0-	263,333	526,667	790,000
/4	-0-	-0-	284,145	568,291	852,436

7

6

FABRIQUE NATIONALE OR CONCLIPTUAL CANDIDATE (BC) SUPPORTING CALCULATIONS SHEET 2

	FY75	FY76	76/77	FY77	TOTAL
1.15 Other					
XM233	49,492	120,116	99,365	327,385	596,358
XM234	** 143,652	323,467	151,949	544,096	1,163,164
XM235M	56,472	113,136	99,365	327,335	596,308
XM235P	143,652	323,467	151,949	544,096	1,163,164
/4	98,317	220,047	125,657	435,728	879,749
1.2 In-House					
1.21 Dev Eng					
XM233	173,312	391,620	60,596	256,681	882,209
XM234	161,229	361,986	72,655	277,497	873,367
XM235M	160,699	361,350	72,443	276,861	871,353
XM235P	158,067	354,418	72,655	277,497	862,637
/4	163,327	367,344	69,587	272,134	872,392
1.22 PEP					
XM233	110,860	179,774	44,054	176,211	510,899
XM234	110,860	179,744	44,054	176,211	510,899
XM235M	110,860	179,744	44,054	176,211	510,899
XM235P	110,860	170,744	44,054	176,211	510,899
/4	110,860	170,744	44,054	176,211	510,899
1.23 Tool					

1.24 Mfg.

١

ţ

*

S.

1.25 Other

138,738 138,738

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) SUPPORTING CALUCLATIONS SHEET 3

	FY75	FY 76	76/77	<u>F¥77</u>	TOTAL
Other-Contra	ct				
Syst. Test					
XM233	32,740	79,9 1 1	99,365	236,499	448,515
XM234	33,424	82,652	100,051	242,504	458,631
XM235M	32,740	79,911	99,365	236,449	448,465
XM235P	33,424	82,652	100,051	242,504	458,631
	·····				
/4	33,082	81,282	99,703	239,489	453,561
Data					
XM233	16,752	40,205	-0-	-0-	56,957
XM234	23,732	33,225	-0-	-0-	56,957
XM235M	23,732	22,225	-0-	-0-	56,957
XM235P	23,732	33,225	-0-	-0-	56,957
					<u> </u>
/4	21,987	34,970	-0-	- 0 -	56,957
Syst. Mgmt.					
XM233	-0-	-0-	-0-	-0-	-0-
XM234	86,496	207,590	51,898	207,590	553,574
XM23514	-0-	-0-	-0-	-0-	-0-
XM235P	86,496	207,590	51,898	207,590	553,574
/4	43,248	103,795	25,949	103,795	276,787
, -	,	2007/00	2.07515	2007700	2,0,,0,
Training					
XM233	-0-	-0-	-0-	90,886	90,886
XM234	-0-	-0-	-0-	94,002	94,002
XM235M	-0-	-0-	-0-	90,886	90,886
XM235P	-0-	-0-	-0-	94,002	94,002
14				92,444	92,444
/4				72,444	76,444

TOTAL ()

5

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) SUPPORTING CALCULATIONS SHEET 4

	DEV. ENG. HRS.	PEP HRS.
XM233 XM234 XM235 (M) XM235 (P)	83,856 82,245 75,800 75,800	38,503 38,503 38,503 <u>38,503</u>
Contract Avg. /4	79,425	38,503
XM233 XM234 XM235 (M) XM235 (P)	52,526 51,426 51,426 50,788	32,055 32,055 32,055 32,055 32,055
In-House Avg. /4	51,542	32,055

.

١

8

1

357

· •

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC)

RATIONALE FSD-ENGINEERING

RATIONALE: The Fabrique Nationale or (BC) Weapon is judged to have 6 areas requiring major redesign and/or extensive analysis, specifically:

- (1) Receiver
- (2) Buffer Assembly
- (3) Gas System
- (4) Bolt/Operating Group
- (5) Firing Mechanism
- (6) Magazine

The major FSD-Engineering effort to address these areas will be conducted in 5 months of FY75 and 12 months of FY76.

The fiscal transition period of 3 months, 76/77 and 12 months of FY77 will be used to finalize detail design, testing, data acquisition, data processing, data evaluation, and evaluation of proposed production related modifications in conjunction with the concurrent PEP effort.

Two basic problems appear to exist:

(1) If the Receiver Assembly is strong enough to insure structural integrity the weight limit may be exceeded.

(2) If the locking lug areas and/or Buffer components are modified to eliminate excessive wear or potential failure an extensive redesign and testing of the operating mechanism may be required.

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC)

IN-HOUSE FSD-ENGINEERING

•	'The		FY75	F	¥76	76	/77		as follows: FY77
		Grade	Hrs \$	Hrs	\$	Hrs	\$	Hrs	\$
٠	Project Eng	14							
	Mech Eng	13							
	Mech Eng	12							
	Mech Tech	12							
	Q.A. Tech	11							
	Mech Tech	9							
	Draftsman	7							
	Draftsman	5							
	Math Analyst	12							
	Ram Eng	12							
	Q.A. Eng	12							
	Q.A. Tech	12							
	Model Maker								
	Direct Labor	FY75	9898 83	,028					
		FY76		22551	188,342	2			
		76/77				4360	37,240		
1		FY77						1473	3 122,958
ţ	Total Direct Overhead (85%) FY75 FY76 76/77	\$ 70,57 160,09 31,65	4 1 4	rs \$43]	L,568			
	Total Overhea	FY77 d (FSD)	$\frac{104,51}{$366,83}$						

ţ

the state

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC)

FSD-ENGINEERING MATERIAL

RATIONALE: Engineering Material costs cover office supplies, drafting paper, etc., and is estimated at \$100 per month.

FY75	5	х	\$100	\$ 500
FY76	12	x	\$100	1200
76/77	3	x	\$100	300
FY77	12	x	\$100	1200
TOTAL				\$3200

Other direct charges are covered in either FSD or PEP.

21

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) FSD - ENGINEERING - OTHER DIRECT COSTS

Rationale: Other Direct Costs are assumed to consist of Computer expense at \$600 per month and Travel Expense.

1

1

Ý.

A.	Computer Expense	
	FY75 5 x \$600	\$ 3,000
	FY76 12 x \$600	7,200
	76/77 3 x \$600	1,800
	FY77 12 x \$600	7,200
	TOTAL	\$19,200
в.	Travel Expense	
	FY75	3,940
	FY76	4,728
	76/77	1,576
	FY77	41,347
	TOTAL	51,591
с.	Total O.D.C./FY	
	FY75	6,940
	FY76	11,928
	76/77	3,376
	FY77	48,547
D.	Total O.D.C.	70,791

FSD - ENGINEERING - SUMMARY OF COSTS

FY75	\$161,042
FY76	361,561
7 6/77	72,570
FY77	277,219
TOTAL	\$872,392

1 - H/4

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) IN-HOUSE TRAVEL COSTS WEST COAST CONTRACTOR

Estimate of Travel Costs:

In sur 1

	FY75	FY76	76/77	FY77	
Reviews at Los Angeles Ara 3 uays x 2 men x \$35/day Car rental 2 days -\$60/tri Air fare \$259 x 2 men	1050 .p 300	1260	420 120	360	
Support of APG test (RDAT- 1 Man x \$35/day Car rental @ \$30/day Air fare \$141/28 trips	DT-II)			275 9,625 3,250 0,948	day s
Support Test Fort Benning 1 Man x \$35/day Car rental @ \$30/day Air fare \$172/18 trips	(OT-II)			130 6,300 5,400 3,096	days
Total FY	\$3,940	\$4,728	\$1,576	\$41,347	
Total ED Travel	\$51 , 591				

1-H/5

Ł

8

E.

Ý

FABRIQUE NATIONALE OR CONCEPTUAL CANDIDATE (BC) ENGINEERING SECTION

FULL SCALE DEVELOPMENT

1. Introduction:

t

ø

1

- a. The Engineering Section is divided into four (4) parts:
- (1) Engineering Direct Labor.
- (2) Engineering Material.
- (3) Engineering Overhead.
- (4) Other Direct Charges to Engineering.

b. Each Engineering part consists of description of the item included and the rationale for including and evaluating each item.

c. Since technical information on the subject is severly limited the costs accrued in each part are the average of the costs for XM233, XM234 and XM235 as developed among the weapon elements according to the percentage of peculiar parts of the weapon system which make up the weapon element. Thus the weapon elements were identified as follows:

Weapon Element

Receiver & Operating Group Barrel Assembly Rear Signt Magazine Bipod Sling Maintenance Tools

2. Rationale for Estimating Engineering Direct Labor Costs Used to Determine the Average Direct Labor Cost.

a. Total Ergineering Direct Labor hours is the sum of two inputs:

(1) Engineering Direct Labor hours to accomplish the Engineering Tesks i volv ? in finalizing the weapon design.

(2) Enginee_iro Direct Labor hours to prepare the information for Data Items. b. The value for each Direct Labor hour is an average hourly rate applied to all man hours expended in the Engineering effort and was determined for each contractor in coordination with AMSWE-PPX in the following manner:

(1) Estimate the total Direct Labor hours required for each Government GS grade.

(2) Multiply these totals by the respective step 5 hourly rate and add to get a total equivalent Government direct labor cost.

(3) Divide the total equivalent Government direct labor cost by the sum of the direct labor hours, regardless of grade, to obtain an average Government engineering hourly rate.

(4) Compare the average Government engineering hourly rate with the Step 5 hourly rates in the GS pay scale to determine the average grade level of skill employed.

(5) Compare the average grade level of skill with available information on the contractor's pay scale to estimate the average contractors engineering hourly rate.

c. The average contractor's engineering hourly rate is estimated to be \$6.69 per hour.

d. Engineering Direct Labor Hours and Costs for Fabrique Nationale or Conceptual Candidate are estimated to be 79,425.

3. Rationale for Estimating Engineering Material Costs (FSDWEMAT):

a. Engineering Materials are considered to consist of miscellaneous material used in performing the engineering effort for Full Scale Development. Layout paper, drafting supplied, bond paper, vollums, computer cards, and computer paper are typical major cost items in this category.

b. Engineering Material Costs are estimated to be:

275
660
160
660
1,755

A-2

4. Rationale for Estimating Engineering Overhead (FSDWEOH):

Based on historical data and information available in the Contract Pricing Division, AMSWE-PPX, the average Engineering Overhead Rate is estimated to be 184% of Engineering Direct Labor Cost.

*

1

5. Rationale for Estimating Other Direct Charges to Engineering (FSDWEOT):

a. This category includes the cost of travel and charges for computer time during Full Scale Development.

(1) The estimated computer costs are for programming and exercising a dynamic model of the weapon, a heat transfer and stress analysis model of the barrel, and analysis of Maintainability and Reliability as follows:

FY75	2,970
FY76	7,:00
76/77	1,330
FY77	7,100

Total Computer Cost 19,000

(2) The estimate of travel costs is as follows:

FY75	2,364.00
FY76	4,728.00
76/77	1,576.00
FY77	49,769.00

Supporting computations may be found under "Estimate of Travel Costs".

b. Other direct Charges to Engineering are summarized as follows:

	FY75	<u>FY76</u>	76/77	<u>FY77</u>
Computer Time Travel Costs	2,970 2,364	7,100 4,728	1,830 1,576	7,100 49,769
Total by FY	5,334	11,828	3,406	56,869

A-3

FY75 5,334 FY76 11,828 76/77 3,406 FY77 56,869 Total ODC \$77,437	Total ODC Total Mate Total Over Total Dire Total Dev.	head ct Labor	77,437 1,755 976,417 <u>531,353</u> ,586,962	
d. Estimate of Travel Costs			•	
Informal reviews at Rock Is	land $\frac{FY75}{3}$	$\frac{FY76}{6}$	<u>76/77</u> 2	<u>FY77</u> 6
3 days x 2 men x \$35/day	630	1,260	420	1,260
Car Rental 2 days-\$60/trip	180	360	120	360
Air Fare \$259 🛪 🕗 men	1,554	3,108	1,036	3,108
Support of APG Test (RDAT-D	r-II)			275 days
l man x \$35/day			\$9	,265
Car Rental @ \$30/day			\$8	,250
Air Fare \$355/28 days			\$9	,940
Support Test Fort Benning (DT-II)			180 days
l Man x \$35/day			\$6	,300
Car Rental x \$30/day			\$5	,400
Air Fare \$307/18 days			\$5	,526
Total Travel	\$2,364	\$4,728	1,576 \$4	9,769

1

366

z

'n,

NUMBERS III-A, B, C, AND D

BASIC ESTIMATED COST PACKAGE INITIAL LIMITED PRODUCTION OF 1000 WEAPONS

- A. XM233
- B. XM234
- C. XM235

ţ

1

D. BEST CONCEPTUAL AND FABRIQUE NATIONALE CONTENDER WEAPONS

.

Purpose of the Estimate:

To project the costs of four candidate designs.

Status of Development:

Presently the four candidate weapons are in Advanced Development. Approximately 10 weapons of each type have been built. Limited Production occurs after Full Scale Development during which approximately 100 weapons are to be built.

Assumptions:

1. Estimates were based on existing designs subject to the projected use of castings, forgings, stampings, moldings, extrusions, etc. where part configuration is amenable to these materials.

2. Estimates include jigs, fixtures, dies, etc. It is assumed that no tooling is available from prior development phases.

3. Plant facilities including general purpose equipment such as machine tools, presses, etc., will be available.

4. Production rate will be 100 weapons per month.

5. Costs for Package III-D are considered to be the average of III-A, III-B, and III-C costs.

1. PREPARING INSTALLATION

SARRI-LS-C

A REAL PROPERTY OF BUILDING

2.	SUP	PLIES OR SERVICES	TO BE PROC	URED	····		3. QUAI		4. PROD	UCTION RATE
L	im	ited Product	ion Cont	ract >	(M233		100	0	100/	mo.
		ad Automatic				6. v	TRUCTU	EAKDOWN RE LEVEL 4	7. ESTIM AS OF 30 NO	ATE PREPARE
		PRODUC	TION			E	TIMATE	D COSTS		REFERENC
		8	9	10	11		12	13	14	18
	с0	ST CATEGORIES	HOURS	RATE	RECURRING	NONRE	CURRING	TOTAL COST	UNIT CO	ST SCHEDUL
		ENGINEERING								
	1	DIRECT LABOR			326,676		1,870	458,546		
	2	MATERIAL			4,000		2,000			×
	3	OVERHEAD			414,671			575,098		
	4	OTHER			9,039		9,039	18,078		
	•	TOOLING							000000000000000000000000000000000000000	
	1	DIRECT LABOR						154,333		
_	2	MATERIAL			12,600			380,491		
4	3	OVERHEAD			28,189			169,766		
4	4	OTHER			-0-	-)	-0		·····
의	•	QUALITY CONTROL			56 600			FC COO	100.0000000000000	*****
	1	DIRECT LABOR			56,602			56,602		
-	2	MATERIAL			-0-			-0-		
-	1	OVERHEAD		1.149-070 1.49 1940	62,262			62,262		
\rightarrow	4	OTHER			-0-			-0-		
₽	÷	MANUFACTURING			426,318			426,318	******	222222
-	1	DIRECT LABOR			103,820			103,820		
-†	3	OVERHEAD		88866 1000000 10100	468,950			468,950		
	4	OTHER			-0-			400/930		
ε	-	PURCHASED EQUIPME	NT							
F		SUBCONTRACT							1	
G		MATERIAL OVERHEAD)						1	
н	•	OTHER			1000-004					
ιĪ	·	TOTAL COST LESS (G	AND A)		1330,134	94]	L,510	2880,264	L	
<u>ı</u>	•	GENERAL AND ADMIN	ISTRATIVE	68						
ĸļ	_	TOTAL COST						· · · · · · · · · · · · · · · · · · ·	 	
L	_	PROFIT OR FEE		10%	2260,587	100-	. 001	7750 700	l	
6.	·	TOTAL PRICE			2200,587	109	,001	3328,388	L	
	TYP	ED NAME AND TITL	E		SIGNATU	RE		EXTENSIO	N	DATE
R	ÔY	F. SCHWEGLE	R							
М	lec	hanical Engi	neer					4255	30	Nov 74
		IEWING OFFICIAL	·····							
	APP	ROVING OFFICIAL						1		

AMC FORM 1011-R

1

REPLACES ANC FORM 1011-R, 28 MAR 48, WHICH IS OBSOLETE

1. PREPARING INSTALLATION

SARRI-LS-C

		RI-LS-C									
		PLIES OR SERVICES					3. QUAN	YTITY	4. PRODU	CTION RATE	
		House Monito									
L	im	ited Product	ion Cont	ract			10	00	1	00	
5.	SYS	TEM(S) SUPPORTED	BY THIS PRO	CUREMEN	IT.	6.	WORK BRI			TE PREPARED	
S	qu	ad Automatic	Weapon	System	L		4	RE LEVEL	30 Nov 74		
		PRODUC	TION			E	STIMATE	REFERENCE			
		8	9	10	11		12	13	14	15	
	cc	OST CATEGORIES	HOURS	RATE	RECURRING	NONR	ECURRING	TOTAL COST	UNIT COS	T SCHEDULE	
		ENGINEERING					····				
4	;	DIRECT LABOR			149,440			149,440			
-	2	MATERIAL			-0-			-0-			
-	3	OVERHEAD			146,152	 		146,152			
-	4	OTHER			-0-	1		-0-			
	4	TOOLING							100000000000000000000000000000000000000	***	
-	• 1	DIRECT LABOR	<u> </u>								
+	2	MATERIAL			1						
-+											
+	3	OVERHEAD OTHER									
+	•		-						*****************		
4	÷	QUALITY CONTROL									
-	<u> </u>	DIRECT LABOR									
┥	2	MATERIAL									
-	1	OVERHEAD								888 888	
-	4	OTHER									
24	•	MANUFACTURING								***	
-	1	DIRECT LABOR									
-	2	MATERIAL									
-	3	OVERHEAD								8888	
	4	OTHER									
	•	PURCHASED EQUIPMI SUBCONTRACT							<u> </u>		
		MATERIAL OVERHEA	0						<u>+</u>	- +	
		OTHER	<u> </u>						<u> </u>	· +	
4		TOTAL COST LESS (C			295,592			295,592	<u>†</u>		
		GENERAL AND ADMIN							<u> </u>		
7		TOTAL COST							+		
4	-	PROFIT OR FEE	· · · · · · · · · · · · · · · · · · ·					· · · · · · · · · · · · · · · · · · ·			
		TOTAL PRICE			/7				1		
6.	TYP	PED NAME AND TITL	E		SIGNATU	RE		EXTENSIO	DN N	DATE	
R	OV	F. SCHWEGLE	D	1						·····	
		hanical Engi									
		IEWING OFFICIAL						4255	5 30	Nov 74	
'	HEV	IEWING OFFICIAL									
-		ROVING OFFICIAL									
	- - - - - - -	NUVINU UPPICIAL						4			
				1							

AMC FORM 1011-R

a construction of the second

REPLACES ANC FORM 1011-R, 28 MAR 48, WHICH IS DESOLETE

the same states a state and a second states and

J' Millinger

ł

1. PREPARING INSTALLATION

SARRI-LS-C

1

1

×

¢

¢.L

n.,

2. SUP	PLIES OR SERVICES	TO BE PROC	URED			3. QUAI		4. PRODUC	TION RATE
						1.0.0		100/	
11m;	ited Product:	ion Cont	ract	XM234		100	0	100/r	no
5. SYS	TEM(S) SUPPORTED	BY THIS PRO	CUREMEN	IT				7. ESTIMA	E PREPARED
Squa	ad Automatic	Weapon	System	u l		STRUCTU	RELEVEL	AS OF	nber 1974
				[JU110 461	1
	PRODUC	TION	r		E	STIMATE	D COSTS		REFERENCE
	8	9	10	11		12	13	14	15
co	ST CATEGORIES	HOURS	RATE	RECURRING	NONRE	CURRING	TOTAL COST	UNIT COS	SCHEDULE
A .	ENGINEERING				†		······································	1	-
1	DIRECT LABOR		l			2,515	460,475		*
2	MATERIAL			4,000		2,000	6,000		*
3	OVERHEAD			415,888					
4	OTHER			9,083	9	9,083	18,166		*
8 .	TOOLING							I	1
1	DIRECT LABOR			25,609	15	5,532	181,141		
2	MATERIAL			12,600					×
3	OVERHEAD			28,168			199,253		
4	OTHER			-0-		-0-	-0-		
c .	QUALITY CONTROL								
1	DIRECT LABOR			56,567			56,567		×
2	MATERIAL			-0-			-0-		
3	OVERHEAD			62,234			62,234		8
4	OTHER			-0-			-0-		
ρ.	MANUFACTURING								
1	DIRECT LABOR			426,148	L		426,148		×
2	MATERIAL			67,200	ļ		67,200		*
3	OVERHEAD			468,763	L		468,763		
- 4	OTHER			-0-			-0-		
E	PURCHASED EQUIPME	INT			_			J	+
F ·	SUBCONTRACT				 			+	
c ·	MATERIAL OVERHEAD	D							
H	OTHER			1004 220	003	022	2007 252	+	
<u> </u> ·	TOTAL COST LESS (C			1904,220	305	,033	2001,255	+	·· ·· · · · · · · · · · · · · · · · ·
<u>.</u>	GENERAL AND ADMIN	IS I KATIVE			 			+	+
	TOTAL COST PROFIT OR FEE							+	
	TOTAL PRICE			2220,321	1146	,216	3366,537	<u> </u>	+
16.	ED NAME AND TITL	£		SIGNATU	•		EXTENSI	DN N	DATE
	PARING OFFICIAL		+						
	F. SCHWEGLEI	R							
	nanical Engin						4255		ION 74
. REV	IEWING OFFICIAL		+				4433	, 30 1	lov 74
									-
. APP	ROVING OFFICIAL		+						
			1						

AMC FORM 1011-R

1

REPLACES AND FORM 1011-R, 28 MAR 68, WHICH IS OBSOLETE

1. PREPARING INSTALLATION

SARRI-LS-C

		KI-15-C								
		PLIES OR SERVICES					3. QUAN	ITITY	4. PRODUCT	TION RATE
		House Monito								
Ŧ	,in	nited Product	ion Con	tract			10	00	100/mo	
						1.				
		TEM(S) SUPPORTED					WORK BRE	RE LEVEL	7. ESTIMAT	E PREPARED
S	βqu	ad Automatic	Weapon	Syster	n		4		30 Nove	ember 197
		PRODUC	TION			E	STIMATEC	COSTS		REFERENCI
			·····	T					<u> </u>	
	-	8	9	10	11		12	13	14	15
	cc	ST CATEGORIES	HOURS	RATE	RECURRING	NONRI	ECURRING	TOTAL COST	UNIT COST	SCHEDUL
		ENGINEERING							<u>+</u>	
1	1	DIRECT LABOR	1. d.d. 200 (000	The second s	149,440	1 =	7	149,440		1
-1	2	MATERIAL								
1	3	OVERHEAD			146,152	1		146,152		
1	4	OTHER				I				
B	•	TOOLING		I					I	
1	. 1	DIRECT LABOR								
Ì	2	MATERIAL								
Ι	3	OVERHEAD								
Ι	4	OTHER								
c	•	QUALITY CONTROL								
Ι	1	DIRECT LABOR	1							
	2	MATERIAL				J				
	3.	OVERHEAD				L				
_	4	OTHER								
24		MANUFACTURING								
-	1	DIRECT LABOR				 				
4	2	MATERIAL								8
-	3	OVERHEAD				 		······································		8
	4	OTHER				 				4
E F	•	PURCHASED EQUIPME				<u>├</u> ──			<u>+</u>	
5		MATERIAL OVERHEAL	D			<u> </u>			+	ł
м Н		OTHER				†				1
Ť		TOTAL COST LESS (C	GANDA)		295,592			295,592	1	
ī	•	GENERAL AND ADMIN							1	1
ĸĪ	•	TOTAL COST							1	
I	•	PROFIT OR FEE								
1	•	TOTAL PRICE							1	1
6.	TYF	ED NAME AND TITL	£		SIGNATU	RE		EXTENSIO	N	DATE
R	OY.	F. SCHWEGLE			·····					
М	ec	hanical Engi	neer					4255	30	Nov 74
R	REV	IEWING OFFICIAL		1						
	APP	ROVING OFFICIAL						+		
										.•
										•

AMC FORM 1011-R

/

REPLACES AMC FORM 1011-R, 28 MAR 66, WHICH IS OBSOLETE

4

Ý

(ANCR 715-22)

1. PREPARING INSTALLATION

٢

.

.

4

		PLIES OR SERVICES			XM235	3.	QUAN 1(1717¥ 000		MO.	
		stem(s) supported ad Automatic						EAKDOWN RE LEVEL	7. ESTIM		ED
		PRODUC	TION			ESTI		COSTS		REFEREN	NCE
		8	9	10	11	12		13	14	15	
	c	DST CATEGORIES	HOURS	RATE	RECURRING	NONRECUP	RRING	TOTAL COST	UNIT CO	DST SCHEDU	IL E
T	•	ENGINEERING			275,978	111,9	976	387,954	<u> </u>		
	1	DIRECT LABOR			4,000		000	6,000			
1	2	MATERIAL			348,439			484,130			
1	3	OVERHEAD]	8,089		089	16,178			
1	4	OTHER									
		TOOLING			-		1				
4	1	DIRECT LABOR	teres en antitite passe	finner ind	21,169	123,7	726	144,895			
┫	2	MATERIAL			10,400			390,409			
-†		OVERHEAD			23,285	136,0		159,382			
╉	4	OTHER			-0-			-0-			
:†		QUALITY CONTROL									
4		DIRECT LABOR			46,748	<u> </u>		16 740			
+	1	MATERIAL			-0-			46,748			
╉	2	000000000000000000000000000000000000000						-0-	*****		
╉	3	OVERHEAD			51,423			51,423			
+	4	OTHER			-0-			-0-			
4		MANUFACTURING									
+		DIRECT LABOR			<u>351,712</u> 84,000			351,712 84,000	***************		
+	2	· · · · · · · · · · · · · · · · · · ·			386,883	-		386,883			
┥	3	OVERHEAD			200,003			300,883			
+	4	OTHER									
H	•	PURCHASED EQUIPME							+		
-	•	SUBCONTRACT							<u> </u>		
4		MATERIAL OVERHEAD	U						ł		
4	·	OTHER			1612 126	007 5	- 0.0	2500 714	<u> </u>		
ł	•	TOTAL COST LESS (C			1612,126	89/12	88	2509,714	 		
+	•	GENERAL AND ADMIN	ISTRATIVE								
4	<u>.</u>	TOTAL COST							t		
t	<u>.</u>	PROFIT OR FEE TOTAL PRICE			1879,739	1046.5	88	2926.327	<u> </u>		
ы. В.		LIVIAL INVE		T				T	+	J	
		PED NAME AND TITL	E		SIGNATU	RE		EXTENSIO	N	DATE	
		PARING OFFICIAL F. SCHWEGLEI	D								
								4255	30	Nov 74	
1410		hanical Engin	neer				_	T6.00		400 /4	
	REV										
	APF	PROVING OFFICIAL									

AMC FORM 1011-R

1

REPLACES ANC FORM 1011-R, 28 MAR 68, WHICH IS OBSOLETE

(AMCR 715-22)

1. PREPARING INSTALLATION

SARRI-LS-C

5.	ARI	RI-LS-C										
2.	SUP	PLIES OR SERVICES	TO BE PROC	URED			3. QUAI	NTITY	4. PI	RODUCT	ION RATE	
I	n-l	House Monitor	ring of :	XM235								
1	im	ited Product:	ion Cont	ract			1	000	1	00/mc	•	
5.	SYS	STEM(S) SUPPORTED	BY THIS PRO	CUREMEN	IT.			EAKDOWN RE LEVEL	7. E	STIMATE S OF	PREPARED	
S	qua	ad Automatic	Weapon	System			4	HE LEVEL	30ີ	Noven	ber 1974	
		PRODUC	TION				STIMATE					
		PRODUC							REFERENCE			
		8	9	10	11		12	13		14	15	
	cc	DST CATEGORIES	HOURS	RATE	RECURRING	NONRE	CURRING	TOTAL COST	UNI	T COST	SCHEDULE	
		ENGINEERING										
	1	DIRECT LABOR			149,440	1		149,440				
	2	MATERIAL			-0-			-0-				
	3	OVERHEAD			146,152			146,152				
	4	OTHER			-0-			-0-				
B		TOOLING										
	1	DIRECT LABOR										
	2	MATERIAL										
	3	OVERHEAD										
	4	OTHER										
с		QUALITY CONTROL										
	1	DIRECT LABOR		L								
	2	MATERIAL										
	3	OVERHEAD				ļ						
	4	OTHER				ļ						
D		MANUFACTURING			·	·				000000000000000000000000000000000000000		
_	1	DIRECT LABOR		000000000000000000000000000000000000000								
	2	MATERIAL										
	3	OVERHEAD										
	4	OTHER										
E	•	PURCHASED EQUIPME							+			
F		SUBCONTRACT MATERIAL OVERHEAD							+			
н		OTHER							<u> </u>			
ī		TOTAL COST LESS (G	AND A)		295,592	·		295,592	†			
1		GENERAL AND ADMIN							1			
ĸ	•	TOTAL COST								1		
ι	•	PROFIT OR FEE										
M	•	TOTAL PRICE										
16.	TYF	PED NAME AND TITL	E		SIGNATU	RE		EXTENSIO				
	PREPARING OFFICIAL ROY F. SCHWEGLER											
Me	Aechanical Engineer							4255		30 No	v 74	
b .	REV	IEWING OFFICIAL		t				+	-+			
t .	APPROVING OFFICIAL						<u>.</u>			<u> </u>		
											•	

AMC FORM 1011-R

REPLACES AMC FORM 1011-R, 28 MAR 48, WHICH IS OBSOLETE

374

(AMCR 715-22)

1. PREPARING INSTALLATION

SARRI-LS-C

t

=

2.	SUP	PLIES OR SERVICES	TO BE PROC	URED		3. QUA	NTITY	4. PRODUCT	ION RATE	
		mited Productic N or BC	on Contrac	t		100	0	100/Mo 7. ESTIMATE PREPARI AS OF 30 Nov 74 REFEREN 14 15 TUNIT COST SCHEDU		
5.	SYS	TEM(S) SUPPORTED	BY THIS PRO	CUREMEN	NT		REAKDOWN	AS OF		
	Sq	uad Automatic W	leapon Sys	stem		4		3	0 Nov 74	
		PRODUC	TION			ESTIMATE	D COSTS		REFERENCE	
		6	9	10	11	12	18	14	18	
	co	ST CATEGORIES	HOURS	RATE	RECURRING	NONRECURRING	TOTAL COST	UNIT COST	SCHEDULE	
A	•	ENGINEERING								
	1	DIRECT LABOR			310,205	125,453	435,658			
	2	MATERIAL			4,000	2,000	6,000			
	3	OVERHEAD			392,999	152,478	545,477			
	4	OTHER			8,737	8,737	17,474			
	•	TOOLING								
	1	DIRECT LABOR			24,135	135,988	160,123			
	2	MATERIAL			11,866	366,468	378,334			
	3	OVERHEAD			26,547	149,586	176,133		4	
_	4	OTHER			-0-	-0-	-0-		-	
c	•	QUALITY CONTROL					ļ			
	1	DIRECT LABOR			53,306		53,306			
	2	MATERIAL			-0-		-0-			
	3	OVERHEAD			58,640		58,640			
_	4	OTHER			-0-		-0-			
D	•	MANUFACTURING						-		
-	1	DIRECT LABOR		0.000000000	401,393		401.393			
_	2	MATERIAL			85,007		85,007			
_	3	OVERHEAD		*****	441.532		441,532			
	4	OTHER					<u></u>			
E	. :-	PURCHASED EQUIPME	INT		h		· · · · ·	+	<u> </u>	
F	•	SUBCONTRACT						+	<u> </u>	
G	•	MATERIAL OVERHEAD	<u>,</u>					+		
<u>н</u>	•	OTHER			1,818,367	940 710	2,759,077	+		
╎	<u> </u>	GENERAL AND ADMIN			1,010,30/	510,710	2,733,077	+		
-+		TOTAL COST	STRATIVE				+	1		
<u>K</u>	-	PROFIT OR FEE						+		
		TOTAL PRICE			2,120,216	1,096,868	3,217,084	+		
6.		PED NAME AND TITLE	E		SIGNATU		EXTENSI	DN	DATE	
F	ROY lec	F. SCHWEGLER	er				4255	30 No	vember 74	
•	REV	IEWING OFFICIAL							2	
	APP	ROVING OFFICIAL			····	<u> </u>				

AMC FORM 1011-R

1

REPLACES AMC FORM 1011-R, 28 MAR 68, WHICH IS OBSOLETE

1. PREPARING INSTALLATION

SARRI-LS-C

			TO 85 8800				3. QUAN		4. P	RODUCT	ION RATE		
		PLIES OR SERVICES											
		House Mon tori duction Contra		or BC L	.imited		100	00		100/	Мо		
5.	SYS	TEM(S) SUPPORTED	BY THIS PRO		T	6.	WORK BRI		7. E	STIMATE			
		ad Aurcmatic W				1		RELEVEL		S OF 30	Nov 74		
				CCIII				<u>'</u>					
		PRODUC	TION				ESTIMATED	COSTS			REFERENCE		
		8	9	10	11	ļ	12	13		14	16		
	сс	ST CATEGORIES	HOURS	RATE	RECURRING	NONF	ECURRING	TOTAL COST	UN	IT COST SCHEDU			
A		ENGINEERING			-								
	1	DIRECT LABOR			149,440			149,440					
	2	MATERIAL			-0-			-0-					
	3	OVERHEAD			146,152			146,152					
	4	OTHER			-0-			-0-					
		TOOLING											
	1	DIRECT LABOR				L							
	2	MATERIAL											
	2	OVERHEAD											
	4	OTHER		a and and		ļ							
c	•	QUALITY CONTROL							-				
	1	DIRECT LABOR											
_	2	MATERIAL									·····		
	1	OVERHEAD											
_	4	OTHER											
₽	•	MANUFACTURING											
	1	DIRECT LABOR		· · · · · · · · · · · · · · · · · · ·									
	2	MATERIAL			×								
_	3	OVERHEAD							20000 20000				
_	4	OTHER		<u>12 (2000) 100000</u>						******			
E F		PURCHASED EQUIPMI SUBCONTRACT							+		·		
G	•	MATERIAL OVERHEA	n		····				+-				
н Н		OTHER							1				
ï		TOTAL COST LESS (C	AND A)		295,592			295,592	1				
1	•												
ĸ		TOTAL COST											
_		PROFIT OR FEE								- 2 Q			
MI	•	TOTAL PRICE							1				
6.	TYP	ED NAME AND TITL	E		SIGNATU	RE		EXTENSIC	N	14 15			
		PARING OFFICIAL		1									
		F. SCHWEGLER						1					
		hanical Enginee	er	ļ				4255		30 Nov	ember 74		
•	REV	ILWING OFFICIAL											
•	APP	ROVING OFFICIAL											
		FORM JOLL O											

AMC FORM 1011-R

1

et a

REPLACES AMC FORM 1011-R, 28 MAR 40, WHICH IS OBSOLETE

	VMODD	VM2 24	XM235	BC/FN <u>A+B+C</u>
	XM233	XM234	XM2 33	5
2.0 Investment Nonrecurring				
2.1 Contract				
2.11 Initial Prod Facilitie	5			
Engineering				
Direct Labor	131,870	132,515	111,976	
Material	2,000	2,000	2,000	
Overhead	160,427	161,315	135,691	
Other Direct Chgs.	9,039	9,083	8,089	
2.12 Initial Prod Fac.				
Tooling	120 706	155 522	123,726	
Direct Labor	128,706 367,891	155,532 351,503	380,009	
Material Overhead	141,577	171,085	136,097	
Other Direct Chgs.	-0-	-0-	-0-	
2.13 Other	-0-	-0-	-0-	
2.14 Total Cost	941,510	983,033	897,588	940,710
2.15 G&A 6%	••••	,		
2.15 Profit 10%				
2.17 Total Price	1,097,801	1,146,216	1,046,588	1,096,868
3.0 Investment Recurring				
3.1 Contract				
3.11 Production				
3.111 Engineering				
Direct Labor	326,676	327,960	275,978	
Material	4,000	4,000	4,000	
Overhead	414,67	415,888	348,43 9 8,089	
Other Direct Chys.	9,039	9,083	0,009	
3.112 Tooling(maintenance o Direct Labor	25,627	25,609	21,169	
Material	12,600	12,600	10,400	
Overhead	28,189	28,168	23,285	
Other Direct Chgs.	20,105	20,100		
3.113 Manufacturing				
Direct Labor	426,318	426,148	351,712	
Material	103,820	67,200	84,000	
Overhead	468,950	468,763	386,883	
Other Direct Chgs.				
3.114 Quality Control				
Direct Labor	56,602	56,567	46,748	
Material	-	-	- -	
Overhe ad	62,262	62,234	51,423	
Other Direct Chgs.	-0-	-0- -0-	-0- - 0 -	
3.115 Other	-0- 1 029 754	1,904,220	1,612,126	1,818,367
3.116 Total Cost	1,938,754	1,504,220	1,012,120	1,010,307

ŧ

	XM233	XM2 34	XM235	BC/FN <u>A+B+C</u> 3
3.117 G&A 6% 3.118 Profit 10%				
3.119 Total Price	2,260,587	2,220,321	1,879,739	2,120,216
3.12 Engineering Changes (Included in 3.111)				
3.13 FDT	-	-	-	-
3.14 MWO's	-	-	-	-
3.2 In-House				
3.21 Production				
3.211 Engineering (Supervisio		oring of contra	ictors)	
Direct Labor	149,440	149,440	149,440	
Material Overhead Other Direct Chas	146,152	146,152	146,152	
Other Direct Chgs. 3.3 Quantity (Units Produced) 3.4 Total In-House	1,000 295,592	1,000 295,592	1,000 295,592	295,592
			-	

「日本」」のありたいのであるとうないない

et.



Ĵ.

NUMBER IV-A

BASIC COST ESTIMATE PACKAGE FULL SCALE PRODUCTION XM233 IN 6.00MM

THE PROPERTY AND

1

(AMCR 715-22) (On R&D Drawings)

		PLIES OR SERVICES	TO BE PROC	IRED		J. QUA		M 75-a	TION RATE	
		VS, Maremont			8	0,000	2,000/mo.			
	SYS	TEM(S) SUPPORTED	BY THIS PRO	CUREMEN	Ŧ		IEAKDOWN JRE LEVEL 4	AS OF	TE PREPARED Oct 74	
-		PRODUC	TION			ESTIMATE				
-			9	10 11		12	13	14	15	
	co	ST CATEGORIES	HOURS	HATE	RECURRING	NONRECURRING	TOTAL COST	UNIT COS	T SCHEDI	
1	•	ENGINEERING					290,90	6 3.63	6	
1	1	DIRECT LABOR	20,779	7.00	145,453		145,45			
ļ	2	MATERIAL								
J	3	OVERHEAD		100%	145,453		145,45	3		
I	4	OTHER								
ļ	•	TOOLING					1,653,77		2	
ļ	1	DIRECT LABOR	37,119	5.85	217,517		217,51			
	2	MATERIAL			1,218,740		1,218,74	0		
	- 3	OVERHEAD OTHER		1007	217,517		217,51	7		
		QUALITY CONTROL					351,564	4 4.39		
1		DIRECT LABUR	41,556	4,23	175,782		175.78			
İ	2	MATERIAL		<u>_</u>						
	1	OVERHEAD		100%	175,782		175,78	2		
1	4	OTHER								
	•	MANUFACTURING					48,438,28	1 605.479)	
]	1	DIRECT LABOR	1,620,30	5.17	8,376,951		8,376,95			
	2	MATEHIAL			18,197,488		18,197,488	3		
	3	GVERHEAD		2617	21,863,842		21,863,84	2		
•		OTHER	1							
•		PURCHASED EQUIPM	NT							
i		SUBCONTRACT					+			
i	-	MA "ERIAL OVERHEAD	D				+			
		OTHER					50 70/ 50	(2) 100		
ł		GENERAL AND ADMIN		67			50,734,52			
ł		TOTAL COST		6%			53,778,597			
		PROFIT OR FEE		10%		-	5,377,860			
l		TOTAL PRICE					59,156,457			
•		PED NAME AND TITL	E	:	SIGNATU	RE	EXTENSI	ON	DATE	
-		PARING OF FICIAL								
		HAEL H. TANAKA			•					
Industrial Engineer				mie	had H.	Jana ka	4207		at 7/	
	REV	IEWING OFFICIAL							ct 74	
		NIS W. MEREDIT		0	hall H.	VI AT	-			
	_	Price Dev & Te	ech An Br	lain	nis . !	firedit	ال 4207	9 0	ct:74	
		HOVING OFFICIAL			11.	1				
		H. COFFENBERRY	iaina Di-	111 +	1 Crkla	nhen	1			
1	OUT.	ef, Contract Pi	TCTUB DIA	; curr	· - 1 / 1		1 4831-21	8 9 0	ct 74	

d'

NUMBER IV-B

No Print and the second of the second of the second of the

.

i.

Saturday Bered to Britter Halanse &

BASIC COST ESTIMATE PACKAGE FULL SCALE PRODUCTION XM234 IN 6.00MM A REAL PROPERTY AND A REAL

* 61

(On R&D Drawings)

1. PREPARING INSTALLATION

AMCAD-DDV-DD

ARMCOM 75-b

	SAR-PPX-PD	TO BE PROC	JRED		ARMCOM 75-b 3. QUANTITY 4. PRODUCTION RATE						
	WS, Philco-Ford					80,000	2,000/mo. 7. ESTIMATE PREPARE AS OF 9 Oct 74				
SYS	TEM(SI SUPPORTED	BY THIS PRO	CUREMEN	т		REAKDOWN URE LEVEL 4					
	PRODUC	TION			ESTIMAT	ED COSTS		REFERENC			
	•	•	10	10 11		13	14	15			
co	ST CATEGORIES	HOURS	HATE	RECURRING	NONRECURRIN	G TOTAL COST	UNIT COST	SCHEDI			
	ENGINEERING					290,906	3.636	<u>}</u>			
1	DIRECT LABOR	20,779	7.00	145,453		145,453					
2	MATERIAL										
3	OJERHEAD		100%	145,453		145,453	L				
4	OTHER										
•	TOOLING	L				1,749,494					
1	DIRECT LABOR	44,852	5.86	262,833		262,833					
2	MATERIAL		1002	1,223,823		1,223,828					
2_	OVERHEAD		100%	262,833		262833					
-	OTHER					351,564	4.395				
<u>.</u>	QUALITY CONTROL	41,550	4,23	175,782		175,782					
	DIRECT LABOR	41,550	4,25	175,702	· ·			<u> </u>			
2	MATERIAL OVERHEAD		1007;	175,782		175,782					
	OTHER		10075	1/3,/04		1/3,/02		<u>+</u>			
	MANUFACTURING					42,102,738	526.284	f			
1	DIRECT LABOR	1,019,534	5.17	8,372,991		8,372,991		<u> </u>			
2	MATERIAL			11.876.240			-	1			
3	OVERHEAD	•	261%	21,853,507		11,876,240 21,853,507					
	OTHER						1.1.1				
	PURCHASED EQUIPME	NT									
	SUBCONTRACT										
	MATERIAL OVERHEAD	D									
·	OTHER	1.5/()	· · · · · ·			44 404 700	556 19/	+			
-	GENERAL AND ADMIN		67			44,494,702	33.371				
	TOTAL COST		<u> </u>			47.164.384					
	PROFIT OR FEE		10%			4,716,438					
\cdot	TOTAL PRICE		- - -			51, 380, 822					
TYP	ED NAME AND TITL	E		SIGNATUR	EXTENSI	DN	DATE				
	PARING OFFICIAL										
MIC	HAEL H. TANAKA		m	1 . 6 71	1 1						
Industrial Engineer JAC				half H.	Janak	4207	<u>9 Oc</u>	t 74			
	NIS W. MEREDIT	н	0	1	M n-	+1					
	Price Dev & T		lin	nis Tr.)	firede	CM 1007					
APP	ROVING OFFICIAL	een an br				4207	9 Oc	t 14			
W.	H. COFFENSEFRY		lu.t	t. Citle	ulien.	4					
ULL	ef, Contract P	ricing Div	U -	11		4831-21	3 9 Oc	- 74			

3

-

NUMBER IV-C

under hannen bei in allen der der eine

BASIC COST ESTIMATE PACKAGE FULL SCALE PRODUCTION XM235 IN 6.00MM

PRE	PARING INSTALLAT	IGN					u			
	SAR-PPX-PD		7,96			ARMCOM	75 - c	•		
	PLIES OR SERVICES	TO BE PROC	URED		3. QUANTI 80,0		. 1	7 other -	CTION RATE	
	TEM(S) SUPPORTED	BY THIS PRO	JREMENT 6. W			1		8,000/mo. 7. ESTIMATE PREPARED AS OF 9 Oct 74		
	PRODUCT	ESTIN			TIMATED COSTS		90	REFERENCE		
		9	10	11	1	2	1.8	14	15	
со	ST CATEGORIES	HUUHS	HATE	RECURRING	101620	્રસ્થાવત	TUTAL COST	UNIT COST	SCHEDI	
Ι.	ENGINEERING						290,906	3.636		
1	DIRECT LABOR	20,779	7.00	145,453			145,453			
2	MATERIAL									
13	OVERHEAD		100%	145,453			145,453			
4	TOOLING						1,401,280	17.516		
4	DIRECT LABOR	J6.239	5.86	212.361			212,361			
2	MATEPIAL		/	976,558						
1.1.	OVERHEAD OTHER		1 00%	212,361			976,5 58 212,361	2		
•	QUALITY CONTROL						351,564	4.395	·	
5	DIRECT LABOR	41,556	4.23	175,782			<u>175,782</u>			
2	MATERIAL		1007	195 300						
12	OVERHEAC		100%	175,782	· • • • • • • • • • • • • • • • • • • •		175,782			
	MANUFACTURING						33,931,324	1.24 1/12		
1	DIRECT LABOR	1,338,170	5.17	6,918,339			6,918,339			
2	MATERIAL			9,956,120			8,956,120			
	OVERHEAD		261%	18,056,865			18,056,865			
	OTHER	<u> </u>								
	PURCHASED EQUIPME	<u>NI</u>								
J	MATERIAL OVERHEAD)			······			1		
1	OTHER									
	TOTAL COST LESS (C						35,975,074	and the second se		
	GENERAL AND ADMIN	STRATIVE	6%				2,158,504			
' ;	TOTAL COST		0%				38,133,578			
	PROFIT OR FEE		<u>U/e</u>				3,813,358 41,946,936			
TIPED NAME AND TITLE				SIGNATUF			EXTENSIO	ł	DATE	
PREI	PARING OFFICIAL									
MIC Ind	HAEL H. TANAKA ustrial Enginee	ma	ichael H	. Le	no.ka	4207	9 Oct	74		
REV	IEWING OFFICIAL			A			/			
Ch,	NIS W. MEREDITH Price Dev & Te		Den	ichael H mis M.	Mec	dit.	4207	9 Oct	74	
	ROVING OFFICIAL		i i	11 11 .						
". Chi	H. COFFENBERRY ef, Contract Pr	ricing Div	ω	H. Coff.	ent	unj	4831-21	8 9 Oct	74	

にいいのか

384

ł

1. P

ł

)

NUMBER IV - D

1

BASIC COST ESTIMATE PACKAGE FULL SCALE PRODUCTION FABRIQUE NATIONALE OR BEST CONCEPTUAL WEAPON

(AMCR 715-22)

NUMBER IV-D

1. PREPARING INSTALLATION

. SU	PPLIES OR SERVICES	TO BE PROC	URED		3.	QUAN	TITY	4. PRODUCTION RATE		
SA	WS Fabrique	Nationa	le or				ĺ			
	Best Con			1			80,000	2000/M	ο.	
. SY	STEM(S) SUPPORTED	BY THIS PRO	CUREMEN	STRUCTURE LE						
Sc	quad Auotmati	c Weapon	Syste				RELEVEL	EVEL AS OF 9 Oct 74		
	PRODUC	TION					COSTS		REFERENCE	
	8 9			10 11			13	14	18	
c	OST CATEGORIES	HOURS	RATE	RECURRING	NONRECU	RING	TOTAL COST	UNIT COST	SCHEDULE	
Ι.	ENGINEERING						290,906	3.636		
1	DIRECT LABOR	20,779	7.00	145,453			145,453			
1 2	MATERIAL									
3	OVERHEAD		100%	145,453			145,453			
4	OTHER									
.	TOOLING						1,601,513			
1	DIRECT LABOR	39,403	5.86	230,902			230,902			
2	MATERIAL		1004	1,139,709			1,139,709	A A A A A A A A A A A A A A A A A A A		
1	OVERHEAD		100%	230,902			230,902		·	
	OTHER QUALITY CONTROL						351,564	4.395		
	DIRECT LABOR	41,556	4.23	175,782			175,782			
1 2	MATERIAL			1/01/02		+	1191102			
1	OVERHEAD		100%	175,782			175.782			
4	OTHER									
$\overline{1}$	MANUFACTURING						41,490,773	A contract of the second second second second second second second second second second second second second se		
1	DIRECT LABOR	1,526,00	5.17	7,889,425			7,889 425			
2	MATERIAL			13,009,949			13,009,949			
3	OVERHEAD		261%_	20,591,399			20,591,399			
4	OTHER									
	PURCHASED EQUIPME SUBCONTRACT							t		
	MATERIAL OVERHEAD)				+				
1.	OTHER									
•	TOTAL COST LESS (G	AND A)					43,734,756	546.685		
	GEHERAL AND ADMIN	STRATIVE	6%				2,624,085			
4.	TOTAL COST		<u> </u>		<u></u>		46,358,841			
. ·	PROFIT OR FEE		0%				4,635,884			
<u>↓↓ -</u> ▶.	TOTAL FRICE						50.994.726	1 637 434		
	PED NAME AND TITL	Ľ		SIGNATURE			EXTENSIC)N	DATE	
R	PARING OFFICIAL DY F. SCHWEGL	ER								
	chanical Eng				4255 6		May 75			
	VIEWING OFFICIAL						+			
API	PROVING OFFICIAL						+			
									.•	

AMC FORM 1011-R

1.

REPLACES ANC FORM 1011-R, 28 MAR 68, WHICH IS OBSOLETE

8 p

)

DISTRIBUTION

Commander US Army Armament Command ATTN: AMSAR-RDG 3 AMSAR-PPX 1 AMSAR-PPM 1 AMSAR-CP 1 AMSAR-CPE 1 Commander US Army Material Command 5001 Eisenhower Avenue Alexandria, VA 22333 ATTN: AMCAM-L 1 AMCRD 1 HQ, DA ATTN: DAMA-PPM-I 3 Commander Defense Documentation Center for Scientific and Technical Information Cameron Station Alexandria, VA 22314 ATTN: Document Service Center 2 Commander Rock Island Arsenal Rock Island, IL 61201 ATTN: SARRI-LS 8 Commander Frankford Arsenal Bridge & Tacony Streets Philadelphia, PA 19137 ATTN: SARFA-MDS 2

í