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ALTERNATIVE MAINTENANCE STUDY

FOR THE

QUICK RESPONSE MULTICOLOR PRINTER SYSTEM

UNITED STATES ARMY TOPOGRAPHIC ENGINEERING CENTER

FORT BELVOIR, VIRGINIA

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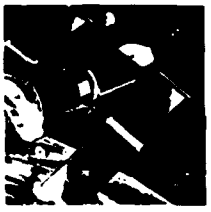

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This document compares Contractor maintenance with Military maintenance for a Computer-base topographic production, battlefield system. The system is comprised of GFE and COTS-NDI equipment. A cost analysis of maintenance alternatives is included.

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Forward

The government acquisition process has provided the military with supplies ever since Valley Forge when General George Washington began procuring items in lots. This 18th century general was actually procuring Commercial-Off-The-Shelf, Non-Developmental items.

At the end of the 19th century, the Research & Development (R&D) aspect of logistics was gaining momentum in providing the military with more military-specific items. R&D became the standard acquisition starting point for new military items. This acquisition process was used for decades throughout the 20th century with only occasional modifications.

Recently, Commercial-Off-The-Shelf and Non-Developmental Item acquisition has been rediscovered. COTS-NDI acquisition has saved time and money although leaving some logisticians a bit shaky at learning a new twist to the decades old tried and true process. Now consider a Research & Development group who, because they are developers and must prove a system first, have procured several vendors products to develop a much needed system. They must now try to figure out how to support the entire system.

This isn't wrong, it's just different. But "different" causes logistical tremors, and possibly some original thinking that may produce the next time and money saving idea.

The following is a quote from the handbook SD-2 entitled "Non-developmental Item Program: Buying NDI" by the Office of the Assistant Secretary of Defense (Production and Logistics) Washington, D.C.

Integrated Logistics Support

Integrated logistics support (ILS) is often the most difficult aspect of NDI acquisitions. Shortened schedules, technology-driven configuration changes, and greatly extended service life all contribute to the challenge of NDI support. Every NDI acquisition requires an individualized logistics support strategy based upon the program's characteristics. The development and execution of an NDI support strategy resolving these problems will require innovative and nontraditional logistic support approaches.

End quote.

Abstract

The purpose of this study is to perform an analysis of maintenance alternatives for the QRMP System Commercial-Off-The-Self, Non-Developmental-Items to determine which maintenance method will be the most cost effective and advantageous to the Government.

The analysis included an evaluation of Contractor Logistics Support (CLS), the Army standard four-level maintenance system, and combinations thereof. Military standard items maintained by the Army maintenance system (ISO shelter, generator, vehicle, etc.) are not included in the study.

Interim contractor support (ICS) is an option to use in the transitional short-term. ICS was not evaluated for long-term support.

The U.S. Army has an electronics maintainer already performing maintenance on similar types of equipment. This precludes the need for initiating a new maintainer although the maintenance training on the QRMP components would have to be added to this maintainer's inventory of components he or she repairs.

The QRMP is a battlefield system that would require support in battlefield conditions. This requirement could be a detriment to the QRMP operations if support cannot be provided in all instances.

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Summary

The maintenance cost estimate results show no appreciable cost difference between total contractor support and total organic support.

The total CLS support is $11,597.00 more than the total Organic support over the 20 year operational life of the system. This is an average of $580.00 per year.

The U.S. Army will be risking battlefield support if a contractor is chosen to provide maintenance support for the QRMP.

The U.S. Army has the technical capability and support to provide maintenance to the QRMP on the battlefield.

The report recommends that a contractor provide Interim Contractor Support for FY-94(95) and during FY-94(95), the Army implement a combination of organic support and contractor support to be functional at the start of FY-95(96).

The implementation of the combined support consists of operator/crew Preventive Maintenance Checks and Services (PMCS) performed by the 81-Q MOS, direct and general support maintenance performed by the 29-J MOS, and depot support maintenance performed by the contractor.

In addition add the repair of the digitizer and plotter in the Digital Topographic Support System (DTSS) to the 29-J MOS and let the 29-J MOS be familiarized or trained to repair the CHS-II components.

1.0 Introduction

1.1 Subject.

The subject of this study is the commercial-off-the-shelf (COTS) portion of the Quick Response Multicolor Printer System (QRMP System). The QRMP System consists of the following COTS items:

a. Front End Workstation,
b. File Server System,
c. Medium Format Scanner/Printer, and
d. Large Format Scanner/Printer.

As set forth by the Project Manager, QRMP System, the usage of the term "QRMP System" shall pertain to the COTS items installed within the ISO shelter and includes the vehicle, generator, air conditioners, and all other Associated Support Items of Equipment (ASIOE). The usage of the term "QRMP" alone shall pertain only to the COTS items.

1.2 Purpose.

The purpose of this study is to perform an analysis of maintenance alternatives for the QRMP COTS items to determine which maintenance method will be the most cost effective and advantageous to the Government.

1.3 Scope.

The analysis will include an evaluation of Interim Contractor Support (ICS), Contractor Logistics Support (CLS), the Army standard four-level maintenance system, and combinations thereof. Military standard items maintained by the Army maintenance system (ISO shelter, generator, vehicle, etc.) are not included in the study.

1.4 Organization.

This report is organized and presented in accordance with American National Standard Z39.18-1987, "Scientific and Technical Reports - Organization, Preparation, and Production."

1.5 Commercial-Off-The-Shelf Non-Developmental Item.

From AMC/TRADOC Pamphlet 70-2, "Material Acquisition Handbook" Chapter 17, Non-Developmental Item (NDI) is a generic term that covers material available from a variety of sources with little or no development effort by the Army. NDIs are normally selected from:

a. Commercial sources (may require ruggedization or militarization)
b. Material developed and in use by other United States

military services or Government agencies.

c. Material developed and in use by other countries.

End Quote.

A Commercial-Off-The-Shelf item is a type of Non-Developmental Item.

2.0 Methods, Assumptions, and Procedures

2.1 Methods.

The methodology used for the QRMP Alternative Maintenance Study is the standard approach for technical research; weigh the evidence pro and con and then arrive at a carefully reasoned solution. Data was collected from personal interviews, Government meetings, QRMP System documents, Army logistics and maintenance documents, and reports from the Defense Technical Information Center (DTIC).

2.2 Assumptions.

2.2.1 Repair/Spare Parts.

The QRMP is subject to periodic technological upgrade. Every five or so years a better component may be acquired to enhance the QRMP's capabilities or products. Even though the present vendors can be queried for parts supply support, this does not reflect on future vendors capability to supply parts. We will assume present and future vendors will supply parts or in the event they cannot supply parts, the Government will not procure their products. The system must be supportable.

2.2.2 Contractor.

For purposes of this study, we will assume the Contractor will:

a. be a single maintenance support entity,

b. be capable of maintaining the QRMP after receiving maintenance training and parts supply agreements from the various QRMP component vendors, and

c. have the world-wide resources available to support the system.

2.2.3 Unit-level Maintenance.

Because there are no unit level mechanic tasks and unit level mechanics needed for the QRMP, the only unit level maintenance for the QRMP will be the operator/crew performing preventive maintenance checks and services (PMCS).

2.2.4 Common Hardware/Software II.

We will assume the Common Hardware/Software II (CHS-II) High Capacity Computer Unit (HCU) will be integrated into the QRMP in place of the present front-end workstation. The integration of the HCU is planned for the QRMP Block II phase as provided by the QRMP Acquisition Plan (March 1992).

2.3 Procedure.

The following procedure was used to perform the alternative maintenance study.

a. Identify the factors which would contribute to the QRMP maintenance solution.
b. Analyze each factor.
c. Evaluate the results of the analysis.
d. Derive conclusions from the evaluation.
e. Based on the conclusions, make recommendations for the most advantageous maintenance solution to the government.

3.0 Results and Discussion

3.1 Introduction.

There are two basic choices for maintenance of a system used by the military, organic support and contractor support. There are combinations of these two support options which involve dividing up the levels of support between the two. Every support option has positive and negative attributes as far as effectiveness and cost. Sometimes a trade-off must be determined between effectiveness and cost to achieve maximum availability of the system.

As with most military systems, the primary consideration for maintenance of the QRMP is operational stationing. Where will the system be used? Maintaining a system on the battlefield will have different requirements than a system used in a building. The system used in a building will have a stable environment and probably will not experience battle conditions. The system used on the battlefield will not have a stable environment and maintenance personnel will be exposed to other than ideal conditions.

The primary mission of the QRMP is to support the battlefield commander with topographic products. The maintenance analysis foremost operational scenario is the "go to war" situation where maintenance in the battle environment must be provided to support the system's operations. A system used in a battle environment should have maintenance support that can function in a battle environment. If the maintenance support cannot function where the system is used, the system will ultimately fail to support its users.

3.2 Factors List.

Factors that contribute to the QRMP maintenance solution are:

a. Army maintenance policies,
b. Non-developmental/Commercial-Off-The-Shelf items,
c. Limited production/Quantity of QRMP Systems,
d. Geographical stationing of QRMP Systems,
e. Estimated cost of maintenance for the QRMP, and
f. Government/Contractor maintenance ability.

3.2.1 Army Maintenance Policies

AR 750-1 establishes the policies for the maintenance of Army material at the unit, direct support (DS), and General Support (GS) levels of the Army Maintenance System. With concern to the QRMP and its requirement to operate at Echelons Above Corps (EAC), Corps, Division and possibly separate Brigade levels in a combat environment, the following excerpts were extracted from AR 750-1 (dated November 1992).

"3-1. General Maintenance Policies"
"i. Maintenance will be performed by military personnel in areas forward of the corps rear boundary. Contractors and contracted maintenance will not normally be allowed for unit or DS levels of maintenance. It is the intent of Army policy that equipment issued to troops in TOE units be maintained by soldiers at unit and DS levels. Exceptions to this policy will be approved by HQDA. Contractor maintenance personnel will not be permanently stationed forward of the corps rear boundary. Contractor maintenance personnel may travel forward of the corps rear boundary on a case-by-case basis as individual equipment failures occur to provide temporary on-site maintenance. Behind the corps rear boundary, in addition to military personnel, civilian maintenance personnel (contract, TDA, local nationals, and so forth) may be acceptable as a prudent risk on the probability of maintenance services being continued in wartime."

"Section IV"
"Contract Maintenance Support"

"4-22. Private Enterprise
When the Army maintenance system cannot provide required support, the Army will rely on the competitive private enterprise system, both domestic and foreign."

"4-23. Prohibitions and Restrictions
a. Prohibitions.
Maintenance by contract personnel is prohibited when:
(1) The maintenance workload to be performed is necessary for individual and unit training.
(2) A satisfactory commercial source is not available and cannot be developed in time to provide maintenance support

when needed.

(3) Contract maintenance support will result in higher cost of maintenance support to the Army.

(4) The product of service is available from another DoD component or another federal agency.

b. Restrictions.

(1) Contractor maintenance personnel may not be permanently stationed forward of the corps rear boundary.

(2) Contractor maintenance personnel may travel forward of the Corps rear boundary on a case-by-case basis as individual equipment failures occur to provide temporary on-site maintenance."

It is evident that Army policy provides for the use of organic maintenance whenever possible and when organic maintenance cannot provide support, contractor support shall be utilized.

3.2.2 Non-developmental/Commercial-Off-The-Shelf Items.

The QRMP is comprised of a work station, file server, medium format scanner/printer, and large format scanner/printer. All of these units are COTS and subject to technological obsolescence with the year-to-year exponential advances in digital data processor design.

It is because of this technical growth, one must consider the economical feasibility of obligating the Government in providing its resources or certain levels of resources for support. Just when the support system has reached full capability, the product becomes outdated. The new COTS-NDI item is procured and again the support system is re-initiated. With COTS-NDI, this process could go on forever, never assuming a state of efficiency. A decision has to be made to identify what areas are better supported by the Government and what areas are better supported by a contractor.

Because the system components may have an approximate five year turnover and are probably composed of proprietary parts, repair of LRUs or modules by the Government could be cost-prohibitive. Would it not be more cost-effective to let the vendors repair their own parts since they are doing so already? Why duplicate a process that is already in place and then have that duplicate process become un-needed or changed in approximately five years? This argument does not demote the vast capabilities of a depot, it merely suggests the cost-prohibitivness of initiating a depot repair operation when depot level repair is already performed by the equipment vendors.

3.2.3 Limited Production/Quantity of QRMP Systems.

At the present time (Summer 1992) the total number of QRMP Systems to be procured has not been quantified because the program is in Block 0, Prototype Evaluation. From various Government meetings we can estimate that approximately 20-30 systems will be acquired.

In consideration of the quantity of systems, quantity by itself is not enough to make any determination of a support solution. The location of the system(s) in conjunction with quantity of systems will provide a more sound justification for support concepts. A single one-of-a-kind system permanently located at one Conus site would have strong economic justification for contractor support. A dozen or more battle-support systems located world-wide may have a stronger operational justification for organic support.

The limited quantity of these systems gives some unique considerations. Redundancy will not occur within the system or within the majority of the gaining units. If a QRMP should experience a failure, the workload for that QRMP could be transferred to another QRMP. Theoretically a backup system could be as close as "in-country" but as far as several hours drive.

It is estimated in "Operation Desert Storm", with the QRMP Systems fully deployed to all applicable units, there would have been 5-6 QRMP Systems in-country. This collocation of QRMP Systems and the concept of workload transfer brings up a maintenance notion. If organic maintenance at DS/GS levels is not acceptable, would it not be feasible to drive the system to the contractor support located at the Corps rear boundary if that boundary were in-country? Workload could be delayed until the repaired system returned or the workload could be directed to another QRMP within the Corps. If the Corps rear boundary was Conus, it would be doubtful the users would want to wait for the system to be shipped to Conus and back for a repair.

3.2.4 Geographical Stationing of QRMP Systems.

The QRMP System will be stationed in the Far-East, Hawaii, Conus, and Europe. Maintenance must be available and fully functional at all these locations. If organic maintenance is used then maintenance support will be available wherever the system is used, garrison and field. Contractors do provide maintenance at these various locations but would the contractor support move with the system when the system was deployed to the field on exercises or to a foreign country in time of conflict?

The organic structure is more deft to constant movement than the contractor. Contractors have gone and usually will go with the systems they support but, if there is an extremely adverse environment where the battle is occurring, there is no guarantee the system will be supported. The battlefield is not the place to discover a lack of support.

3.2.5 Government/Contractor Maintenance Ability.

The QRMP is comprised of components from various vendors and as individual entities, these vendors can repair their own equipment. The QRMP is not three independent components rather a complete

integrated system. Since the system has been integrated by a Government R&D organization, only this organization, at this time, has the knowledge to repair it as a whole, with the assistance of vendor technicians maintaining individual sub-systems.

If the scanner has a fault, and the fault is caused by the workstation, who would the user or contractor call for maintenance? If the scanner vendor is called to repair the fault in the scanner, the repair person will find nothing wrong with the scanner. If there was a system level repairman who knew how to fix interconnection problems but, not the internals of any of the three vendors hardware, there would be four repair persons for the system. Which repair person would be called for what problem? It would seem the most efficient solution would be to have one repair person knowledgeable in repairing the entire system, including the internals of the sub-systems.

The QRMP is a Government in-house developed system. At this time both organic maintenance and contractor maintenance are unable to fix the system as a whole. Both entities, contractor and organic maintenance will experience a learning curve from the beginning.

3.2.6 Operator/DS-GS Maintainer Considerations.

The 81-Q enlisted MOS has been nominated to operate and provide unit-level maintenance for the QRMP. The 81-Q could be trained to repair the QRMP at the DS/GS level. The benefits of having the 81-Q maintain the system at DS/GS levels are:

a. The repair person is collocated with the equipment, and
b. The equipment downtime would be reduced.

The disadvantages of having the 81-Q maintain the system at DS/GS levels are:

a. Adding the necessary electronics training to the topographics training,
b. Lack of space within the ISO shelter for tools and test equipment,
c. Reduced productive time in unit because of the extended training time, and
d. The QRMP is not maintenance intensive rather it requires operators to operate it to provide products.

Given the limited quantity, various world-wide locations, and extended service life of the QRMP, the best MOS would be one that is located at DISCOMS and COSCOMS and one that is trained on other systems so that the maintainer does not become idle. The operator/DS-GS maintainer combination works well when the subject system performs its mission with very little operator intervention and much attention to maintenance. This is not the case with the QRMP.

3.2.7 Review of Army Enlisted Maintenance MOSs.

Part of the effort towards developing a maintenance solution is identifying organic maintenance personnel who are currently performing similar maintenance on similar types of equipment. AR 611-201 shows the 29-J, Telecommunications Terminal Device Repairer, is currently trained to provide DS/GS maintenance on teletypewriters, reperforators, facsimile equipment, computer terminals, and associated devices. The 29-J provides many benefits; a new maintenance MOS does not have to be created for the QRMP, the 29-J already receives the necessary basic electronics training for this type of equipment, the 29-J is stationed at DISCOMS and COSCOMS, and the QRMP components could be added to the 29-J's repertoire.

3.2.8 Common Hardware/Software II.

With the possibility of the CHS-II HCU being integrated into the QRMP, the maintenance support of the CHS-II HCU in contrast to the maintenance support of the QRMP needs to be addressed. The CHS-II HCU has been designed to need unit and depot level maintenance only. The nominated unit level maintainer for the CHS-II HCU is the enlisted 31-U MOS. Since the units gaining the QRMP System will probably have the 31-U MOS, a local maintainer will be available if the CHS-II HCU within the QRMP needs repair.

The CHS-II HCU within the QRMP is an integral part of the QRMP and the 31-U may not be able to repair a CHS-II HCU fault caused by the fileserver or other associated equipment. This does not preclude the user from calling the local 31-U for a CHS-II HCU problem only it presents a unique situation where the DS/GS maintainer would be called if the 31-U was unable to repair the CHS-II HCU (QRMP) fault.

3.2.9 Estimated Cost of Maintenance.

The guide for developing the cost of maintenance estimate for the QRMP was the Cost Analysis Manual from the U.S. Army Cost and Economic Analysis Center. This manual provides a standard cost estimating methodology for Baseline Cost Estimates including contractor and organic maintenance support.

The cost estimate is based on peace time usage. Using war time usage for the cost estimate would cause the cost estimate to reflect a higher annual usage than what will be actually experienced. The use of the QRMP in wartime will greatly escalate the cost of maintenance because of the increase in product demand. Since it is impossible to forecast when and how long future conflicts will occur, the peace time estimate is the most realistic choice for the cost estimate.

3.2.9.1 Best Engineering Estimates.

3.2.9.1.1 Mean Time Between Failure Rates.

The Mean Time Between Failure (MTBF) for the Medium and Large Format Scanners/Printers and Annual Operating Hours (AOH) for the entire QRMP were developed by using a best engineering estimate (SWAG). The MTBF for the Medium Format Scanner/Printer and the Large Format Scanner/Printer were provided by USATEC and are based on their usage of the equipment. The MTBF for the File Server was provided by the manufacturer. The MTBF for the Front End Work Station was provided by the manufacturer as; 18 systems in use for one year (2080 hours) with three failures. From DoD 3235.1-H, Test & Evaluation of System Reliability, Availability, and Maintainability the formula:

Total Units x Measured Interval / Total Failures = MTBF
provides (18 x 2080 / 3 = 12,480 MTBF).

3.2.9.1.2 Annual Operating Hours.

The Annual Operating Hours (AOH) were estimated by CSC and approved by USATEC. The AOH estimate was achieved by considering:

a. on the low usage side, some units will not have an every day or week or month demand for products thus they may not even power-up the QRMP, and
b. some units will work with the workstation and fileserver and only occasionally produce a product,
c. on the high usage side, some units (like the 555 Eng. Co., III Corps, Ft. Hood, TX.) produce products eight hours a day for a majority of the year, and
d. war time demand for products could reach 16-24 hours a day.

From these concerns, the best figure for AOH is 2080 hours.

3.2.9.1.3 Maintenance and Parts Percentages.

The maintenance cost is 12 percent of the cost of the unit. The 12 percent rate was provided by RBG Company and Page Prep Company as a commercial percentage of the unit cost. The maintenance agreement (cost) is 12 percent of the price of the unit which comes from typical commercial maintenance agreements for equipment of the types used herein. The 12 percent maintenance cost breaks down to 6 percent for labor/management and 6 percent for parts. The 6 percent for labor/management further breaks down to 5 percent for labor/management below depot level and 1 percent for labor/management at depot level. The 6 percent for parts further breaks down to 2.5 percent for consumables and 2.5 percent for reparables and 1 percent for depot material parts.

3.2.9.1.4 CLS vs Organic Parts.

The individual vendor would be supplying parts at the 6 percent rate whether the supply was for CLS support or to Organic support. Because the parts vendor is supplying the same parts to the same machines, these parts would carry the same cost, profit, overhead and G&A no matter which maintenance method was chosen.

3.2.9.2 Presentation of Maintenance Cost Estimate.

Table 1.0 "QRMP Maintenance Option Matrix" presents the five possible maintenance options for the QRMP relative to the Army four-level maintenance system. The five maintenance options shown are all combinations of CLS and Organic support. This matrix provides an over view of which cost elements in the Cost Analysis Manual are applied to each maintenance option. Maintenance Option 3 is not a choice to be considered because Direct Support and General Support will not be divided for the types of COTS items in the QRMP. Realistically there will not be a need for General Support for the QRMP when considering the definition and mission of General Support as defined by AR 750-1.

In the present configuration, the QRMP will not have Unit-Level maintenance repairs although operator/crew preventive maintenance checks and services (PMCS) will be required. Operator/crew PMCS is defined as a part of Unit-Level maintenance in AR 750-1.

Following Table 1.0 are the cost elements from the Cost Analysis Guide containing formulas, computations, and results. After the cost elements, the cost summaries from the Cost Analysis Guide present a summary of costs from applicable cost elements for maintenance options 1-5 and finally, Table 2.0 "QRMP Maintenance Option Total Costs" presents the QRMP maintenance option total costs for comparison.

Option 1	Option 2	Option 3	Option 4	Option 5	Maintenance Level
Organic	CLS	CLS	CLS	CLS	Depot
Organic	Organic	CLS	CLS	CLS	General Support
Organic	Organic	Organic	CLS	CLS	Direct Support
Organic	Organic	Organic	Organic	CLS	Unit
2.11	2.11	2.11	2.11		Training Ammo/ Missiles
4.02	4.02	4.02	4.02		Maintenance (MTOE)
4.051	4.051	4.051	4.051		Training (MP funded)
		5.01	5.01	5.01	Field Maintenance Civilian Labor
5.03	5.03	5.03	5.03	5.03	Replenish Depot-Level Reparables
5.04	5.04	5.04	5.04	5.04	Replenishment Consumables
5.061	5.061				Overhaul (P7M)
5.07	5.07	5.07	5.07	5.07	Transportation
5.101	5.101	5.101	5.101	5.101	Project Management Administration
5.11	5.11	5.11	5.11		Training (O&M funded)

TABLE 1.0

QRMP Maintenance Option Matrix

3.2.11 Cost Analysis Guide - Cost Elements.

COST DOCUMENT

1. **HEADER.**

SYSTEM: ORMP DATE: 9-25-92

ELEMENT TITLE: TRAINING AMMUNITION/MISSILES

ELEMENT NUMBER: 2.11

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. E4 OPA Replacement Training Cost = $460.00.

c. E5 OPA Replacement Training Cost = $461.00.

d. Average Replacement Training Cost = $461.00 (Constant 89$).

e. $461.00 * (1/ 0.8689 OPA Inflation Factor) = $531.00 (Constant 93$).

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the costs of ammunition consumed by the system being costed during both unit training and annual services practice. This element also includes the cost of system specific individual training for replacement personnel. The cost of ammunition consumed during the training of replacement personnel, along with the cost of replacement equipment, is included in this cost element.

b. This element excludes the MP associated with replacement training and the O&M funded training services costs.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Replacement Training Cost - AMCOST MODEL, Version 4.0, Dated March 1989.

d. Annual Attrition Rate - Army Force Planning Cost Handbook, November 1982.

e. Maintenance Man-Year Per QRMP - From Cell 4.02 calculations.

f. Number of QRMPs - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

5. **COST EXPRESSION.**

a. Equation:

Annual Maintainer's Replacement Training Cost *
Maintenance Man Year/QRMP *
Number of QRMPs *
Annual Attrition Rate *
Operational Life per QRMP =
Total Life Cost of System Specific Training Ammunition

6. **METHODOLOGY CALCULATIONS.**

(Option 1 & 2)

$531 Average Replacement Training Cost *
0.28 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$1,297 Total (Constant 93$)

(Option 3)

$531 Average Replacement Training Cost *
0.22 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$1,019 Total (Constant 93$)

(Option 4)

$531 Average Replacement Training Cost *
0.15 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$695 Total (Constant 93$)

7. **LIMITATIONS OF ESTIMATE.**

a. None

8. **RESULTS (Constant FY93 Dollars).**

(Option 1 & 2)

FY94	FY95	FY96	FY97	FY98	FY99	FY00
64.85	64.85	64.85	64.85	64.85	64.85	64.85
FY01	FY02	FY03	FY04	FY05	FY06	FY07
64.85	64.85	64.85	64.85	64.85	64.85	64.85
FY08	FY09	FY10	FY11	FY12	FY13	
64.85	64.85	64.85	64.85	64.85	64.85	

(Option 3)

FY94	FY95	FY96	FY97	FY98	FY99	FY00
50.95	50.95	50.95	50.95	50.95	50.95	50.95
FY01	FY02	FY03	FY04	FY05	FY06	FY07
50.95	50.95	50.95	50.95	50.95	50.95	50.95
FY08	FY09	FY10	FY11	FY12	FY13	
50.95	50.95	50.95	50.95	50.95	50.95	

(Option 4)

FY94	FY95	FY96	FY97	FY98	FY99	FY00
34.75	34.75	34.75	34.75	34.75	34.75	34.75
FY01	FY02	FY03	FY04	FY05	FY06	FY07
34.75	34.75	34.75	34.75	34.75	34.75	34.75
FY08	FY09	FY10	FY11	FY12	FY13	
34.75	34.75	34.75	34.75	34.75	34.75	

9. **TOTAL.**

(Option 1 & 2)	$1,297 Total (Constant 93$)
(Option 3)	$1,019 Total (Constant 93$)
(Option 4)	$695 Total (Constant 93$)
(Option 5)	Does not apply.

COST DOCUMENT

1. **HEADER.**

SYSTEM: QRMP DATE: 9-25-92

ELEMENT TITLE: MAINTENANCE (MTOE) ELEMENT NUMBER: 4.02

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. Cost of Mechanic E4/5, MOS 29J, to maintain each QRMP below depot.

c. E4 $26,000 Total Basic Pay and Allowances Cost less Permanent Change of Station Costs (Constant 92$).

d. E5 $31,974 Total Basic Pay and Allowances Cost less Permanent Change of Station Costs (Constant 92$).

e. Average Total Basic Pay and Allowances Cost less Permanent Change of Station Costs (Constant 92$) = $28,987.

f. Total Permanent Change of Station Costs E4/E5 = $1468 (FY92 Constant Dollars).

g. Annual Operational Hours = 2080 Hours per Year.

h. 1740 Average Military Man Hours in Man-Year.

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the costs of base pay and allowance, theater costs, and special pay of those direct and general support military personnel below depot level whose primary function is to maintain the materiel system being costed.

b. This element excludes the costs of those persons whose primary function is to maintain other equipment in the force unit such as trucks and switchboards.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Maintenance Ratio Per Hour - QRMP Operational Requirements Document, Dated March 1992.

d. Number of QRMPs - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

e. Annual Operating Hours - Mr. Steve Hollandsworth, U.S. Army Topographic Engineering Center.

f. Maintenance Pay and Allowances - Memorandum: Military Pay Rates in Baseline Cost Estimates, dated 7 April 1992.

g. Permanent Change of Station - Memorandum: Military Pay Rates in Baseline Cost Estimates, dated 7 April 1992.

h. Average Military Man-Hours in Military-Year - Fort Belvoir Cost Analysis Division.

5. **COST EXPRESSION.**

a. Equation:

(Average Total Basic Pay and Allowances Cost +
Total Permanent Change of Station Costs) *
MPA Inflation Factor 1/0.9681 (Constant 93$) *
Maintenance Ratio *
Number of QRMPs *
Operational Life =
Total Life Cost of Maintenance (MTOE)

6. **METHODOLOGY CALCULATIONS.**

(Option 1 & 2) Maintenance Man-Year for the QRMP =

Maintenance Ratio (ORG) = 0.12 (Man Hr/Op Hr) = 250 Hours Year
Maintenance Ratio (DS) = 0.064 (Man Hr/Op Hr) = 133 Hours Year
Maintenance Ratio (GS) = 0.047 (Man Hr/Op Hr) = 98 Hours Year
TOTAL = 0.23 (Man Hr/Op Hr) = 481 Hours Year

(Option 3) Maintenance Man-Year for the QRMP =

Maintenance Ratio (ORG) = 0.12 (Man Hr/Op Hr) = 250 Hours Year
Maintenance Ratio (DS) = 0.064 (Man Hr/Op Hr) = 133 Hours Year
TOTAL = 0.184 (Man Hr/Op Hr) = 383 Hours Year

(Option 4) Maintenance Man-Year for the QRMP =

Maintenance Ratio (ORG) = 0.12 (Man Hr/Op Hr) = 250 Hours Year
TOTAL = 0.12 (Man Hr/Op Hr) = 250 Hours Year

(Option 1 & 2)

Man-Year Ratio for the QRMP =
481 Total Annual Man-hours /
1740 Average Military Man-Hours in Military Man-Year =
0.28

(Option 3)

Man-Year Ratio for the QRMP =
383 Total Annual Man-hours /
1740 Average Military Man-Hours in Military Man-Year =
0.22

(Option 4)

Man-Year Ratio for the QRMP =
250 Total Annual Man-hours /
1740 Average Military Man-Hours in Military Man-Year =
0.15

(Option 1 & 2)

($28,987 Average Total Basic Pay and Allowances Cost -
Permanent Change of Station Costs (Constant 92$) +
($1,468 Total Permanent Change of Station Costs (Constant 92$)) *
MPA Inflation Factor 1/0.9681 *
0.28 Maintenance Ratio Per QRMP *
2 QRMPs *
20 Year Operational Life =
$352,336 (Constant 93$)

(Option 3)

($28,987 Average Total Basic Pay and Allowances Cost -
Permanent Change of Station Costs (Constant 92$) +
($1,468 Total Permanent Change of Station Costs (Constant 92$)) *
MPA Inflation Factor 1/0.9681 *
0.22 Maintenance Ratio Per QRMP *
2 QRMPs *
20 Year Operational Life =
$276,835 (Constant 93$)

(Option 4)

($28,987 Average Total Basic Pay and Allowances Cost -
Permanent Change of Station Costs (Constant 92$) +
($1,468 Total Permanent Change of Station Costs (Constant 92$)) *
MPA Inflation Factor 1/0.9681 *
0.15 Maintenance Ratio Per QRMP *
2 QRMPs *
20 Year Operational Life =
$188,751 (Constant 93$)

7. **LIMITATIONS OF ESTIMATE.**
   a. None

8. **RESULTS (Constant FY93 Dollars).**

(Option 1 & 2)

FY94	FY95	FY96	FY97	FY98	FY99
17,616.80	17,616.80	17,616.80	17,616.80	17,616.80	17,616.80
FY00	FY01	FY02	FY03	FY04	FY05
17,616.80	17,616.80	17,616.80	17,616.80	17,616.80	17,616.80
FY06	FY07	FY08	FY09	FY10	FY11
17,616.80	17,616.80	17,616.80	17,616.80	17,616.80	17,616.80
FY12	FY13				
17,616.80	17,616.80				

(Option 3)

FY94	FY95	FY96	FY97	FY98	FY99
13,841.75	13,841.75	13,841.75	13,841.75	13,841.75	13,841.75
FY00	FY01	FY02	FY03	FY04	FY05
13,841.75	13,841.75	13,841.75	13,841.75	13,841.75	13,841.75
FY06	FY07	FY08	FY09	FY10	FY11
13,841.75	13,841.75	13,841.75	13,841.75	13,841.75	13,841.75
FY12	FY13				
13,841.75	13,841.75				

(Option 4)

FY94	FY95	FY96	FY97	FY98	FY99
9,437.55	9,437.55	9,437.55	9,437.55	9,437.55	9,437.55
FY00	FY01	FY02	FY03	FY04	FY05
9,437.55	9,437.55	9,437.55	9,437.55	9,437.55	9,437.55
FY06	FY07	FY08	FY09	FY10	FY11
9,437.55	9,437.55	9,437.55	9,437.55	9,437.55	9,437.55
FY12	FY13				
9,437.55	9,437.55				

9. **TOTAL.**

(Option 1 & 2)	$352,336 Total (Constant 93$)
(Option 3)	$276,835 Total (Constant 93$)
(Option 4)	$188,751 Total (Constant 93$)
(Option 5)	Does not apply.

COST DOCUMENT

1. HEADER.

SYSTEM: QRMP DATE: 9-25-92

ELEMENT TITLE: TRAINING ELEMENT NUMBER: 4.051

2. ASSUMPTIONS.

a. 20 Year Operational Life of System.

b. E4 MPA Replacement Training Cost = $10,730.

c. E5 MPA Replacement Training Cost = $12,409.

d. Average Replacement Training Cost = $11,570 (Constant 89$).

e. $11,570 * (1 / 0.8593 MPA Inflation Factor) = $13,464 (Constant FY93$).

3. INCLUSION/EXCLUSION CRITERIA.

a. This element includes the MP funded costs of all pay and allowances for the system specific replacement personnel undergoing formal training for future assignment to the given materiel system. It also includes the pay and allowances of the instructors for the replacement personnel training.

4. DATA SOURCE AND DATA ADJUSTMENTS.

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Replacement Training Cost - AMCOST MODEL, Version 4.0, Dated March 1989.

d. Annual Attrition Rate - Army Force Planning Cost Handbook, November 1982.

e. Maintenance Man-Year Per QRMP - From Cell 4.02 calculations.

f. Number of QRMPs - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

5. **COST EXPRESSION.**

a. Equation:

Annual Maintainer's Replacement Training Cost *
Maintenance Man Year/QRMP *
Number of QRMPs *
Annual Attrition Rate *
Operational Life per QRMP =
Total Life Replacement Training Cost

6. **METHODOLOGY CALCULATIONS.**

(Option 1 & 2)

$13,464 Average Replacement Training Cost *
0.28 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$32,874 Total (Constant 93$)

(Option 3)

$13,464 Average Replacement Training Cost *
0.22 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$25,829 Total (Constant 93$)

(Option 4)

$13,464 Average Replacement Training Cost *
0.15 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$17,611 Total (Constant 93$)

7. **LIMITATIONS OF ESTIMATE.**

a. None

8. **RESULTS (Constant FY93 Dollars).**

(Option 1 & 2)

FY94	FY95	FY96	FY97	FY98	FY99
1,643.70	1,643.70	1,643.70	1,643.70	1,643.70	1,643.70
FY00	FY01	FY02	FY03	FY04	FY05
1,643.70	1,643.70	1,643.70	1,643.70	1,643.70	1,643.70
FY06	FY07	FY08	FY09	FY10	FY11
1,643.70	1,643.70	1,643.70	1,643.70	1,643.70	1,643.70
FY12	FY13				
1,643.70	1,643.70				

(Option 3)

FY94	FY95	FY96	FY97	FY98	FY99
1,291.45	1,291.45	1,291.45	1,291.45	1,291.45	1,291.45
FY00	FY01	FY02	FY03	FY04	FY05
1,291.45	1,291.45	1,291.45	1,291.45	1,291.45	1,291.45
FY06	FY07	FY08	FY09	FY10	FY11
1,291.45	1,291.45	1,291.45	1,291.45	1,291.45	1,291.45
FY12	FY13				
1,291.45	1,291.45				

(Option 4)

FY94	FY95	FY96	FY97	FY98	FY99
880.55	880.55	880.55	880.55	880.55	880.55
FY00	FY01	FY02	FY03	FY04	FY05
880.55	880.55	880.55	880.55	880.55	880.55
FY06	FY07	FY08	FY09	FY10	FY11
880.55	880.55	880.55	880.55	880.55	880.55
FY12	FY13				
880.55	880.55				

9. **TOTAL.**

(Option 1 & 2)	$32,874 Total (Constant 93$)
(Option 3)	$25,829 Total (Constant 93$)
(Option 4)	$17,611 Total (Constant 93$)
(Option 5)	Does not apply.

COST DOCUMENT

1. **HEADER.**

SYSTEM: ORMP DATE: 9-25-92

ELEMENT TITLE: FIELD MAINTENANCE CIVILIAN LABOR

ELEMENT NUMBER: 5.01

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. The CLS maintenance agreement cost estimate is 12 percent of the cost of the unit. The 12 percent maintenance cost breaks down to 6 percent for labor/management and 6 percent for parts. The 6 percent for labor/management further breaks down to 5 percent for labor/management below depot level and 1 percent for labor/management at depot level.

c. Unit Costs are Current FY92 Dollars.

d. First Year Warranty Included as Part of the COTS Unit Price of the Unit.

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the costs of civilian maintenance labor at any level below depot maintenance. It includes contractor performed DS/GS Maintenance costs.

b. This element excludes civilian labor at the depot.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Percent Maintenance Agreement Used for Labor/Managerial - See 3.2.9.1, "Maintenance and Parts Percentages" above.

d. Unit Costs - Mr. Steve Hollandsworth, U.S. Army Topographic Engineering Center.

5. **COST EXPRESSION.**

a. Equation:

Unit Cost *
Labor/Managerial Percentage of Maintenance Agreement =
Annual Cost of Labor/Managerial per Unit

Sum of Annual Cost of Labor/Managerial of All Units *
Number of Systems *
(Operational Life - Warranty Period) =
Total Life Cost of Labor/Managerial

6. **METHODOLOGY CALCULATIONS.**

COMPONENT NAME	UNIT COST		5.0%		ANNUAL COST OF LABOR
Workstation	50,000	*	0.05	=	2,500
Fileserver	50,000	*	0.05	=	2,500
Medium Format Scanner/Printer	85,000	*	0.05	=	4,250
Large Format Scanner/Printer	100,000	*	0.05	=	5,000

Annual Cost of Labor/Managerial of All Units $14,250

$14,250 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty) =
Total Life Cost of Reparable Parts $541,500

7. **LIMITATIONS OF ESTIMATE.**

a. None

8. **RESULTS (Constant FY93 Dollars).**

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	28,721.16	28,721.16	28,721.16	28,721.16	28,721.16
FY00	FY01	FY02	FY03	FY04	FY05
28,721.16	28,721.16	28,721.16	28,721.16	28,721.16	28,721.16
FY06	FY07	FY08	FY09	FY10	FY11
28,721.16	28,721.16	28,721.16	28,721.16	28,721.16	28,721.16
FY12	FY13				
28,721.16	28,721.16				

9. **TOTAL.**

(Option 1 & 2) Does not apply.

(Option 3) Cell does not provide a division between DS and GS.

(Option 4 & 5)

$541,500 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars $545,702

COST DOCUMENT

1. HEADER.

SYSTEM: ORMP DATE: 9-25-92

ELEMENT TITLE: REPLENISHMENT DEPOT LEVEL REPARABLES (SPARES)

ELEMENT NUMBER: 5.03

2. ASSUMPTIONS.

a. 20 Year Operational Life of System.

b. Percentage of Unit Cost Replenished is 2.5 percent for Each Unit. For the Workstation and Fileserver, the commercial 2.5 percent for reparable parts can be applied to both CLS and Organic maintenance based upon the organic Annual Operating Hours (AOH) estimate of 2080 hours which is comparable to the commercial estimate of usage of a typical 40 hour work week.

For the Medium Format Scanner/Printer (MFSP) and Large Format Scanner/Printer (LFSP), commercial maintainers charge a per copy fee for maintenance so that no matter what the usage rate is, the maintenance cost for consumable parts will be the same between CLS and Organic.

Under CLS, the more the unit is used, the more commercial maintainers will charge for maintenance. Under Organic, the more the unit is used, the more maintenance will also cost so, the cost of consumable parts for the MFSP and LFSP is linear between CLS and Organic, regardless of usage.

The 2.5 percent commercial figure for consumable parts will be used for both the CLS and Organic calculations for the MFSP and LFSP.

c. Unit Costs are Current FY92 Dollars.

d. First Year Warranty Included as Part of the COTS Unit Price of the Unit.

3. INCLUSION/EXCLUSION CRITERIA.

a. This element includes the O&M costs of purchasing reparables required to resupply initial stockage. It also includes the reparable individual parts, assemblies, or sub-assemblies required on a recurring basis for the repair of major end items of equipment subsequent to fielding.

b. This element excludes depot material parts.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Percent Replenished - See 3.2.9.1, "Maintenance and Parts Percentages" above.

d. Unit Costs - Mr. Steve Hollandsworth, Engineer, U.S.Army Topographic Engineering Center.

5. **COST EXPRESSION.**

a. Equation:

Unit Cost *
Reparable Parts Percentage of Maintenance Agreement =
Annual Cost of Reparable Parts per Unit

Sum of Annual Cost of Reparable Parts of All Units *
Number of Systems *
(Operational Life - Warranty Period) =
Total Life Cost of Reparable Parts

6. **METHODOLOGY CALCULATIONS.**

COMPONENT NAME	UNIT COST		2.5%		ANNUAL COST OF REPARABLE PARTS
Workstation	50,000	*	0.025	=	1,250
Fileserver	50,000	*	0.025	=	1,250
Medium Format Scanner/Printer	85,000	*	0.025	=	2,125
Large Format Scanner/Printer	100,000	*	0.025	=	2,500

Annual Cost of Reparable Parts of All Units $7,125

(CLS)
$7,125 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty) =
Total Life Cost of Reparable Parts $270,750

(ORGANIC)
$7,125 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty -
1 Year Initial Stockage) =
Total Life Cost of Reparable Parts $256,500

7. **LIMITATIONS OF ESTIMATE.**

a. None

8. **RESULTS (Constant FY93 Dollars).**

a. CLS

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	14,360.58	14,360.58	14,360.58	14,360.58	14,360.58
FY00	FY01	FY02	FY03	FY04	FY05
14,360.58	14,360.58	14,360.58	14,360.58	14,360.58	14,360.58
FY06	FY07	FY08	FY09	FY10	FY11
14,360.58	14,360.58	14,360.58	14,360.58	14,360.58	14,360.58
FY12	FY13				
14.360.58	14,360.58				

b. ORGANIC

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	Init Stock	14,360.56	14,360.56	14,360.56	14,360.56
FY00	FY01	FY02	FY03	FY04	FY05
14,360.56	14,360.56	14,360.56	14,360.56	14,360.56	14,360.56
FY06	FY07	FY08	FY09	FY10	FY11
14,360.56	14,360.56	14,360.56	14,360.56	14,360.56	14,360.56
FY12	FY13				
14,360.56	14,360.56				

9. **TOTAL.**

<u>(Option 1 & 2)</u>

(ORGANIC) $256,500 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars <u>$258,490</u>

<u>(Option 3)</u> Cell does not provide a division between DS and GS.

<u>(Option 4 & 5)</u>

(CLS) $270,750 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars <u>$272,851</u>

COST DOCUMENT

1. **HEADER.**

SYSTEM: ORMP DATE: 9-25-92

ELEMENT TITLE: REPLENISHMENT CONSUMABLES ELEMENT NUMBER: 5.04

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. Percentage of Unit Cost Replenished is 2.5 percent for Each Unit. For the Workstation and Fileserver, the commercial 2.5 percent for consumable parts can be applied to both CLS and Organic maintenance based upon the organic Annual Operating Hours (AOH) estimate of 2080 hours which is comparable to the commercial estimate of usage of a typical 40 hour work week.

For the Medium Format Scanner/Printer (MFSP) and Large Format Scanner/Printer (LFSP), commercial maintainers charge a per copy fee for maintenance so that no matter what the usage rate is, the maintenance cost for consumable parts will be the same between CLS and Organic.

Under CLS, the more the unit is used, the more commercial maintainers will charge for maintenance. Under Organic, the more the unit is used, the more maintenance will also cost so, the cost of consumable parts for the MFSP and LFSP is linear between CLS and Organic, regardless of usage.

The 2.5 percent commercial figure for consumable parts will be used for both the CLS and Organic calculations for the MFSP and LFSP.

c. Unit Costs are Current FY92 Dollars.

d. First Year Warranty Included as Part of the COTS Unit Price of the Unit.

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the O&M costs of purchasing consumables required to resupply initial stockage. It also includes the consumable (non-reparable) individual parts, assemblies, or sub-assemblies required on a recurring basis for the repair of major end items of equipment subsequent to fielding.

b. This element excludes depot material parts.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Percent Replenished - See 3.2.9.1, "Maintenance and Parts Percentages" above.

d. Unit Costs - Mr. Steve Hollandsworth, U.S.Army Topographic Engineering Center.

5. **COST EXPRESSION.**

a. Equation:

Unit Cost *
Consumable Parts Percentage of Maintenance Agreement =
Annual Cost of Consumable Parts per Unit

Sum of Annual Cost of Consumable Parts of All Units *
Number of Systems *
(Operational Life - Warranty Period) =
Total Life Cost of Consumable Parts

6. **METHODOLOGY CALCULATIONS.**

COMPONENT NAME	UNIT COST		2.5%		ANNUAL COST OF CONSUMABLE PARTS
Workstation	50,000	*	0.025	=	1,250
Fileserver	50,000	*	0.025	=	1,250
Medium Format Scanner/Printer	85,000	*	0.025	=	2,125
Large Format Scanner/Printer	100,000	*	0.025	=	2,500

Annual Cost of Consumable Parts of All Units $7,125

(CLS)
$7,125 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty) =
Total Life Cost of Consumable Parts $270,750

(ORGANIC)
$7,125 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty -
1 Year Initial Stockage) =
Total Life Cost of Consumable Parts $256,500

7. **LIMITATIONS OF ESTIMATE.**
a. None

8. **RESULTS (Constant FY93 Dollars).**

a. CLS

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	14,360.58	14,360.58	14,360.58	14,360.58	14,360.58
FY00	FY01	FY02	FY03	FY04	FY05
14,360.58	14,360.58	14,360.58	14,360.58	14,360.58	14,360.58
FY06	FY07	FY08	FY09	FY10	FY11
14,360.58	14,360.58	14,360.58	14,360.58	14,360.58	14,360.58
FY12	FY13				
14.360.58	14,360.58				

b. ORGANIC

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	Init Stock	14,360.56	14,360.56	14,360.56	14,360.56
FY00	FY01	FY02	FY03	FY04	FY05
14,360.56	14,360.56	14,360.56	14,360.56	14,360.56	14,360.56
FY06	FY07	FY08	FY09	FY10	FY11
14,360.56	14,360.56	14,360.56	14,360.56	14,360.56	14,360.56
FY12	FY13				
14,360.56	14,360.56				

9. **TOTAL.**

<u>(Option 1 & 2)</u>

(ORGANIC) $256,500 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars <u>$258,490</u>

<u>(Option 3)</u> Cell does not provide a division between DS and GS.

<u>(Option 4 & 5)</u>

(CLS) $270,750 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars <u>$272,851</u>

COST DOCUMENT

1. **HEADER.**

SYSTEM: ORMP DATE: 9-25-92

ELEMENT TITLE: OVERHAUL (P7M) ELEMENT NUMBER: 5.061

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. Unit Costs are Current FY92 Dollars.

c. First Year Warranty Included as Part of the COTS Unit Price of the Unit.

d. The CLS maintenance agreement cost estimate is 12 percent of the cost of the unit. The 12 percent maintenance cost breaks down to 6 percent for labor/management and 6 percent for parts. The 6 percent for labor/management further breaks down to 5 percent for labor/management below depot level and 1percent for labor/management at depot level. The 6 percent for parts further breaks down to 2.5 percent for consumables and 2.5 percent for reparables and 1 percent for depot material parts.

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the costs of material, labor, and overhead for the repair/overhaul of the basic end item and components. The material, labor, and overhead costs for the contractor performed depot overhaul are also included in this element.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Percent Replenished - See 3.2.9.1, "Maintenance and Parts Percentages" above.

d. Unit Costs - Mr. Steve Hollandsworth, U.S.Army Topographic Engineering Center.

e. Annual Operating Hours - Mr. Steve Hollandsworth, U.S. Army Topographic Engineering Center.

f. Mean Time Between Failure Rates:
   (1) Workstation - Mr. Barry Golden, RGB Company,
   (2) File Server - Mr. Art Schufelt, Page Prep Company,
   (3) MFSP and LFSP - Mr. Steve Hollandsworth, U.S. Army Topographic Engineering Center.

g. Mean Time To Repair
   (1) Workstation - Mr. Barry Golden, RGB Company,
   (2) File Server - Mr. Art Schufelt, Page Prep Company,
   (3) MFSP and LFSP - Mr. Mark Sinanian, Canon USA, Inc.

h. Depot Maintenance Labor Rate per Hour - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

i. Unit Costs - Mr. Steve Hollandsworth, U.S. Army Topographic Engineering Center.

5. **COST EXPRESSION.**

a. CLS Parts Equation:

Unit Cost *
Depot Material Parts Percentage of Maintenance Agreement =
Annual Cost of Depot Material Parts per Unit

Sum of Annual Cost of Depot Material Parts of All Units *
Number of Systems *
(Operational Life - Warranty Period) =
Total Life Cost of Depot Material Parts

b. Organic Parts Equation:

Unit Cost *
Depot Material Parts Percentage of Maintenance Agreement =
Annual Cost of Depot Material Parts per Unit

Sum of Annual Cost of Depot Material Parts of All Units *
Number of Systems *
(Operational Life - Warranty Period - Initial Stockage) =
Total Life Cost of Depot Material Parts

c. CLS Labor Equation:

Component Quantity *
Unit Cost of Component *
Depot Labor/Managerial Portion of Maintenance Agreement =
Annual Cost of Depot Labor/Managerial per Unit

Sum Annual Cost of Depot Labor/Managerial All Units =
Total Annual Cost of Depot Labor/Managerial

Total Annual Cost of Depot Labor/Managerial *
Number of QRMP *
(Operational Life - Warranty Period) =
Total Life Cost of Depot Labor/Managerial

d. Organic Labor Equation: Annual Operating Hours /
Mean Time Between Failure =
Annual Number of Failures

Annual Number of Failures *
Mean Time To Repair *
Depot Maintenance Labor Rate =
Annual Cost of Depot Maintenance per Unit

Sum Annual Cost of Depot Maintenance Labor All Units =
Total Annual Cost of Depot Maintenance Labor

Total Annual Cost of Depot Maintenance Labor *
Number of QRMP *
(Operational Life - Warranty Period) =
Total Life Cost of Depot Maintenance Labor

6. **METHODOLOGY CALCULATIONS.**

a. CLS and Organic Parts

COMPONENT NAME	UNIT COST		1.0%		ANNUAL COST OF REPARABLE PARTS
Workstation	50,000	*	0.01	=	500
Fileserver	50,000	*	0.01	=	500
Medium Format Scanner/Printer	85,000	*	0.01	=	850
Large Format Scanner/Printer	100,000	*	0.01	=	1,000

Annual Cost of Reparable Parts of All Units $2,850

(CLS) $2,850 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty) =
Total Life Cost of Reparable Parts $108,300

(ORGANIC) $2,850 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty -
1 Year Initial Stockage) =
Total Life Cost of Reparable Parts $102,600

b. CLS Labor

COMPONENT NAME	UNIT COST		1.0%		ANNUAL COST OF REPARABLE PARTS
Workstation	50,000	*	0.01	=	500
Fileserver	50,000	*	0.01	=	500
Medium Format Scanner/Printer	85,000	*	0.01	=	850
Large Format Scanner/Printer	100,000	*	0.01	=	1,000

Total Annual Cost of Depot Maintenance Labor $2,850

$2,850.00 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty) =
Total Life Cost of Depot Maintenance Labor $108,300

c. Organic Labor

COMPONENT NAME	AOH		MTBF		NUMBER OF FAILURES
Workstation	2080	/	12,480	=	0.167
Fileserver	2080	/	50,000	=	0.042
Medium Format Scanner/Printer	2080	/	250	=	8.320
Large Format Scanner/Printer	2080	/	600	=	3.467

COMPONENT NAME	NUMBER OF FAILURES		MTTR		LABOR RATE		ANNUAL COST OF DML
Workstation	0.167	*	1.00	*	$60.50	=	$10.10
Fileserver	0.042	*	1.00	*	$60.50	=	$2.54
Medium Format Scanner/Printer	8.320	*	1.83	*	$60.50	=	$921.15
Large Format Scanner/Printer	3.467	*	1.83	*	$60.50	=	$383.85

Total Annual Cost of Depot Maintenance Labor $1,318.00

$1,318.00 *
2 QRMP Systems *
(20 Year Operational Life - 1 Year Warranty) =
Total Life Cost of Depot Maintenance Labor $50,084

7. **LIMITATIONS OF ESTIMATE.**
   a. None

8. **RESULTS (Constant FY93 Dollars).**

a. CLS

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	11,488.47	11,488.47	11,488.47	11,488.47	11,488.47
FY00	FY01	FY02	FY03	FY04	FY05
11,488.47	11,488.47	11,488.47	11,488.47	11,488.47	11,488.47
FY06	FY07	FY08	FY09	FY10	FY11
11,488.47	11,488.47	11,488.47	11,488.47	11,488.47	11,488.47
FY12	FY13				
11,488.47	11,488.47				

b. ORGANIC

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	2,656.47	8,400.69	8,400.69	8,400.69	8,400.69
FY00	FY01	FY02	FY03	FY04	FY05
8,400.69	8,400.69	8,400.69	8,400.69	8,400.69	8,400.69
FY06	FY07	FY08	FY09	FY10	FY11
8,400.69	8,400.69	8,400.69	8,400.69	8,400.69	8,400.69
FY12	FY13				
8,400.69	8,400.69				

9. **TOTAL.**

<u>(Option 1)</u> (ORGANIC) $152,684 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars $153,869

<u>(Option 2)</u> (CLS) $216,600 /
Constant FY93 Inflation Factor 0.9923 =
Constant FY93 Dollars $218,281

<u>(Option 3)</u> Since it is unknown how a division would occur between DS and GS for Option 3, it is also unknown whether to include this cell as a separate CLS cost or exclude this cell because the costs are included in a maintenance agreement.

<u>(Option 4 & 5)</u> Cell does not apply to Options 4 and 5 because the costs are included in the maintenance agreement.

COST DOCUMENT

1. **HEADER.**

SYSTEM: ORMP DATE: 9-25-92

ELEMENT TITLE: TRANSPORTATION ELEMENT NUMBER: 5.07

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. The CLS maintenance agreement cost estimate is 12 percent of the cost of the unit. The 12 percent maintenance cost breaks down to 6 percent for labor/management and 6 percent for parts. The 6 percent for parts further breaks down to 2.5 percent for consumables and 2.5 percent for reparables and 1 percent for depot material parts. Since 100 percent of the equipment cost equals 100 percent of the equipment weight, 1 percent of the cost equals 1 percent of the weight. Percentage of Component Weight Replenished at Depot Level is 1 percent for Each Component.

c. Unit Costs are Current FY92 Dollars.

d. First Year Warranty Included as Part of the COTS Unit Price of the Unit.

e. The transportation costs will be the same between CLS and Organic because the same item weights between CLS and Organic will be transported to/from the comparative locations. The comparative locations are Fort Bragg and Germany with the Washington DC area used as the return point.

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the O&M funded costs of transporting items to depot maintenance facilities and back to the operational units.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Unit Costs - Mr. Steve Hollandsworth, U.S. Army Topographic Engineering Center.

d. Number of Failures - From "Number of Failures" calculation in Cell 5.061 above.

e. Number of Systems and Location - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

f. Shipping Factor - Mr. Sini, Federal Forwarding Company.

g. Workstation Weight - From "QRMP APPLE/QUADRA WORKSTATION CONFIGURATION SPECIFICATION" sheet.

h. Large Format Scanner Printer Weight - Canon USA, Inc. cut sheet.

i. Fileserver Weight in Pounds - Mr. Art Schufelt, Page Prep Company.

j. Medium Format Scanner Printer Weight in Pounds - PHONECON, CANON USA, Inc. Dallas, Texas.

5. COST EXPRESSION.

a. Equation:

Component Weight *
Percent of Reparable Items Repaired at Depot *
Number of Failures *
Transportation Cost per Pound =
Annual Cost of Reparable Item Transportation

Sum Annual Cost of Reparable Item Transportation =
Total Annual Cost of Transporting Depot Reparables

6. METHODOLOGY CALCULATIONS.

a. CONUS

COMPONENT NAME	COMPONENT WEIGHT LB		REPARABLE PERCENTAGE		NUMBER FAILURES	$/lb		COST OF TRANSPORT
Workstation	161	*	0.01	*	0.167	* 0.42	=	0.11
Fileserver	160	*	0.01	*	0.042	* 0.42	=	0.03
Medium Format Scanner/ Printer	602	*	0.01	*	8.320	* 0.42	=	21.04
Large Format Scanner/ Printer	948	*	0.01	*	3.467	* 0.42	=	13.80

TOTAL ANNUAL COST OF CONUS TRANSPORTATION (Current 92$) $34.98

$35.00 Total Annual Cost Of CONUS Transportation *
1 QRMP System *
(20 Year Operational Life - 1 Year Warranty) =
$665.00 (Current FY92$)

b. OCONUS

COMPONENT NAME	COMPONENT WEIGHT LB		REPARABLE PERCENTAGE		NUMBER FAILURES	$/lb		COST OF TRANSPORT
Workstation	161	*	0.01	*	0.167	* 1.10	=	0.30
Fileserver	160	*	0.01	*	0.042	* 1.10	=	0.07
Medium Format Scanner/ Printer	602	*	0.01	*	8.320	* 1.10	=	55.10
Large Format Scanner/ Printer	948	*	0.01	*	3.467	* 1.10	=	36.15

TOTAL ANNUAL COST OF OCONUS TRANSPORTATION (Current 92$) $91.62

$92.00 Total Annual Cost Of OCONUS Transportation *
1 QRMP System *
(20 Year Operational Life - 1 Year Warranty) =
$1,748 (Current FY92$)

7. **LIMITATIONS OF ESTIMATE.**
   a. None

8. **RESULTS (Constant FY93 Dollars).**

FY94	FY95	FY96	FY97	FY98	FY99
Warranty	128.00	128.00	128.00	128.00	128.00
FY00	FY01	FY02	FY03	FY04	FY05
128.00	128.00	128.00	128.00	128.00	128.00
FY06	FY07	FY08	FY09	FY10	FY11
128.00	128.00	128.00	128.00	128.00	128.00
FY12	FY13				
128.00	128.00				

9. **TOTAL.**

$665.00 Current FY92$ CONUS Travel +
$1,748 Current FY92$ OCONUS Travel =
$2,413 (Current 92$)

$2,413 /
0.9923 Constant FY93 Inflation Factor =
$2,432 (Constant FY93$)

COST DOCUMENT

1. **HEADER.**

SYSTEM: QRMP DATE: 9-25-92

ELEMENT TITLE: PROJECT MANAGEMENT ADMINISTRATION (PM CIV)

ELEMENT NUMBER: 5.101

2. **ASSUMPTIONS.** None.

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the O&M-funded costs of the PM office (Not Funded By the RDT&E, or Procurement) for system engineering and technical control, as well as the business management of the system/program.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Grade Levels and Percent Time Dedicated to QRMP - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

d. Annual Salaries - Selective Federal White Collar Pay Schedules, effective 1 January 1992 - 31 December 1992.

5. **COST EXPRESSION.**

a. Equation:

Number of Persons *
Annual Salary *
Percent of Time Dedicated =
Annual Cost of Person

Sum Annual Cost of Persons =
Total Annual System Project Management

Total Annual System Project Management *
Operational Life =
Total Life Cost of System Project Management Administration

6. **METHODOLOGY CALCULATIONS.**

GRADE LEVEL	# PERSONS	ANNUAL SALARY 1992	TIME DEDICATED	TOTAL
GS11	1	36,747	100%	36,747
GS12	2	44,041	100%	88,082
GS13	2	52,370	100%	104,740
GS13	1	52,370	60%	31,422
GM15	1	72,797	50%	36,399
TOTAL ANNUAL SYSTEM PROJECT MANAGEMENT				$297,390

7. **LIMITATIONS OF ESTIMATE.**
   a. None

8. **RESULTS (Constant FY93 Dollars).**

FY94	FY95	FY96	FY97	FY98	FY99
307,189.35	307,189.35	307,189.35	307,189.35	307,189.35	307,189.35
FY00	**FY01**	**FY02**	**FY03**	**FY04**	**FY05**
307,189.35	307,189.35	307,189.35	307,189.35	307,189.35	307,189.35
FY06	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**
307,189.35	307,189.35	307,189.35	307,189.35	307,189.35	307,189.35
FY12	**FY13**				
307,189.35	307,189.35				

9. **TOTAL.**

(Options 1,2,3,4,5)

$297,390 Total Annual System Project Management *
(1 / 0.9681 OMA Inflation Factor) *
20 Year Operational Life =
$6,143,787 (Constant 93$)

COST DOCUMENT

1. **HEADER.**

SYSTEM: QRMP DATE: 9-25-92

ELEMENT TITLE: TRAINING ELEMENT NUMBER: 5.11

2. **ASSUMPTIONS.**

a. 20 Year Operational Life of System.

b. E4 OMA Replacement Training Cost = $4,593.00.

c. E5 OMA Replacement Training Cost = $5,191.00.

d. Average Replacement Training Cost = $4,892 (Constant 89$).

e. $4,892 * (1 / 0.8689 OMA Inflation Factor) = $5,630 (Constant 93$)

f. $2,760 Recruit Assention and Separation Cost (Current 85$) / 0.7742 OMA Inflation Factor = $3,565 (Constant 93$).

3. **INCLUSION/EXCLUSION CRITERIA.**

a. This element includes the O&M funded costs of system specific individual training for replacement personnel. The training can include the specific course taught in a TRADOC school and/or transition training for qualifying the replacement personnel.

b. This element excludes the MP costs associated with the instructors and students, and the procurement costs for training ammunition.

4. **DATA SOURCE AND DATA ADJUSTMENTS.**

a. Inflation - AMC Inflation Guidance dated 10 Jan 92.

b. Operational Life - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

c. Replacement Training Cost - AMCOST MODEL, Version 4.0, Dated March 1989.

d. Annual Attrition Rate - Army Force Planning Cost Handbook, November 1982.

e. Maintenance Man-Year Per QRMP - Cell 5.082.

f. Number of QRMPs - Ms. Rose Acheson, U.S. Army Topographic Engineering Center.

g. Recruit Assention and Separation Cost - United States Army OMA and MPA Cost Factors Handbook, Volume I, Dated December 1984.

5. **COST EXPRESSION.**

a. Equation:

(Annual Maintainer Replacement training cost +
Recruit Assention and Separation cost) *
Maintenance Man Year/QRMP *
Number of QRMPs *
Annual Attrition Rate *
Operational Life per QRMP =
Total Life Cost of Training

6. **METHODOLOGY CALCULATIONS.**

(Option 1 & 2)

($5,630 Average Replacement Training Cost +
$3,565 Recruit Ascension and Separation Cost) *
0.28 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$22,451 Total (Constant 93$)

(Option 3)

($5,630 Average Replacement Training Cost +
$3,565 Recruit Ascension and Separation Cost) *
0.22 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$17,640 Total (Constant 93$)

(Option 4)

($5,630 Average Replacement Training Cost +
$3,565 Recruit Ascension and Separation Cost) *
0.15 Maintenance Man-Year Per QRMP *
2 systems *
0.218 Annual Attrition Rate *
20 Year Operational Life =
$12,027 Total (Constant 93$)

7. **LIMITATIONS OF ESTIMATE.**

a. None

8. **RESULTS (Constant FY93 Dollars).**

(Option 1 & 2)

FY94	FY95	FY96	FY97	FY98	FY99
1,122.55	1,122.55	1,122.55	1,122.55	1,122.55	1,122.55
FY00	FY01	FY02	FY03	FY04	FY05
1,122.55	1,122.55	1,122.55	1,122.55	1,122.55	1,122.55
FY06	FY07	FY08	FY09	FY10	FY11
1,122.55	1,122.55	1,122.55	1,122.55	1,122.55	1,122.55
FY12	FY13				
1,122.55	1,122.55				

(Option 3)

FY94	FY95	FY96	FY97	FY98	FY99
882.00	882.00	882.00	882.00	882.00	882.00
FY00	FY01	FY02	FY03	FY04	FY05
882.00	882.00	882.00	882.00	882.00	882.00
FY06	FY07	FY08	FY09	FY10	FY11
882.00	882.00	882.00	882.00	882.00	882.00
FY12	FY13				
882.00	882.00				

(Option 4)

FY94	FY95	FY96	FY97	FY98	FY99
601.35	601.35	601.35	601.35	601.35	601.35
FY00	FY01	FY02	FY03	FY04	FY05
601.35	601.35	601.35	601.35	601.35	601.35
FY06	FY07	FY08	FY09	FY10	FY11
601.35	601.35	601.35	601.35	601.35	601.35
FY12	FY13				
601.35	601.35				

9. **TOTAL.**

(Option 1 & 2)	$22,451 Total (Constant 93$)
(Option 3)	$17,640 Total (Constant 93$)
(Option 4)	$12,027 Total (Constant 93$)
(Option 5)	Does not apply.

COST SUMMARY

1. **HEADER.**

SYSTEM: ORMP **DATE:** 9-25-92

SUMMARY ELEMENT TITLE: Option 1

ELEM NO	FY94	FY95	FY96	...	FY13	TOTAL
2.11	64.85	64.85	64.85	...	64.85	1,297.00
4.02	17,616.80	17,616.80	17,616.80	...	17,616.80	352,336.00
4.051	1,643.70	1,643.70	1,643.70	...	1,643.70	32,874.00
5.01	Does not apply to Option 1					0.00
5.03	Warranty Init Stock		14,360.56	...	14,360.56	258,490.00
5.04	Warranty Init Stock		14,360.56	...	14,360.56	258,490.00
5.061	Warranty	2,656.47	8,400.69	...	8,400.69	153,869.00
5.07	Warranty	128.00	128.00	...	128.00	2,432.00
5.101	307,189.35	307,189.35	307,189.35	...	307,189.35	6,143,787.00
5.11	1,122.55	1,122.55	1,122.55	...	1,122.55	22,451.00

Total Life Cost Option 1 = $7,226,026.00

COST SUMMARY

1. **HEADER.**

SYSTEM: ORMP **DATE:** 9-25-92

SUMMARY ELEMENT TITLE: Option 2

ELEM NO	FY94	FY95	FY96 ...	FY13	TOTAL
2.11	64.85	64.85	64.85 ...	64.85	1,297.00
4.02	17,616.80	17,616.80	17,616.80 ...	17,616.80	352,336.00
4.051	1,643.70	1,643.70	1,643.70 ...	1,643.70	32,874.00
5.01	Does not apply to Option 2				0.00
5.03	Warranty Init Stock		14,360.56 ...	14,360.56	258,490.00
5.04	Warranty Init Stock		14,360.56 ...	14,360.56	258,490.00
5.061	Warranty	11,488.47	11,488.47 ...	11,488.47	218,281.00
5.07	Warranty	128.00	128.00 ...	128.00	2,432.00
5.101	307,189.35	307,189.35	307,189.35 ...	307,189.35	6,143,787.00
5.11	1,122.55	1,122.55	1,122.55 ...	1,122.55	22,451.00

Total Life Cost Option 2 = $7,290,438.00

COST SUMMARY

1. **HEADER.**

SYSTEM: ORMP **DATE:** 9-25-92

SUMMARY ELEMENT TITLE: Option 3

ELEM NO	FY94	FY95	FY96 ...	FY13	TOTAL
2.11	50.95	50.95	50.95 ...	50.95	1,019.00
4.02	13,841.75	13,841.75	13,841.75 ...	13,841.75	276,835.00
4.051	1,291.45	1,291.45	1,291.45 ...	1,291.45	25,829.00
5.01	(This Cell does not provide a division between DS and GS)				
5.03	(This Cell does not provide a division between DS and GS)				
5.04	(This Cell does not provide a division between DS and GS)				
5.061	Does not apply to Option 3				0.00
5.07	Warranty	128.00	128.00 ...	128.00	2,432.00
5.101	307,189.35	307,189.35	307,189.35 ...	307,189.35	6,143,787.00
5.11	882.00	882.00	882.00 ...	882.00	17,640.00

Total Life Cost Option 3 = $ UNKNOWN

COST SUMMARY

1. **HEADER.**

SYSTEM: ORMP **DATE:** 9-25-92

SUMMARY ELEMENT TITLE: Option 4

ELEM NO	FY94	FY95	FY96 ...	FY13	TOTAL
2.11	34.75	34.75	34.75 ...	34.75	695.00
4.02	9,437.55	9,437.55	9,437.55 ...	9,437.55	188,751.00
4.051	880.55	880.55	880.55 ...	880.55	17,611.00
5.01	Warranty	28,721.16	28,721.16 ...	28,721.16	545,702.00
5.03	Warranty	14,360.58	14,360.58 ...	14,360.58	272,851.00
5.04	Warranty	14,360.58	14,360.58 ...	14,360.58	272,851.00
5.061	Does not apply to Option 4				0.00
5.07	Warranty	128.00	128.00 ...	128.00	2,432.00
5.101	307,189.35	307,189.35	307,189.35 ...	307,189.35	6,143,787.00
5.11	601.35	601.35	601.35 ...	601.35	12,027.00

Total Life Cost Option 4 = $7,456,707.00

COST SUMMARY

1. HEADER.

SYSTEM: ORMP DATE: 9-25-92

SUMMARY ELEMENT TITLE: Option 5

ELEM NO	FY94	FY95	FY96 ...	FY13	TOTAL
2.11	Does not apply to Option 5				0.00
4.02	Does not apply to Option 5				0.00
4.051	Does not apply to Option 5				0.00
5.01	Warranty	28,721.16	28,721.16 ...	28,721.16	545,702.00
5.03	Warranty	14,360.58	14,360.58 ...	14,360.58	272,851.00
5.04	Warranty	14,360.58	14,360.58 ...	14,360.58	272,851.00
5.061	Does not apply to Option 5				0.00
5.07	Warranty	128.00	128.00 ...	128.00	2,432.00
5.101	307,189.35	307,189.35	307,189.35 ...	307,189.35	6,143,787.00
5.11	Does not apply to Option 5				0.00

Total Life Cost Option 5 = $7,237,623.00

Option 1	Option 2	Option 3	Option 4	Option 5	Maintenance Level
Organic	CLS	CLS	CLS	CLS	Depot
Organic	Organic	CLS	CLS	CLS	General Support
Organic	Organic	Organic	CLS	CLS	Direct Support
Organic	Organic	Organic	Organic	CLS	Unit
				$7,237,623.00	
				$7,456,707.00	
				$ UNKNOWN	
				$7,290,438.00	
				$7,226,026.00	

Table 2.0

QRMP Maintenance Option Total Costs

4.0 Conclusions

a. The total CLS support is $11,597.00 more than the total Organic support over the 20 year operational life of the system. This is an average of $580.00 per year.

b. There is not an appreciable cost difference between CLS and Organic support.

c. The U.S. Army will be risking battlefield support if a contractor is chosen to provide maintenance support for the QRMP.

d. The U.S. Army has the technical capability and support to provide maintenance to the QRMP on the battlefield.

5.0 Recommendations

a. A contractor provide Interim Contractor Support for FY-94(95).

b. During FY-94(95), the Army implement a combination of organic support and contractor support to be functional at the start of FY-95(96).

c. Implementation of the combined support consisting:

(1) operator/crew Preventive Maintenance Checks and Services (PMCS) performed by the 81-Q MOS,

(2) unit-level maintenance is non-applicable,

(3) direct and general support maintenance performed by the 29-J MOS, and

(4) depot support maintenance performed by the contractor.

d. Add the repair of the digitizer and plotter in the Digital Topographic Support System (DTSS) to the 29-J MOS.

e. The 29-J MOS be familiarized or trained to repair the CHS-II components.

6.0 Bibliography.

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