LEVEL II

PRESENTATION TO THE
THE SIXTEENTH ANNUAL
DEPARTMENT OF DEFENSE COST ANALYSIS SYMPOSIUM

TITLE: COST/COST EFFECTIVENESS ANALYSIS

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TABLE OF CONTENTS

Division 86 (Div 86)

Cost/Cost Effectiveness Analysis

1. PURPOSE. This report provides cost and cost effectiveness analyses for the two heavy division alternatives examined in the Division 86 (Div 86) study. Twenty-year force costs for both divisions are displayed and compared in the cost analysis. The cost effectiveness analysis develops relative effectiveness measures from war gaming results to be compared with relative costs. All results are based on force modernization to the 1986 timeframe.

2. GENERAL.

a. Methodology.

(1) The methodology for this cost effectiveness analysis is based on variable cost, variable effectiveness. This methodology compares the measured change in effectiveness between forces with the measured change in cost. A desirable feature of this methodology is that those costs common to both forces being examined have no effect so that those effects brought about by differences in the force structure are what is measured.

(2) The cost data used in this report are in current FY80 dollars. Force costs for a 20-year period are developed by multiplying the annual recurring cost by 20 and adding the nonrecurring costs. Cost data is taken from the Force Cost Information System (FCIS).

(3) Research and development costs are not considered in this report. The costs compared in this analysis are for two heavy division organizations equipped with the same 1986-timeframe equipment. The delta cost methodology negates the effect of equipment research and development costs since they are the same for both alternatives.

(4) The cost of wartime reserve stockage of ammunition is not included in this report. The inclusion of such costs in the peacetime force costs developed is desirable. However, ammunition rate data for a number of new systems to be fielded in the 1986 timeframe are not available.

b. Cost Model. The Force Cost Information System (FCIS) was chosen for use in the development of force costs in support of this study. The FCIS is an automated system used in developing the resource requirements for any given force structure pertaining to: (1) procurement; (2) operations and maintenance, Army (OMA); and (3) military personnel, Army (MPA). Force costs can be developed for any size force from company size to division size for combat, combat support, and combat service support units. Conceptual forces can be costed based on the use of conceptual TOE and require the development of cost data for each conceptual line item of equipment included in the TOE.

c. Organizational Alternatives.

(1) The two organizational alternatives considered in this report are: (1) the current heavy division (H-series TOE) with equipment updated for the 1986 timeframe and designated as the C-series, and (2) the objective heavy division configured for the 1986 timeframe and designated as the S-series.

(2) Force costing of both divisions was accomplished by costing the major commands, battalions, squadrons and separate companies making up the division. These units are listed in table 1 for the C-series division and in table 2 for the S-series. Also shown are the Standard Requirements Code (SRC) number as well as the quantity of each type unit in the division.

(3) There is, with one exception, a one-to-one match up of type major units in the two divisions, although the internal organization of corresponding units may differ significantly. The exception is the cavalry squadron in the C-series division which has no corresponding type major unit under the S-series organization. The S-series does have a cavalry squadron within its air cav attack brigade (ACAB), as shown in table 2, which is compared to the C-series cavalry squadron in this analysis.

(4) The numbers of major weapon systems in the two divisions are compared in table 3.

d. TOE Development.

(1) The Div 86 cost analysis was by necessity tied to the development of new TOE for the C- and S-series heavy divisions. These TOE, developed by the responsible schools and centers, were input to the TOE data files maintained at the Data Processing Field Office (DPFO) at Ft Leavenworth, Kansas. The Force Design Directorate (FDD) of CACDA reviewed these TOE to establish their validity prior to shipment to the US Army Management Systems Support Agency (USAMSSA) for entry on the FCIS master file. Once entered on the FCIS master file, the TOE were modified to conform to the FCIS system as, for example, by changing the officer MOS back to the old MOS file used in the FCIS. Initial runs were made as a check of the completeness of the FCIS data files and to insure that the TOE were correct. Equipment and MOS/grades for which costs did not exist were identified and substitutions found.

(2) The C-series TOE serves as a base case for this analysis in that it is essentially an upgraded version of the current heavy division TOE. The S-series (objective division) TOE are the conceptual Div 86 organizations developed by task forces within TRADOC. Configuring this S-series organization to best utilize all the weaponry that will be in the

Table 1. C-SERIES FORCE UNITS COSTED

UNIT NAME	SRC NO	NO. OF UNITS
Div HHC	17004C000	1
MP Co	19017C710	1
Aviation Bn	17085C700	1
HHC	17086C700	(1)
Atk Hel Co	17387C720	(2)
Cmbt Spt Avn Co	57057C320	(1)
Div Avn Co	17087C000	(1)
Tam Co	55424C000	(1)
Signal Bn	11035C800	1
Engineer Bn	05145C720	1
Bde HHC	17042C000	3
Cavalry Sqdn	17105C020	1
NBC Co	03087C700	1
CEWI Bn	30165C820	1
Div Arty	06300C000	1
Division Spt Cmd	29021C000	1
ADA Bn	44325C000	1
Inf Bn, Mech	07045C600	5
Tank Bn	17035C010	6

Table 2. S-SERIES FORCE UNITS COSTED

UNIT NAME	SRC NO	NO OF UNITS
Div HHC	17204S600	1
MP Co	19217S600	1
Air Cav Atk Bde	17201S610	1
HHC	17202S600	(1)
Atk Hel Bn	17275S600	(2)
Cbt Spt Avn Bn	01285S610	(1)
Cav Sqdn	17205S610	(1)
Signal Bn	11035S610	1
Engineer Bn	05245S600	1
Bde HHC	17242S600	3
Division Arty	06200S600	1
NBC Co	03387S600	1
Division Spt Cmd	29221S710	1
ADA Bn	44275S600	1
CEWI Bn	34265S600	1
Inf Bn, Mech	07245S600	4
Tank Bn	17235S600	6

Table 3. SELECTED MAJOR WEAPON SYSTEMS

SYSTEM	C-SERIES QUANTITY	S-SERIES QUANTITY	DIFFERENCE (S-C)
XM-1	360	348	-12
IFV	210	216	+6
ITV	90	48	-42
CFV	116	129	+13
107mm MORTAR	53	0	-53
I-81mm MORTAR	45	66	+21
OH-58	46	54	+9
AAH	43	50	+7
UH-1/UH-60	40	30	-10
EH-1/EH-60	3	12	+9
155mm HOW SP	72	72	0
8" HOW SP	12	16	+4
MLRS SP	9	9	0
ROLAND	24	0	-24
DIVAD GUN	24	36	+12
CHAPARRAL	24	24	0
STINGER	62	73	+11

force by 1986 was the purpose of the Div 86 effort. Both sets of TOE were updated to reflect 1986 equipment and personnel requirements

(3) It is not possible to include all known materiel and personnel changes to the TOE because:

(a) Some items to be available in 1986 have not been defined other than in materiel need documents. This problem impacts primarily on items that support major materiel or personnel actions. For example, many tool kits, test equipment items, installation kits, etc., that support systems like the UTTAS, AAH, XM1, and DIVAD gun are not yet defined, or no BOIP or unit cost data are available. In these cases, where an appropriate current item is available, it is entered into the TOE to indicate the need for the preferred item; e.g., the current tool sets are substituted for any specialized tool sets to be developed for such equipment as the XM1, IFV/CFV, BLACKHAWK, etc.

(b) Some of the personnel changes caused by introduction of new materiel require establishment of new MOSC/ASI. These personnel changes cannot be placed in the TOE because the automated TOE system does not accept unapproved MOSC/ASI and no cost data are available on the new MOSC/ASI. An appropriate current MOSC/ASI is used in the TOE to approximate cost data. For example, the proposed MOSC for the XM1 tank turret mechanic is 45V, which is not accepted by the ADP system; so the TOE indicates that the tank turret mechanic MOSC is 45N, which is the current MOSC for the M60A1 turret mechanic.

3. Cost data.

a. Equipment costs.

(1) The development of force costs for a conceptual organization necessitates the development of cost data for each of the conceptual items of equipment in the force.

(2) The US Army Materiel Development and Readiness Command (DARCOM) was tasked to provide cost data for each of the conceptual items of equipment in the C- and S-series TOE forces. These costs were submitted to the OCA for inclusion in the FCIS equipment file. The OCA established priority of choice for the inclusion of cost data in the FCIS equipment files as follows:

(a) Cost data currently in the FCIS equipment file.

(b) Cost data developed/provided by DARCOM Headquarters.

(c) Cost data from the DARCOM Supply Bulletin (SB 700-20)

(3) There are 22 line items of equipment for which no cost data were available, either from DARCOM Headquarters or from SB 700-20.

(4) Appendix B contains tables showing the cost data taken from the DARCOM Supply Bulletin 700-20 and those items of equipment that were not costed.

b. Personnel Related Costs.

(1) Purpose. The cost data used in the development of the personnel related costs for this cost analysis are discussed here. The annual recurring and non-recurring cost data shown on the unit cost breakdown worksheets (appendices C and D) are developed from FCIS data sheets. These costs are not all-inclusive and are used to reflect those costs that are primarily personnel related.

(2) Discussion. All unit personnel costs presented in this report are based on outputs of the FCIS cost model. However, for most units of the S-series division, the personnel cost figures include a manual update of the FCIS cost results necessitated by changes in the number of personnel within those units. Consequently, the breakdown of personnel costs into the categories discussed below is not actually shown in this report although these are the type of costs included in personnel cost figures.

(a) Military personnel, Army (MPA) costs include both direct and indirect costs. MPA direct costs include military pay and allowances as well as PCS travel cost for the unit. MPA indirect costs for MOS training include the cost of training replacements and providing the replacements necessary to maintain the strength of a force unit at full TOE. In addition, this category includes the cost of separation travel and payments for unit personnel attrition from the active Army.

(b) Operations and maintenance, Army (OMA) costs are not clearly identified in the Army Force Planning Cost Handbook (AFPCH) or in the FCIS output. The OMA categories chosen as being representative of a force unit's personnel related costs are all in the indirect cost category. These OMA indirect cost categories, described below, were chosen on the basis of conversations with personnel at the OCA and are based on descriptions from the AFPCH.

1. OMA Program 8(M) - includes the medical costs of personnel accession and the variable costs of medical services that can be related to the military personnel of a force unit.

2. OMA Program 8(T) - includes the cost of individual training for basic branch as well as the OMA cost of replacement MOS training of unit personnel.

3. OMA Program 8 (0) - includes the personnel processing costs of accession of personnel as well as the variable cost of personnel support type activities; e.g., costs in Europe include the operation of schools for dependents.

4. OMA Program 9 - includes the administrative costs of accession of personnel as well as the administrative and associated activity costs that vary with strength changes.

(3) Personnel cost trends. An analysis of the personnel related costs in tables 5 and 6 shows that, in dollars, the total personnel cost of the S-series division is slightly (almost insignificantly) higher than for the C-series division. However, the personnel costs for the S-series accounts for 45% of the total cost for that division, which is less than 48% of the total C-series cost accounted for in personnel costs. These differences are of themselves not very significant and must be reviewed in relation to each type of force unit. HHC units, MP companies, and the support command are examples of personnel intensive units, and the personnel related costs can be as high as 77 percent of the unit's total cost. Equipment intensive units, on the other hand, may have as little as 30 percent of their total cost as personnel costs. Some examples are the ADA Battalion, the Aviation Battalion (C-series) or ACAB (S-series), and the Cavalry Squadron. The proportion of total cost taken up by personnel costs is a function of the type unit.

(4) MOS/grade substitution. A number of the MOS/grades used in the division force did not have cost data in the FCIS cost file. MOS/grade substitutions were therefore made in order to capture the average cost of personnel for each missing MOS/grade. The OCA provided the following information to be used in the substitution of MOS/grades for those not costed:

(a) All missing enlisted personnel MOS were changed to the 76Z series (Senior Supply Specialist).

(b) All missing warrant officer MOS were changed to the 761A series (General Supply Technician).

(c) All missing officer MOS were changed to the 1543 series (Infantry Heavy Mortar Unit Commander).

(5) Unit personnel cost adjustments. As previously noted, the TOE for the S-series division were continuously changing as decisions were made regarding the configuration of the units within that organization. Changes in personnel strengths for specific type units quite often represented simple transfers from one unit to another. There was a change in total personnel strength of less than 1 percent from the time the FCIS cost run was made until the final S-series organization, as reported on here, was approved. Therefore, the personnel costs recorded in this cost analysis for

the S-series division were arrived at through a manual adjustment of the FCIS costs. To make the adjustment, two sets of annual recurring and nonrecurring costs were obtained from OCA. For enlisted personnel, the nonrecurring cost was $8004 and the annual recurring cost was $17,953. For officers/warrant officers, the costs were $19,006 nonrecurring and $34,906 recurring. These average costs were multiplied by the number of personnel gained or lost from a unit and the result added to or subtracted from the FCIS costs.

4. FORCE COST COMPARISONS.

a. General

(1) Force costs for the C-series TOE heavy division were taken from the FCIS. S-series TOE heavy division costs were based on the FCIS but were manually adjusted to reflect changes made within its TOE. Costs are given in thousands of FY80 dollars unless otherwise specified. Each force was costed for the European theater at a 100 percent strength level for both personnel and equipment. The cost of each unit is shown as the 20-year total cost of fielding and supporting that unit. In addition, the 20-year personnel related costs are shown for each unit.

(2) C-series TOE unit cost breakdown worksheets corresponding to the units shown on table 1 appear in appendix C. Worksheets for S-series TOE costs corresponding to the units shown in table 2 are in appendix D.

b. Force Cost Comparisons. The summary comparisons of division costs and personnel strengths are shown in table 4. The total cost of the S-series division ($15,538,335,000) exceeds that of the C-series ($14,094,793,000) by 10 percent. In contrast, the personnel related costs for the S-series organization ($6,992,610,000) are only 3 percent more than the C-series ($6,804,671,000), which corresponds directly to the 3 percent increase in total personnel strength between the S- and C-series. Thus, nearly 87% of the $1,443,542,000 difference in total cost of the two divisions is in equipment and equipment related costs.

c. Force Cost Data. The following tables are provided on the force costs for the C-series heavy division and the S-series heavy division considered in the Div 86 study.

(1) Table 5, cost of C-series TOE. This table reflects the cost, by type unit, for the C-series division force. Data shown are total personnel, personnel related 20-year cost, total 20-year cost, and percent of total 20-year cost that is personnel related.

(2) Table 6, cost of S-series TOE. This table contains the same data as does table 5, but for the S-series, or objective division, force units.

Table 4. COST COMPARISON SUMMARY
THOUSANDS OF FY80 DOLLARS

	C-SERIES DIVISION	S-SERIES DIVISION	S COMPARED TO C
PERSONNEL STRENGTH (TABLE 7)	19,416	19,988	+ 572
TOTAL 20 YEAR FORCE COSTS (TABLE 8)	$ 14,094,793	$ 15,538,335	$ 1,443,542
PERSONNEL RELATED COSTS (TABLE 7)	$ 6,804,671	$ 6,992,610	$ 187,939
EQUIPMENT AND EQUIPMENT RELATED COSTS	$ 7,290,122	$ 8,545,725	$ 1,255,603

Table 5. HEAVY DIVISION
C SERIES TOE
THOUSANDS OF FY 80 CONSTANT DOLLARS

FORCE UNIT NAME		NO OF UNITS COSTED	TOTAL NO OF PERSONNEL	20 YEAR PERSONNEL RELATED COSTS	TOTAL 20 YEAR COST	PERSONNEL COST AS A % OF TOTAL
Div HHC	17004C000	1	186	$ 92,602	$ 119,658	77
MP Co	19017C710	1	197	64,476	90,238	71
Avn Bn	17085C700	1	1070	447,885	1,690,185	26
Cav Sqdn	17105C020	1	710	238,288	545,341	44
Signal Bn	11035C800	1	752	251,346	400,561	63
Engineer Bn	05145C720	1	974	309,974	561,377	55
Bde HHC	17042C000	3	324	135,537	189,825	71
NBC Co	03087C700	1	118	40,442	65,886	61
CEWI Bn	30165C820	1	767	320,374	907,450	35
Div Arty	06300C000	1	3345	1,103,744	2,053,121	54
Div Spt Cmd	29021C000	1	2881	1,073,341	1,448,535	74
Ada Bn	44325C000	1	665	228,414	754,278	30
Inf Bn, Mech	07045C600	5	4205	1,368,700	2,438,840	56
Tank Bn	17035C010	6	3222	1,129,548	2,829,498	40
TOTAL			19,416	$ 6,804,671	$ 14,094,793	48

Table 6. HEAVY DIVISION
S SERIES TOE
THOUSANDS OF FY 80 CONSTANT DOLLARS

FORCE UNIT NAME		NO OF UNITS COSTED	TOTAL NO OF PERSONNEL	20 YEAR PERSONNEL RELATED COSTS	TOTAL 20 YEAR COST	PERSONNEL COST AS A % OF TOTAL
Div HHC	17204S600	1	218	$ 110,691	$ 160,043	69
MP Co	19217S600	1	116	40,391	55,294	73
ACAB[1]	17201S610	1	1396	571,418	2,595,484	22
Cav Sqdn[2]	17205S610	1	625	229,667	597,282	38
Signal Bn	11035S610	1	799	264,191	470,829	56
Engineer Bn	05245S600	1	1083	352,740	661,139	53
Bde HHC	17242S600	3	414	164,703	267,447	62
Division Arty	06200S600	1	3522	1,164,501	2,236,536	52
Division Spt Cmd	29221S710	1	3325	1,172,928	1,779,265	66
NBC Co	03387S600	1	154	53,114	88,395	60
ADA Bn	44275S600	1	892	311,011	1,040,134	30
CEWI Bn	34265S600	1	488	207,923	392,233	53
Inf Bn, Mech	07245S600	4	3476	1,143,848	2,132,820	54
Tank Bn	17235S600	6	3480	1,205,484	3,061,434	39
TOTAL			19,988	$ 6,992,610	$ 15,538,335	45

Notes:

1. Data shown for ACAB does not include the Cav Sqdn.
2. Cav Sqdn is part of ACAB; data shown separately for comparison purposes.

Table 7. COST COMPARISON
PERSONNEL RELATED COSTS
THOUSANDS OF FY 80 CONSTANT DOLLARS

FORCE UNITS	C-series NO OF UNITS C	S	C-series COST	C-series NO OF PERSONNEL	S-series COST	S-series NO OF PERSONNEL	$ COMPARED TO C COST	$ COMPARED TO C NO OF PERSONNEL
DIV HHC	1	1	92,602	186	$ 110,691	218	$ 18089	+ 32
MP CO	1	1	64,476	197	40,391	116	-26437	- 81
NBC CO	1	1	40,442	118	53,114	154	12672	+ 36
AVN BN/ACAB[1]	1	1	447,885	1070	571,418	1396	123533	+326
CAV SQDN[2]	1	1	238,288	710	229,667	625	-8621	- 85
DIV ADA	1	1	228,414	665	311,011	892	82597	+227
DIV ARTY	1	1	1,103,744	3345	1,164,501	3522	60757	+177
BDE HHC	3	3	135,537	324	164,703	414	29166	+ 90
TANK BN	6	6	1,129,548	3222	1,205,484	3480	75936	+258
MECH INF BN	5	4	1,368,700	4205	1,143,848	3476	-224852	-729
SIG BN	1	1	251,346	752	264,191	799	12845	+ 47
CEWI BN	1	1	320,374	767	207,923	488	-112451	-279
ENG BN	1	1	309,974	974	352,740	1083	42766	+109
SUPPT COMD	1	1	1,073,341	2881	1,172,928	3325	99587	+444
TOTAL			$ 6,804,671	19,416	$ 6,992,610	19,988	$ +187,939	+572

NOTES: 1. Data shown for ACAB-(S-series) does not include Cav Sqdn.
2. Cav Sqdn is part of ACAB (S-series); shown separately here for comparison to Cav Sqdn (C-series).

Table 8. DIV 86 COST COMPARISON
TOTAL 20 YEAR COST
THOUSANDS OF FY80 CONSTANT DOLLARS

FORCE UNITS	NO OF UNITS C	NO OF UNITS S	C	S	S COMPARED TO C
DIV HHC	1	1	$ 119,658	$ 160,043	$ +40385
MP CO	1	1	90,238	55,294	-34944
NBC CO	1	1	65,886	88,395	+22509
AVN BN/ACAB[1]	1	1	1,690,185	2,595,484	+905299
CAV SQDN[2]	1	1	545,341	597,282	+51941
DIV ADA	1	1	754,278	1,040,134	+285856
DIV ARTY	1	1	2,053,121	2,236,536	+183415
BDE HHC	3	3	189,825	267,447	+77622
TANK BN	6	6	2,829,498	3,061,434	+231936
MECH INF BN	5	4	2,438,840	2,132,820	-306020
SIG BN	1	1	400,561	470,829	+70268
CEWI BN	1	1	907,450	392,233	-515217
ENG BN	1	1	561,377	661,139	+99762
SUPPT COMD	1	1	1,448,535	1,779,265	+330730
TOTAL			$ 14,094,793	$ 15,538,335	+$ 1,443,542

NOTES: 1. Data shown here for ACAB-(S-series) does not include Cav Sqdn.
2. Cav Sqdn now is part of ACAB (S-series); shown separately here for comparison to Cav Sqdn (C-series).

(3) Table 7, comparison of personnel related costs. This table shows differences, by type unit, in personnel and personnel related costs for the S-series division compared to the C-series division.

(4) Table 8, comparison of total costs. This table shows the difference, by type unit, in the total 20-year cost of the S-series division compared to the C-series division.

5. COST EFFECTIVENESS ANALYSIS BACKGROUND.

a. General.

(1) The cost effectiveness analysis develops comparisons of force cost measures, as presented above, to force effectiveness measures derived from war gaming results. In this variable cost, variable effectiveness type analysis, the comparison is of relative cost measures to corresponding relative effectiveness measures.

(2) The CACDA Scenarios and War Gaming Directorate (SWG) conducted the war games from which effectiveness measures for this analysis are derived. The Division War Game (DIVWAG) model was used to evalute the combat effectiveness of the S-series, or objective, and the C-series divisions in both defensive and an offensive role. The games are documented in two reports: DIVWAG, Division 86 Comparison of C-Series and Objective Divisions in the Defense (U), March 1980, SECRET; and DIVWAG Division-86 Comparison of C-Series and Objective Divisions in the Offense (U), June 1980, CONFIDENTIAL.

(3) The quantifiable effectiveness measures obtained from DIVWAG gaming results are based on raw measures of losses incurred and ammunition expended. These are measures primarily of combat power, or effectiveness, for the forces being gamed. Not directly, or quantitatively, measured from the game results are those many functions that must be performed to support a division's combat power. Command and control, communications, intelligence, logistical support, and mobility/countermobility are examples of battlefield functions for which quantitative measures of relative effectiveness cannot be computed for this analysis. Therefore, the analysis reported here does not attempt to derive measures of effectiveness for the entire division force. Rather, the effectiveness (and associated cost) comparisons include only those assets, or more precisely the units containing those assets, that contribute directly to the computed effectiveness measures.

(4) The battlefield functions considered in this cost effectiveness analysis are addressed in three categories. These are the target servicing function, the counterfire and interdiction functions, and the logistics support and reconstitution functions. Only the first two of these include specific measures of effectiveness computed from gaming results. The

logistics support/reconstitution functions are considered because there is a significant difference between organizations within the C- and S-series divisions that carry out these functions. However, only a subjective assessment of effectiveness is possible for this particular comparison.

b. Forces considered.

(1) This analysis considers only divisional units in both the cost and the effectiveness comparisons. The contribution of corps units, which is included in the SWGD results and analysis, is not entered into any of the comparisons made here. Each divisional unit included in this analysis fulfills two conditions:

(a) The unit contains assets which contributed to one of the three categories of battlefield functions for which effectiveness measures are developed.

(b) The unit has approximately the same level of "overhead" - e.g., command and control, maintenance - as a corresponding unit from the other division.

(2) The specific units considered in this analysis are listed in table 9 for each of the three battlefield function categories. The C-series, units listed remained constant in both configuration and cost throughout the defensive and the offensive games. Units from the S-series division, however, were continuously changing and thus were different in configuration, and therefore in cost, between the defensive game and the offensive game. In the ACAB units included under the target servicing category even the names of the units had changed. The S-series cavalry squadron was called a reconnaisance squadron at the time the DIVWAG games were run. A brief discussion of each category is given in the following paragraphs.

(a) Target servicing. Units under the target servicing category contain direct fire weapons, specifically tanks, TOW firing vehicles, and attack helicopters. The tank and mechanized infantry units are included at the major unit, or battalion, level since the units are comparable at that level. The major aviation units from the two divisions are not comparable under the conditions stated above. Thus only those units within the S-series ACAB and the C-series Aviation Battalion that have attack helicopters, or other direct fire, assets are considered for this analysis. The published SWGD reports previously referred to (paragraph 5.a.(2)) provide detailed descriptions of these units as they were gamed.

(b) Counterfire/interdiction. The DIVARTY unit from each division contains all of the indirect fire assets (howitzers, rocket launchers) that are included in this category. However, for comparison of cost, the target acquisition unit within each DIVARTY was excluded because those particular units are not comparable. The Target Acquisition Battalion of the S-series DIVARTY is considerably larger than the Target Acquisition

Table 9. Force Units Considered in Cost Effectiveness Analysis.

Target Servicing

C-Series		S-Series	
Unit Name	Number	Unit Name	Number
Tank Bn	6	Tank Bn	6
Mech Bn	5	Mech Bn	4
Cav Sqdn	1	Recon Sqdn[1]	1
AH Co	2	ACAS (defense)	2
		AH Bn (offense)	2

Counterfire/Interdiction

DIVARTY		DIVARTY	
HHB	1	HHB	1
FA Bn, 155 SP	3	FA Bn, 155 SP	3
FA Bn, 8"/GSRS	1	FA Bn, 8"/GSRS	1

Logistics Support/Reconstitution

DISCOM	1	DISCOM	1

1. The recon sqdn and the cav sqdn (table 2) are the same units.

Battery of the C-series DIVARTY. The larger S-series unit, however, does not necessarily represent an increase in the target acquisition assets within the division as compared to the C-series, but is the result of consolidating such assets into that one unit.

(c) Logistical support/reconstitution. The major unit for this category is the DISCOM. The S-series DISCOM has three brigade support battalions which do not exist within the C-series DISCOM as distinct units. It is this difference that is of interest in this analysis.

c. Weapon System Comparison. A comparison of major weapon systems in the forces played for the defensive games is given in table 10 and for the offensive games in table 11. The numbers of weapon systems shown are from the units listed in table 9. None of the corps assets played are included in this table.

6. COST/EFFECTIVENESS ANALYSIS.

a. General. The methodology used in this report is to compute a measure of relative effectiveness for two organizations and compare that to the relative cost. Three separate comparisons are made between the S-series and C-series divisions for the categories identified in paragraph 5.

b. Effectiveness Measures. The effectiveness measures used in this analysis are based on initial weapon system strengths and weapon system losses for the Blue and Red forces. Initial strength for all Red weapons was constant in each pair of games considered here. The data was obtained from results of the DIVWAG wargaming done in both an offensive and a defensive scenario. The loss exchange ratio (LER) is computed for each comparison as the ratio of Red force losses to Blue force losses. The effectiveness measure used to compute the relative effective value for the cost to effectiveness comparison is the force exchange ratio (FER). The FER, which relates the final force ratio to the initial force ratio (IFR), is calculated as the LER divided by the IFR. The ratio of the S-series FER to the C-series FER is then the relative effectiveness of the S-series to the C-series for a given comparison.

c. Target Servicing Comparisons.

(1) Defense. The target servicing combat effectiveness comparisons are given in table 12 with corresponding cost comparisons in table 13. In both tables, separate results are shown for tank/TOW vehicle (ground target servicing weapons) and for attack helicopters. The losses shown in table 12 include, for the Blue force, the total number of (divisional) weapons killed by all Red weapons throughout the game but for the Red force are only those weapons killed by the type Blue weapons indicated in the leftmost column. The results in table 12 and 13 would appear to demonstrate that the S-series is cost effective compared to the

Table 10. Selected Major Weapon Systems - Defensive Games

System	C-Series Quantity	S-Series Quantity	Difference (S - C)
XM1	360	348	- 12
IFV	205	227	22
ITV	90	48	- 42
CFV	116	101	- 15
AAH	36	48	12
155mm HOW SP	72	72	0
8" HOW SP	12	16	4
GSRS SP	9	9	0

Table 11. Selected Major Weapon Systems - Offensive Games

System	C-Series Quantity	S-Series Quantity	Difference (S - C)
XM1	360	348	- 12
IFV	205	227	22
ITV	90	48	- 42
CFV	116	101	- 15
AAH	36	50	14
155mm HOW SP	72	72	0
8" HOW SP	12	16	4
GSRS SP	9	9	0

C-series in its ground target servicing organizations but not in its air target servicing units. The tanks and TOW vehicles in the S-series were considerably more combat effective (25%) relative to the C-series while the corresponding relative cost decreased by 3 percent. The same comparisons for attack helicopters show a decrease of 3 percent in relative combat effectiveness and a 35 percent increase in relative cost. However, the gaming results and analysis documented in the SWG report show that the attack helicopters contributed a great deal to the increase in measured combat effectiveness of the ground systems. This phenonemon does show up in the relative effectiveness measures presented in table 12. The total target servicing relative effectiveness of 1.26 is better than that of the ground component only (1.25) even though the helicopter measure that was included in the total was less than 1 (0.97). The total target servicing comparison does indicate that the S-series is more cost effective with a 26 percent increase in effectiveness but only a 3 percent increase in cost of the associated units.

(2) Offense. The target servicing combat effectiveness results from the offensive games are given in table 14 and the associated cost data in table 15. Unlike the defensive case, no comparisons of the two divisions favor the S-series organization in the offense. The ground target servicing shows the S-series to be some 33 percent less effective than the C-series while the associated unit costs decreased by only 4 percent. While the effectiveness of the helicopters did increase somewhat under the S-series organization, the measured improvement of 16 percent does not match the 36 increase in associated costs. Overall, the target servicing combat effectiveness demonstrated by the S-series in the offensive role was not as good as the C-series although the relative cost of the S-series units again increased by 3 percent.

(3) Summary. The cost associated with target servicing units in the S-series division is 3 percent greater than the cost associated with the comparable units in the C-series division for both the offensive and the defensive games. DIVWAG gaming results show that the corresponding effectiveness for target servicing is 26 percent greater in a defensive role and 17 percent lower in an offensive operation. Thus, on the basis of this analysis, those units within the S-series division dedicated to the target servicing function are a cost effective alternative to the corresponding C-series units in the defense but not in the offense.

d. Counterfire/Interdiction Comparisons.

(1) Defense. Both the combat effectiveness and the cost results for the counterfire/interdiction comparisons between two divisions are given for the defensive games in table 16. All Blue artillery assets are included in the effectiveness results which includes 155mm and 8" howitzers and MLRS in both divisions (see table 10). Clearly, these assets proved to be more effective under the S-series division as compared to the C-series. Further,

Table 12. Target Servicing Combat Effectiveness Comparison for Defensive Games

C-Series Division

Type Blue Weapon	Red Losses	Blue Losses	LER
Tank/TOW Vehicles	451	481	0.94
Attack Helicopters	309	24	12.88
All Target Servicing	760	505	1.50

S-Series Division

Tank/TOW Vehicles	476	367	1.30
Attack Helicopter	357	38	9.39
All Target Servicing	833	405	2.06

S-Series vs C-Series

Relative Effectiveness Measure

Tanks/TOW Vehicles	Attack Helicopters	Total Target Servicing
1.25	0.97	1.26

Table 13. Target Servicing Unit Cost Comparisons for Defensive Games

(costs in millions of FY 80 dollars)

Type Unit	C-Series Division	S-Series Division	Difference (S-series - C-series)
Tank/TOW Vehicle	$ 5806	$ 5612	- $ 194
Attack Helicopter	1170	1582	+ 412
Total	$ 6976	$ 7194	+ $ 218

S-series vs C-series
Relative Cost Measure

	Tank/TOW Vehicle	Attack Helicopter	Total Target Servicing
Dollars	0.97	1.35	1.03
Personnel	0.95	1.29	0.96

Table 14. Target Servicing Combat Effectiveness Comparison for Offensive Games

C-Series Division

Type Blue Weapon	Red Losses	Blue Losses	LER
Tank/TOW Vehicle	96	442	0.22
Attack Helicopter	120	22	5.45
Total	216	464	0.47

S-Series Division

Tank/TOW Vehicle	65	419	0.16
Attack Helicopter	114	25	4.56
Total	179	444	0.40

S-Series vs C-Series Relative Effectiveness Measure

Tank/TOW Vehicles	Attack Helicopter	Total Target Servicing
0.67	1.16	0.83

Table 15. Target Servicing Unit Cost Comparisons for Offensive Games

(costs in millions of FY 80 dollars)

Type Unit	C-Series Division	S-Series Division	Difference (S-series - C-series)
Tank/TOW Vehicle	$ 5806	$ 5559	- $ 247
Attack Helicopter	1170	1596	+ 426
Total Target Servicing	$ 6976	$ 7155	+ $ 179

S-series vs C-series Relative Cost Measure

	Tank/TOW Vehicle	Attack Helicopter	Total Target Servicing
Dollars	0.96	1.36	1.03
Personnel	0.93	1.30	0.95

the relative effectiveness measure of 1.14 compares favorably with the 1.07 relative cost measure. The cost data shown include all the firing battery plus the headquarters and headquarters battery from each DIVARTY but excludes the target acquisition units which are not comparable units between the two forces.

(2) Offense. Results from the offensive games for counterfire/interdiction are summarized in table 17. Again, S-series counterfire/interdiction assets are more effective, here by 11 percent, than the C-series. The cost of the DIVARTY units considered in the S-series organization gamed in the offense was 6 percent greater than the comparable aggregate of C-series units. The comparison of relative effectiveness to relative cost favors the S-series organization for the counterfire/interdiction units.

(3) Summary. The effectiveness of the S-series counterfire/interdiction assets compared to the C-series was favorable in both the defense, with a relative measure of 1.14, and in the offense, 1.11. The increase in costs of associated units in both cases was less than the increase in effectiveness (1.07 relative cost for defense, 1.06 for offense). Thus, this analysis suggests that the S-series organization is more cost effective in its counterfire/interdiction capability.

e. Logistics support/reconstitution. The divisional unit considered in this paragraph is the DISCOM. The only quantifiable relative measure that is possible in this case is the relative cost. The DIVWAG games do not provide any results that can adequately measure the effectiveness of a DISCOM in providing logistics support and reconstitution to combat units. This particular comparison is included to relate, as much as possible, subjective evaluations of the brigade support battalion incorporated under the S-series organization to the measurable costs associated with it. The brigade support battalion is perceived as being considerably more effective in providing support to a maneuver brigade than is the forward area support coordinator (FASCO) concept in the C-series. Some idea of the cost involved in implementing this concept in the S-series DISCOM can be derived from table 8. The $1,779,265 thousand cost shown for the S-series DISCOM is 23 percent greater than the $1,448,535 thousand cost of the C-Series DISCOM. A comparison based on these costs may understate the difference since there are some assets in the C-series DISCOM that were excluded in the configuration of the S-series DISCOM. For example, the finance company that is in the C-series division is a corps function under the S-series organization. Thus, the S-series DISCOM is at least 23 percent greater in cost than the C-series DISCOM. On the other hand, the support functions provided by the DISCOM do not affect the effectiveness of only that unit, but, in fact, the entire division or at least the ground combat units of the division. In this light, the $331 million increase in cost of the S-series over the C-series DISCOM does not represent nearly as large of a relative increase. While it is not possible to numerically compute a

Table 16. Counterfire/Interdiction Effectiveness and Unit Cost Comparisons for Defensive Games.

Combat Effectiveness

	Red Losses	Blue Tube Losses	LER
C-series Game	397	29	13.69
S-series Game	390	26	15.00

S-series vs C-series Relative Effectiveness Measure = 1.14

(costs in millions of FY 80 dollars)

	C-Series Division	S-Series Division	Difference (S-series - C-series)	S-series vs C-series Relative Measure
20-Year Force Cost	$ 1868	$ 2002	$ 134	1.07
Personnel	3119	3222	103	1.03

Table 17. Counterfire/Interdiction Effectiveness and Unit Cost Comparisons for Offensive Games

Combat Effectiveness

	Red Losses	Blue Tube Losses	LER
C-series Game	166	11	15.09
S-series Game	177	11	16.09

S-series vs C-series Relative Effectiveness Measure = 1.11

Unit Cost & Personnel

(costs in millions of FY 80 dollars)

	C-series Division	S-series Division	Difference (S-series - C-series)	S-series vs C-series Relative Measure
20-year Force Cost	$ 1868	$ 1980	$ 112	1.06
Personnel	3119	3157	38	1.01

relative effectiveness for this comparison, the expected increase in effectiveness, albeit subjectively derived, would justify the additional cost associated with the brigade support battalions in the S-series DISCOM.

7. Summary.

a. Cost and Personnel. The S-series total cost of $15,538,335 thousand is 10 percent greater than the $14,094,793 thousand cost of the C-series. The total personnel strength of 19,998 for the S-series exceeds the 19,416 man C-series strength by 3 percent. Appromixately 87 percent of the $1,443,542 thousand increase in cost of the S-series force is associated with equipment.

b. Effectiveness. In a defense role, the S-series division exceeded the C-series by 26 percent in target servicing effectiveness and by 14 percent in counterfire/interdiction effectiveness. In the offense, the S-series target servicing falls 17 percent below that of the C-series while its counterfire/interdiction effectiveness remains above that of the C-series by 11 percent. Logistics support/reconstitution as provided in both the offense and defense by the brigade support battalions of the S-series DISCOM is qualitatively assessed as being more effective than the same functions as provided under the FASCO concept in the C-series DISCOM.

c. Cost/Effectiveness. The relative effectiveness of the S-series exceeds the associated relative cost in performing the target servicing function in a defense and in performing counterfire/interdiction functions for both offensive and defensive roles. The only case in which the S-series did not appear to be cost effective was for the target servicing function in an offensive role. Subjective evaluation suggets the S-series DISCOM is cost effective in its ability to provide logistics support/reconstitution when compared to the C-series.

APPENDIX A

(U) FCIS - COST MODEL DESCRIPTION

A-1. PURPOSE. This paper provides a description of the Force Cost Information System (FCIS). The FCIS is the cost model used in the development of force costs in support of Army force costing.

A-2. BACKGROUND.

a. The FCIS is maintained by the US Army Management Systems Support Agency (USAMSSA) under the control of the Office of the Comptroller of the Army (OCA). Access to the FCIS data bank at USAMSSA is via the Mohawk 2400 remote terminal.

b. The FCIS is an automated system used in developing the resource requirements for any given force structure pertaining to: (1) procurement; (2) operations and maintnenance. Army (OMA); and (3) military personnel, Army (MPA). Force costs can be developed for any size force from company size to division size for combat, combat support, and combat service support units. Conceptual forces can be costed based on the use of conceptual TOE and require the development of cost data for each new line item of equipment in the conceptual force.

c. The FCIS is designed to cost TOE force units in accordance with the equipment descriptions of these units found in the Army Master Data File. A Standard Requirement Code (SRC) is a unique alphanumeric code which identifies a given table of organization and equipment and is the basis of equipment, personnel, and supply cost computations. Programs included in the Force Cost Information System (FCIS) are:

(1) Program 1 - Strategic Forces. Operation of the U.S. Army safeguard weapons sytem.

(2) Program 2 - General Purpose Forces. Consists of general purpose force-oriented program elements including the command organizations associated with these forces, the logistics organizations organic to these forces, and the related support units which are deployed or deployable as constituent parts of military forces and field organizations.

(3) Program 7 (S) - Central Supply. Provides for supply depot operations, supply management operations, central procurement activities, base operations, command, second destination transportation, industrial preparedness, operations, and logistics support activities.

(4) Program 7 (M) - Depot Maintenance. Provides for depot level maintenance (to include installation of modification/conversion kits) of weapons/support systems and commodity group equipment. It also provides for maintenance support services, such as maintenance engineering and technical assistance, maintenance publications and new equipment training.

(5) Program 8 (T) - Training. Provides for the operation and maintenance of the Army school system and training activities to include training at civilian institutions, schools of other services and the preparation and distribution of training devices and publications.

(6) Program 8 (M) - Medical Activities. Provides for health service support of the Army and certain attendant activities such as health service administration. provision of health services in Army facilities, operation of medical service schools, training at "civilian" institutions, and other related health service activities.

(7) Program 8 (O) - Other Personnel Activities. Provides for recruiting activities, USA Recruiting Support Center, examining and entrance activities, USA Recruiting Support Center, examining and entrance activities, operation of reception stations, welfare and morale services, operation of disciplinary barracks, and other personnel support services. Also provides for central procurement of special services supplies and equipment, TDY of bands, Chief of Chaplains specialized services, and Army Education Centers.

(8) Program 9 - Administration and Associated Activities. Provides for the support and operation of departmental and major administrative headquarters, field commands and administrative activities (not elsewhere accounted for). Includes HQDA and HQMDW.

d. Cost data are developed for the following geographic locations: CONUS, Europe, Alaska and Pacific, and for any of the five different authorized levels of unit strength: i.e.:

STRENGTH LEVEL	1	100% Personnel and Equipment
	2	90% Personnel and/or Equipment
	3	80% Personnel and/or Equipment
	4	Cadre, Full Equipment
	5	Augmented with indigenous civilian personnel

(1) FCIS limitations include the following: (a) no consideration is given for inherited assets, (b) the annual operating costs are not valid for the first 2 years of operation that the unit is in the force, and (c) the non-recurring cost excludes the initial load of missiles and ammunition. Cost appropriations for Research Development Testing and Evaluation (RDT&E), Military Construction, Army (MCA), and war reserves are not provided. All costs are valid only when the total Army strength is from 600,000 to 1,000,000 people. Two FCIS assumptions are (a) charging each force unit with the full cost of all initial personnel procurement and training to produce full TOE trained strength in the unit, and (b) the annual operating costs are developed at the full TOE trained strength with full TOE equipment in a peacetime environment. Despite its limitations, the Force Cost Information System is the best automated cost data bank available for Army force costing. FCIS output is structured to provide cost data that includes one-time activation costs, annual recurring costs, operating costs, direct costs, and indirect costs.

e. Data provided includes the following:

(1) One-time activation costs include the buy of the unit or force equipment, training of personnel in required military occupational specialties, and deployability of equipment and personnel to specified locations.

(2) Annual recurring costs include the incremental costs of operating a planned unit of force for 1 year.

(3) Investment costs are the incremental costs to procurement appropriations.

(4) Operating costs are the incremental costs to the operation and maintenance appropriation and to the military pay appropriation.

(5) Direct costs are incremental costs that would be specifically identified with the unit, which includes the initial buy and replacement buy of unit equipment; the pay and allowances of unit personnel; supplies such as petroleum, oil, and lubricants, and repair parts used by the unit in operating and maintaining its equipment; and the ammunition and missiles fired during annual service practice.

(6) Indirect costs are incremental costs of activities that support the personnel and equipment of planned force units, including such things as individual military occupational specialty training, depot maintenance, medical installation, and administrative support of unit equipment.

f. For conceptual force units, the Office of Comptroller of the Army will provide, at the request of the analyst, a list of all equipment line items and MOS/grades in the force that are not on the FCIS data bank, for the TOE being costed.

(1) Cost data for the MOS/grades not in the data bank are replaced automatically with average MOS/grades that are equivalent to the (MOS/grade) skill level being replaced.

(2) Costs for line items of equipment that are not on the data bank are determined by substituting costs for similar pieces of equipment.

(3) The "Standard Price" on a per unit basis for an equipment line item number used in the FCIS system normally reflects all acquisition costs other than those financed by the RDT&E appropriation, to include first destination transportation. The weapon system unit cost definition most nearly describing these prices is "flyaway (rollaway) costs", which include hardware costs, initial production facilities, and related G&A and profit.

(4) The OCA provides the following costs used in the FCIS data bank:

(a) Procurement costs in constant FYXX dollars.

(b) OMA costs in constant FYXX dollars.

(c) MPA costs in constant FYXX dollars.

g. The sources of FCIS costs should be separated for discussion into two cost areas, personnel and equipment.

(1) Personnel related costs. Personnel costs for pay and allowances are taken from the President's current budget. Training costs for personnel are taken from the TRADOC comptroller study on training. These costs are used to update the FCIS personnel data file. The cost data used in this paper for the development of personnel related costs include MPA (direct and indirect) and OMA (indirect) costs. These costs are not all inclusive but are used to reflect those costs that are primarily personnel related. The annual recurring and non-recurring cost data for each appropriation category are taken from the FCIS data sheets. A more complete discussion of the MPA and OMA personnel cost categories is as follows:

(a) Military personnel, Army (MPA) costs are clearly identified on the FCIS data sheets. These costs are reported as direct and as indirect costs. MPA direct costs include military pay and allowances as well as PCS travel costs for the unit. MPA indirect costs for MOS training include the cost of training replacements and providing the replacements necessary to maintain the strength of a force unit at full TOE. In addition, this category includes the cost of separation travel and payments for unit personnel attrition from the active Army.

(b) Operations and maintenance, Army (OMA) costs which are personnel related are not clearly identified in the Army Force Planning Cost Handbook (AFPCH) or in the FCIS data sheets. The following OMA categories chosen as being representative of a force unit's personnel related costs are all in the indirect cost category and were selected on the basis of conversations with personnel at the OCA and are based on the descriptions reported in the AFPCH, as previously described in this paper.

1. OMA Program 8(H) - provides for health service support of the Army and certain attendant activities such as health service administration, provision of health services in Army facilities, operation of medical service schools, training at "civilian" institutions, and other related health service activities.

2. OMA Program 8(T) - provides for the operation and maintenance of the Army school system and training activities to include training at civilian institutions, schools of other services and the preparation and distribution of training devices and publications.

3. OMA Program 8(C) - provides for recruiting activities USA Recruiting Support Center, examining and entrance activities, operation of reception stations, welfare and morale services, operation of disciplinary

barracks, and other personnel support services. Also provides for central procurement of special services supplies and equipment, TDY of bands, Chief of Chaplains specialized services, and Army Education Centers.

4. OMA Program 9 - provides for the support and operation of departmental and major administrative headquarters, field commands and administrative activities (not elsewhere accounted for). Includes HQDA and HQMDW.

(2) Equipment costs. The development of force costs for a conceptual organization necessitates the development of cost data for each of the conceptual items of equipment in the force. The program objective memorandum (POM) procurement data base is used as the source of unit prices for those lines of equipment contained in the POM. The POM will not include equipment that exists in the force and is no longer being procured. The US Army Materiel Development and Readiness Command (DARCOM) is tasked to provide cost data for each of the conceptual items of equipment in the TOE forces. These costs are provided to the OCA for inclusion in the FCIS equipment file. The OCA establishes priority of choice for the inclusion of cost data in the FCIS equipment files as follows:

(a) Cost data currently in the FCIS equipment file.

(b) Cost data developed/provided by DARCOM Headquarters.

(c) Costs for all other items of equipment are derived from DARCOM supply bulletin (SB) 700-20 and then adjusted to current year dollars. The costs in (SB) 700-20 may differ from the costs in the POM since (SB) 700-20 reports either the cost of an item of equipment when it was last purchased or the projected cost of buying, by the Army.

(d) There normally will be line items of equipment for which cost data is not available, either from DARCOM Headquarters or from (SB) 700-20. If the equipment is significant from a cost viewpoint, then an appropriate equipment line item substitution should be made.

(3) Summary. Analysis of personnel cost trends show that MMC units, MP companies and the support command are personnel intensive units whose personnel related costs can be as high as 75 percent of the units total cost. Units that are equipment intensive include the combat aviation battalion, armored cavalry squadrons and the ADA battalions. The personnel related costs of these units can be as low as 40 percent of the unit's total cost. The effect of personnel costs on the total force/unit cost is a function of the type force/unit.

APPENDIX B

EQUIPMENT COST DATA

B-1. PURPOSE. This appendix provides the status of cost data for those line items of equipment not currently in the FCIS equipment file.

B-2. SCOPE. The following tables show the equipment line items costs that were extracted from the Supply Bulletin 700-20. Equipment line items for which no cost data were available are summarized by division.

B-3. TABLES. A list of tables in this appendix follows:

TABLE B-I

DIVISION 86

EQUIPMENT LINE ITEMS COST DATA TAKEN FROM SB 700-20

LINE ITEM NUMBER	COST CONSTANT FY 80	DESCRIPTION
L40063	7000	Laser Infrared Observation Set: AN/GVS-5.
R38349	38924	Radio Set: AN/PRC-70
T38720	107	Tool Kit Fire Direction Arty remote Eqpt: TK-224/GSG-10v
Z18880	1500	Control Sensor Dispenser: C-10437 ( )/GSQ
Z41551	1006000	Maintenance Support Facility (DS):
Z50298	2405	Test Set Radio Frequency Power: TS-3793/U.
Z64973	659000	Satellite Communications Terminal: AN/TSC-93.
Z73620	7400	Signal Generator: SG-112 (V) 1/U.
Z83707	23580	Test Set Instrument Display System Bench P/N476-854.

TABLE B-II

DIVISION 86

Summary of Equipment Not Costed

C-Series Division

LIN	QUANTITY	NOMENCLATURE
Z04815	1	Amplifier-power adapter: Vehicular HYP-67/TSEC
Z16482	2	Satellite Communications Terminal: AN/TSC-85(V)2(S52242)
Z20148	3	Crane Maintenance Portable
Z39449	5	Const. Eqmt Loader Section: XM954 FAMECE
Z83708	2	Test Set Instrument Display Sys Bench P/N476-854
Z95435	15	Vehicle Resupply Self-Loading: (GSRS)

S-Series Division

I13157	5	Card Punch Machine: ADPE
I19168	4	Converter Card/Tape: ADPE Punch Card Machine
I20537	1	Data converter: ADPE Analog to digital
I23141	1	Display Equipment: ADPE
I35210	1	Interpreter: APDE
I74660	2	Card Sorter: ADPE
Z10959	2	Battery Box: CY-/USO
Z16482	2	Satellite Communications Terminal: AN/TSC-85(V)2 (S52242)
Z27592	1	Firefinder DS Cable Adapter Tool Kit
Z27598	1	Firefinder DS Tool Kit:
Z35149	1	Interface Test Processor Radar: TS-2973/APS-940
Z35204	19	Interim Tactical Facsimile: AN/GXC-7A
Z65658	214	Self-Contained Land Navigation Subsystem:
Z73874	1	Single Band Plug-in: HP 86230B-H80
Z76747	1	Sweep Oscillator: HP 8620C
Z83073	1	Test Set Electronics System: AN/ASM-338

APPENDIX C

C-Series Division Force Costs

C-1. PURPOSE. This appendix displays the costs of each of the force unit TOE used in the development of the C-series TOE force. These force unit TOE costs do not include any provision for unexpended R&D costs for the new weapon systems that are part of the force. The cost of wartime reserve stockage of ammunition is also not included.

C-2. SCOPE. The cost data presented in this appendix are stated in constant FY 80 dollars. The costs for these C-series TOE units are extracted from the FCIS. Unit costs were modified to add high cost impact equipment, one million dollars or more. All unit costs are calculated on the basis of a single unit and on the total number of units in the force. The tables in this appendix are provided for the units that make up the C-series heavy division. All tables are for both the defensive and offensive forces unless otherwise noted.

TABLE	UNIT	SRC NO.
C-1	Div Recap	17000C010
C-2	Div HHC	17004C000
C-3	MP Co	19017C710
C-4	Avn Bn	17085C700
C-5	Signal Bn	11035C800
C-6	Engineer Bn	05145C720
C-7	Bde HHC (3)	17042C000
C-8	Cav Sqdn	17105C020
C-9	NBC Co	03087C700
C-10	CEWI Bn	30165C820
C-11	DIVARTY	06300C000
C-12	Div Support Cmd	29021C000
C-13	ADA Bn	44325C000
C-14	Mech Inf Bn (5)	07045C600
C-15	Tank Bn (6)	17035C010

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-1

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DIVISION RECAP

SRC NUMBER 17000C010

NUMBER OF PERSONNEL OFF.	1,199
WO.	319
EN.	17,898
TOTAL	19,416

PERSONNEL RELATED COSTS:

NON RECURRING COST	245,951
ANNUAL RECURRING COST	327,936
20 YEAR PERSONNEL RELATED COST	$ 6,804,671

TOTAL UNIT COSTS:

NON RECURRING COST	2,242,973
ANNUAL RECURRING COST	592,590
20 YEAR UNIT COST	$ 14,094,773

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-2

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DIV HHC

SRC NUMBER 17004C000

NUMBER OF PERSONNEL OFF.	63
WO.	2
EN.	121
TOTAL	186

PERSONNEL RELATED COSTS:

NON RECURRING COST	3,122
ANNUAL RECURRING COST	4,474
20 YEAR PERSONNEL RELATED COST	$ 92,602

TOTAL UNIT COSTS:

NON RECURRING COST	8,118
ANNUAL RECURRING COST	5,577
20 YEAR UNIT COST	$ 119,658

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-3

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME MP CO

SRC NUMBER 19017C710

NUMBER OF PERSONNEL OFF.	9
WO.	0
EN.	188
TOTAL	197

PERSONNEL RELATED COSTS:

NON RECURRING COST	2,196
ANNUAL RECURRING COST	3,114
20 YEAR PERSONNEL RELATED COST	$ 64,476

TOTAL UNIT COSTS:

NON RECURRING COST	5,678
ANNUAL RECURRING COST	4,228
20 YEAR UNIT COST	$ 90,238

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-4

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME AVN BN

SRC NUMBER 17085C700

NUMBER OF PERSONNEL OFF.	72
WO.	174
EN.	824
TOTAL	1,070

PERSONNEL RELATED COSTS:

NON RECURRING COST	28,525
ANNUAL RECURRING COST	20,968
20 YEAR PERSONNEL RELATED COST	$ 447,885

TOTAL UNIT COSTS:

NON RECURRING COST	480,885
ANNUAL RECURRING COST	60,465
20 YEAR UNIT COST	$ 1,690,185

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-5

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME SIGNAL BN

SRC NUMBER 11035C800

NUMBER OF PERSONNEL OFF.	28
WO.	5
EN.	719
TOTAL	752

PERSONNEL RELATED COSTS:

NON RECURRING COST	9,266
ANNUAL RECURRING COST	12,104
20 YEAR PERSONNEL RELATED COST	$ 251,346

TOTAL UNIT COSTS:

NON RECURRING COST	45,161
ANNUAL RECURRING COST	17,770
20 YEAR UNIT COST	$ 400,561

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-6

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME ENGINEER BN

SRC NUMBER 05145C720

NUMBER OF PERSONNEL OFF.	41
WO.	3
EN.	930
TOTAL	974

PERSONNEL RELATED COSTS:

NON RECURRING COST	8,994
ANNUAL RECURRING COST	15,049
20 YEAR PERSONNEL RELATED COST	$ 309,974

TOTAL UNIT COSTS

NON RECURRING COST	79,297
ANNUAL RECURRING COST	24,104
20 YEAR UNIT COST	$ 561,377

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-7

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME BDE HHC (3)

SRC NUMBER 17042C000

NUMBER OF PERSONNEL OFF.	23	3 UNITS
WO.	1	
EN.	84	
TOTAL	108	324

PERSONNEL RELATED COSTS:

NON RECURRING COST	1,579	
ANNUAL RECURRING COST	2,180	
20 YEAR PERSONNEL RELATED COST	$ 45,179	$ 135,537

TOTAL UNIT COSTS:

NON RECURRING COST	5,395	
ANNUAL RECURRING COST	2,894	
20 YEAR UNIT COST	$ 63,275	$ 189,825

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-8

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME	CAV SQDN
SRC NUMBER	17105C020

NUMBER OF PERSONNEL OFF.	31
WO.	2
EN.	677
TOTAL	710

PERSONNEL RELATED COSTS:

NON RECURRING COST	8,868
ANNUAL RECURRING COST	11,471
20 YEAR PERSONNEL RELATED COST	$ 238,288

TOTAL UNIT COSTS:

NON RECURRING COST	97,901
ANNUAL RECURRING COST	22,372
20 YEAR UNIT COST	$ 545,341

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-9

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME NBC CO

SRC NUMBER 03087C700

NUMBER OF PERSONNEL OFF.	4
WO.	0
EN.	114
TOTAL	118

PERSONNEL RELATED COSTS:

NON RECURRING COST	1,522
ANNUAL RECURRING COST	1,946
20 YEAR PERSONNEL RELATED COST	$ 40,442

TOTAL UNIT COSTS:

NON RECURRING COST	6,946
ANNUAL RECURRING COST	2,947
20 YEAR UNIT COST	$ 65,886

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-10

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME	CEWI BN
SRC NUMBER	30165C820

NUMBER OF PERSONNEL OFF.	46
WO.	37
EN.	684
TOTAL	767

PERSONNEL RELATED COSTS:

NON RECURRING COST	17,594
ANNUAL RECURRING COST	15,139
20 YEAR PERSONNEL RELATED COST	$ 320,374

TOTAL UNIT COSTS:

NON RECURRING COST	116,550
ANNUAL RECURRING COST	39,545
20 YEAR UNIT COST	$ 907,450

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-11

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DIVISION ARTY

SRC NUMBER 06300C000

NUMBER OF PERSONNEL OFF.	228
WO.	18
EN.	3,099
TOTAL	3,345

PERSONNEL RELATED COSTS:

NON RECURRING COST	33,844
ANNUAL RECURRING COST	53,495
20 YEAR PERSONNEL RELATED COST	$ 1,103,744

TOTAL UNIT COSTS:

NON RECURRING COST	270,281
ANNUAL RECURRING COST	89,142
20 YEAR UNIT COST	$ 2,053,121

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-12

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DISCOM

SRC NUMBER 29021C000

NUMBER OF PERSONNEL OFF.	159
WO.	46
EN.	2,676
TOTAL	2,881

PERSONNEL RELATED COSTS:

NON RECURRING COST	36,081
ANNUAL RECURRING COST	51,863
20 YEAR PERSONNEL RELATED COST	$ 1,073,341

TOTAL UNIT COSTS:

NON RECURRING COST	121,135
ANNUAL RECURRING COST	66,370
20 YEAR UNIT COST	$ 1,448,535

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-13

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME ADA BN

SRC NUMBER 44325C000

NUMBER OF PERSONNEL OFF.		38
	WO.	7
	EN.	620
	TOTAL	665

PERSONNEL RELATED COSTS:

NON RECURRING COST	7,594
ANNUAL RECURRING COST	11,041
20 YEAR PERSONNEL RELATED COST	$ 228,414

TOTAL UNIT COSTS:

NON RECURRING COST	132,758
ANNUAL RECURRING COST	31,076
20 YEAR UNIT COST	$ 754,278

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-14

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME INF BN, MECH (5)

SRC NUMBER 07045C600

NUMBER OF PERSONNEL OFF.	39	5 UNITS
WO.	2	
EN.	800	
TOTAL	841	4,205

PERSONNEL RELATED COSTS:

NON RECURRING COST	8,420	
ANNUAL RECURRING COST	13,266	
20 YEAR PERSONNEL RELATED COST	$ 273,740	$ 1,368,700

TOTAL UNIT COSTS:

NON RECURRING COST	61,868	
ANNUAL RECURRING COST	21,295	
20 YEAR UNIT COST	$ 487,768	$ 2,438,840

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE C-15

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME TANK BN (6)

SRC NUMBER 17035C010

NUMBER OF PERSONNEL OFF.	36	6 UNITS
WO.	2	
EN.	499	
TOTAL	537	3,222

PERSONNEL RELATED COSTS:

NON RECURRING COST	6,918	
ANNUAL RECURRING COST	9,067	
20 YEAR PERSONNEL RELATED COST	$ 188,258	$ 1,129,548

TOTAL UNIT COSTS:

NON RECURRING COST	92,123	
ANNUAL RECURRING COST	18,973	
20 YEAR UNIT COST	$ 471,583	$ 2,829,498

APPENDIX D

S-Series Division Costs

D-1. PURPOSE. This appendix displays the costs of each of the force unit TOE used in the development of the S-series TOE force. These force unit TOE costs do not include any provision for unexpended R&D costs for the new weapon systems that are part of the force. The cost of wartime reserve stockage of ammunition is also not included.

D-2. SCOPE. The cost data presented in this appendix are stated in constant FY 80 dollars. The costs for these T-series TOE units are extracted from the FCIS. Unit costs were modified to add high cost impact equipment, one million dollars or more. All unit costs are calculated on the basis of a single unit and on the total number of units in the force. The tables in this appendix are provided for the units that make up the S-series heavy division. All tables are for both the defensive and offensive forces unless otherwise noted.

TABLE	UNIT	SRC NO.
D-1	Div Recap	17000S610
D-2	Div HHC	17204S600
D-3	MP Co	19217S600
D-4	Air Cav Atk Bde	17201S601
D-5	Cav Sqdn	17205S610
D-6	Signal Bn	11435S600
D-7	Engineer Bn	05245S600
D-8	Bde HHC (3)	17242S600
D-9	DIVARTY	06200S600
D-10	NBC Co	03387S600
D-11	Div Support Cmd	29221S710
D-12	ADA Bn	44275S600
D-13	CEWI Bn	34265S600
D-14	Mech Inf Bn (4)	07245S600
D-15	Tank Bn (6)	17235S600

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-1

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DIV RECAP

SRC NUMBER 17000S610

NUMBER OF PERSONNEL OFF.	1,334
WO.	377
EN.	18,277
TOTAL	19,988

PERSONNEL RELATED COSTS:

NON RECURRING COST	253,590
ANNUAL RECURRING COST	336,951
20 YEAR PERSONNEL RELATED COST	$ 6,992,610

TOTAL UNIT COSTS:

NON RECURRING COST	2,619,935
ANNUAL RECURRING COST	645,920
20 YEAR UNIT COST	$ 15,538,335

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-2

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DIV HHC

SRC NUMBER 17204S600

NUMBER OF PERSONNEL OFF.	78
WO.	1
EN.	139
TOTAL	218

PERSONNEL RELATED COSTS:

NON RECURRING COST	4,751
ANNUAL RECURRING COST	5,297
20 YEAR PERSONNEL RELATED COST	$ 110,691

TOTAL UNIT COSTS:

NON RECURRING COST	15,163
ANNUAL RECURRING COST	7,244
20 YEAR UNIT COST	$ 160,043

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-3

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME MP CO

SRC NUMBER 19217S600

NUMBER OF PERSONNEL OFF.	6
WO.	0
EN.	110
TOTAL	116

PERSONNEL RELATED COSTS:

NON RECURRING COST	1,311
ANNUAL RECURRING COST	1,954
20 YEAR PERSONNEL RELATED COST	$ 40,391

TOTAL UNIT COSTS:

NON RECURRING COST	2,594
ANNUAL RECURRING COST	2,635
20 YEAR UNIT COST	$ 55,294

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-4

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME AIR CAV ATK BDE

SRC NUMBER 17201S601

NUMBER OF PERSONNEL OFF.	103
WO.	189
EN.	1,104
TOTAL	1,396

PERSONNEL RELATED COSTS:

NON RECURRING COST	32,958
ANNUAL RECURRING COST	26,923
20 YEAR PERSONNEL RELATED COST	$ 571,418

TOTAL UNIT COSTS:

NON RECURRING COST	621,904
ANNUAL RECURRING COST	98,679
20 YEAR UNIT COST	$ 2,595,484

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-5

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME	CAV SQDN
SRC NUMBER	17205S610

NUMBER OF PERSONNEL OFF.	41
WO.	27
EN.	557
TOTAL	625

PERSONNEL RELATED COSTS:

NON RECURRING COST	9,567
ANNUAL RECURRING COST	11,005
20 YEAR PERSONNEL RELATED COST	$ 229,667

TOTAL UNIT COSTS:

NON RECURRING COST	184,662
ANNUAL RECURRING COST	23,131
20 YEAR UNIT COST	$ 597,282

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-6

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME	SIGNAL BN
SRC NUMBER	11435S600

NUMBER OF PERSONNEL OFF.	29
WO.	6
EN.	764
TOTAL	799

PERSONNEL RELATED COSTS:

NON RECURRING COST	9,951
ANNUAL RECURRING COST	12,712
20 YEAR PERSONNEL RELATED COST	$ 264,191

TOTAL UNIT COSTS:

NON RECURRING COST	65,289
ANNUAL RECURRING COST	20,277
20 YEAR UNIT COST	$ 470,829

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-7

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME ENGINEER BN

SRC NUMBER 05245S600

NUMBER OF PERSONNEL OFF.	51
WO.	8
EN.	1,024
TOTAL	1,083

PERSONNEL RELATED COSTS:

NON RECURRING COST	10,580
ANNUAL RECURRING COST	17,108
20 YEAR PERSONNEL RELATED COST	$ 352,740

TOTAL UNIT COSTS:

NON RECURRING COST	100,139
ANNUAL RECURRING COST	28,050
20 YEAR UNIT COST	$ 661,139

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-8

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME BDE HHC (3)

SRC NUMBER 17242S600

NUMBER OF PERSONNEL OFF.	27	3 UNITS
WO.	0	
EN.	111	
TOTAL	138	414

PERSONNEL RELATED COSTS:

NON RECURRING COST	1,821	
ANNUAL RECURRING COST	2,654	
20 YEAR PERSONNEL RELATED COST	$ 54,901	$ 164,703

TOTAL UNIT COSTS:

NON RECURRING COST	10,869	
ANNUAL RECURRING COST	3,914	
20 YEAR UNIT COST	$ 89,149	$ 267,447

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-9

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DIVISION ARTY

SRC NUMBER 06200S600

NUMBER OF PERSONNEL OFF.	236
WO.	23
EN.	3,263
TOTAL	3,522

PERSONNEL RELATED COSTS:

NON RECURRING COST	35,881
ANNUAL RECURRING COST	56,431
20 YEAR PERSONNEL RELATED COST	$ 1,164,501

TOTAL UNIT COSTS:

NON RECURRING COST	311,516
ANNUAL RECURRING COST	96,251
20 YEAR UNIT COST	$ 2,236,536

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-10

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME NBC CO

SRC NUMBER 03387S600

NUMBER OF PERSONNEL OFF.	7
WO.	0
EN.	147
TOTAL	154

PERSONNEL RELATED COSTS:

NON RECURRING COST	2,014
ANNUAL RECURRING COST	2,555
20 YEAR PERSONNEL RELATED COST	$ 53,114

TOTAL UNIT COSTS:

NON RECURRING COST	10,275
ANNUAL RECURRING COST	3,906
20 YEAR UNIT COST	$ 88,395

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-11

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME DISCOM

SRC NUMBER 29221S710

NUMBER OF PERSONNEL OFF.	192
WO.	59
EN.	3,074
TOTAL	3,325

PERSONNEL RELATED COSTS:

NON RECURRING COST	42,428
ANNUAL RECURRING COST	56,525
20 YEAR PERSONNEL RELATED COST	$ 1,172,928

TOTAL UNIT COSTS:

NON RECURRING COST	177,445
ANNUAL RECURRING COST	80,091
20 YEAR UNIT COST	$ 1,779,265

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-12

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME ADA BN

SRC NUMBER 44275S600

NUMBER OF PERSONNEL OFF.	50
WO.	9
EN.	833
TOTAL	892

PERSONNEL RELATED COSTS:

NON RECURRING COST	10,171
ANNUAL RECURRING COST	15,042
20 YEAR PERSONNEL RELATED COST	$ 311,011

TOTAL UNIT COSTS:

NON RECURRING COST	183,914
ANNUAL RECURRING COST	42,811
20 YEAR UNIT COST	$ 1,040,134

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-13

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME CEWI BN

SRC NUMBER 34265S600

NUMBER OF PERSONNEL OFF.	40
WO.	35
EN.	413
TOTAL	488

PERSONNEL RELATED COSTS:

NON RECURRING COST	10,023
ANNUAL RECURRING COST	9,895
20 YEAR PERSONNEL RELATED COST	$ 207,923

TOTAL UNIT COSTS:

NON RECURRING COST	75,733
ANNUAL RECURRING COST	15,825
20 YEAR UNIT COST	$ 392,233

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-14

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME INF BN, MECH (4)

SRC NUMBER 07245S600

NUMBER OF PERSONNEL OFF.	45	4 UNITS
WO.	2	
EN.	822	
TOTAL	869	3,476
PERSONNEL RELATED COSTS:		
NON RECURRING COST	8,982	
ANNUAL RECURRING COST	13,849	
20 YEAR PERSONNEL RELATED COST	$ 285,962	$ 1,143,848
TOTAL UNIT COSTS:		
NON RECURRING COST	73,165	
ANNUAL RECURRING COST	23,002	
20 YEAR UNIT COST	$ 533,205	$ 2,132,820

DIVISION 86

UNIT COST BREAKDOWN WORKSHEETS

TABLE D-15

THOUSANDS OF FY 80 CONSTANT DOLLARS

UNIT NAME TANK BN (6)

SRC NUMBER 17235S600

NUMBER OF PERSONNEL OFF.	40	6 UNITS
WO.	2	
EN.	538	
TOTAL	580	3,480

PERSONNEL RELATED COSTS:

NON RECURRING COST	7,094	
ANNUAL RECURRING COST	9,691	
20 YEAR PERSONNEL RELATED COST	$ 200,914	$ 1,205,484

TOTAL UNIT COSTS:

NON RECURRING COST	99,339	
ANNUAL RECURRING COST	20,545	
20 YEAR UNIT COST	$ 510,239	$ 3,061,434